

Information Sheet on Ramsar Wetlands (RIS) – 2009-2014 version

Available for download from http://www.ramsar.org/doc/ris/key_ris_e.doc and
http://www.ramsar.org/pdf/ris/key_ris_e.pdf

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).

Notes for compilers:

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 17, 4th edition).
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.

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

Queensland Department of Environment and Heritage
Protection
GPO Box 2454,
Brisbane, QLD 4001
Ph: +61 7 137 468
Email: info@ehp.qld.gov.au

FOR OFFICE USE ONLY.

DD MM YY

--	--	--

Designation date

--	--	--	--	--	--

Site Reference Number

2. Date this sheet was completed/updated:

1 January 2014

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.

Currawinya Lakes (Currawinya National Park)

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

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:

No post-nomination ecological character changes were identified for the Currawinya Lakes Ramsar site (BMT WBM, 2009). However, the draft ecological character description has identified wetland type Y (Freshwater Springs) to be present within the Ramsar site, which was not listed in the previous RIS. Current nomination criteria applicable to the Ramsar site remain analogous to the pre-1999 nomination criteria that were listed in the previous RIS. The site continues to meet Criteria 1, 2, 3, 4, 5 and 6.

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) (Attachment 1);
- 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 boundaries of the Currawinya Lakes Ramsar site are coincident with those of Currawinya National Park (in March 1992). Currawinya was gazetted as a national park (National Park 23) under the provisions of the *Queensland National Parks and Wildlife Act 1975* on 9 May 1991. The initial gazettal area was about 148,000 hectares. On 20 March 1992, a block of vacant Crown Land, which included Lake Wyara, was

added to the park. The boundary of the Ramsar wetland is the same as the 1992 gazetted boundary, and covers an area of 151,300 hectares.

A subsequent addition to the western side of the National Park on 28 November 2008, which increased the park area to 154,870 hectares, has not yet been reflected in a change to the Ramsar site boundary. Amendments to the Currawinya Lakes Ramsar site boundaries to make them consistent with the current gazetted Currawinya National Park will be considered.

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.

Approximate centre of the site: 28° 47' 36" S 144° 33' 09" E.

Approximate north-west corner - 28°39' 29.52" S 144°13' 18.48" E.

Approximate north-east corner – 28 ° 36' 24.4794" S 144°54' 44.2794" E.

Approximate south-west corner – 28 ° 59' 51.3594" S 144 ° 11' 51.3594" E.

Approximate south-east corner – 28 ° 54' 28.8" S 144 ° 34' 44.04" 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.

The Currawinya Lakes Ramsar site is located in the Paroo Drainage Basin within the Murray-Darling Drainage Division in the state of Queensland (estimated population 4,658,600 as of 30 June 2013). The western part of the site is located with the Bulloo Shire and the eastern part in the Paroo Shire. The nearest township is Hungerford, located approximately one kilometre from the southern boundary of the site (identified as a low count area, most recent available population estimate is 59 in the 2006 census).

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

Average: 135 metres above mean sea level.

Minimum: 116 metres above mean sea level.

Maximum: 192 metres above mean sea level.

11. Area: (in hectares)

Total area: 151,300 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.

The Currawinya Lakes Ramsar site is a mosaic, containing a river, dunefields, lakes, alluvial plains, claypans, salt pans, springs, creeks and deeply weathered ranges. It has some of the most diverse wetland types in inland Australia, with largely unmodified permanent and intermittent saline and freshwater wetlands, including the Great Artesian Basin springs. These artesian springs occur on the margins of the Great Artesian Basin as vents for the natural discharge of artesian water. The Great Artesian Basin is one of the largest artesian groundwater basins in the world. It underlies approximately one-fifth of Australia, covers a total area of over 1,711,000 square kilometres and has estimated total water storage of 64,900 million megalitres.

More than 70 artesian springs in five broad groups have been identified on the site, mostly in the Hoods Range area to the east of Lake Numalla, with isolated springs in low dunefields to the east and south of Lake Numalla. All spring groups except one contain both active and inactive mounded and non-mounded (water) springs.

The two largest water bodies within the Ramsar site, Lake Numalla and Lake Wyara, are markedly different. Lake Numalla, fed by the Paroo River via Carwarra Creek during floods, is fresh and turbid while, only three kilometres away, Lake Wyara is saline and generally clear. Lake Numalla is also a semi-permanent water body, having been dry three times since pastoral settlement, whereas Lake Wyara dries regularly and becomes a vast saltpan. Currawinya also contains two of just three permanent waterholes (Caiwarro and Corni Paroo) on the Paroo River downstream of Eulo.

The range of wetland habitats within the Ramsar site supports an array of native fauna, particularly an abundance and diversity of waterbird species. The Currawinya Lakes are of international significance as part of an inland route for migratory shorebirds from East Asia, providing important summer feeding areas. The water bodies support substantial waterbird breeding events (particularly for pelicans, gulls, terns, cormorants and swans), as well as providing refuge habitat in drought conditions for birds, amphibians, reptiles and native fish.

Numerous plant communities are found within Currawinya Lakes, with sandplains dominated by mulga and poplar box low open woodlands; gidgee and yapunyah woodlands on alluvial plains; mulga, bastard mulga, and turpentine mulga shrublands on the ranges and hills; and low, open shrublands and sedgelands on dunefields and claypans.

Currawinya Lakes is highly significant to local Indigenous communities for its archaeological, traditional and contemporary values. The site includes stone arrangements, native wells, scarred trees (trees with bark removed for canoes and shields), stone artefacts and burial grounds.

Contemporary use of the area is limited by its remote location. A number of nature-based, low-impact recreational activities occur within the site, including nature walks and drives, wildlife watching, camping, canoeing and fishing.

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 for the application of each Criterion listed in 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 1: *Wetland contains representative, rare or unique examples of a natural or near-natural wetland type found within the appropriate biogeographic region.*

The Currawinya Lakes Ramsar site, within the Murray-Darling Basin Drainage Division (Commonwealth of Australia (Bureau of Meteorology), 2012), contains a rich concentration of the diversity of wetland types that occur in inland Australia with a range of saline and freshwater lacustrine and palustrine features. These wetlands are in a relatively unmodified condition due to the natural hydrological regime that has been maintained on the Paroo River and the site's protected area status.

The site includes a rare wetland type, the Great Artesian Basin springs. The 23 spring areas (containing one or more springs) within Currawinya National Park are mostly located in the Hoods Range area to the east of Lake Numalla. This includes several spring groups in an area called 'The Granites' on the western fall of the range – characterised by large granite boulders. This area is dominated by inactive mound springs, but 14 active springs have been documented. Isolated springs, including the active Kaponyee and Bokeen springs, are located to the south of the main lakes.

The site is within the Mulga Lands bioregion (Commonwealth of Australia, 2012). The Mulga Lands bioregion is characterised by flat to undulating plains with strips of low hills. The dominant vegetation types are mulga and eucalypt woodlands. Currawinya Lakes was selected as one of the first protected areas within the Mulga Lands as it contains excellent examples of the vegetation of south-western Queensland.

Criterion 2: *Wetland supports vulnerable, endangered or critically endangered species or threatened ecological communities.*

The Great Artesian Basin springs within the Currawinya Lakes Ramsar site represent a unique ecological community that has a conservation status of nationally endangered under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). These springs occur where groundwater discharges naturally at margins or faultlines of the Great Artesian Basin. Each individual spring varies in shape, water flow, topographic and geographic location. The native species associated with the springs can include plants and animals that are endemic to one or more springs/wetlands, as well as those that occur more widely. The species are generally dependent on constant availability of water. No endemic species have been recorded from the artesian spring wetlands of Currawinya National Park; however groundwater scalds surrounding the springs contain large populations of the poached egg daisy (*Calocephalus* sp. Eulo M.E. Ballingall MEB2590). The poached egg daisy is restricted to small isolated populations between Eulo and Currawinya and is listed as near threatened under Queensland's *Nature Conservation Act 1992*.

One nationally threatened plant species is known to occur within the site, namely, regal pumpkin burr (*Sclerolaena walkeri*) that grows on the Paroo River floodplain throughout Currawinya and is listed nationally (and in Queensland) as vulnerable. Two fauna species listed as threatened nationally have been recorded on the site, this includes the Australian painted snipe (*Rostratula australis*), which is listed as nationally endangered (vulnerable within Queensland) and as a migratory species under the EPBC Act. Also recorded from the site is the silver perch (*Bidyanus bidyanus*), listed as critically endangered under the EPBC Act in 2013.

The species and ecological communities identified as vulnerable, endangered or critically endangered under national legislation (i.e. EPBC Act) and within international frameworks that are recorded on the site are summarised in the table below.

Common name	Scientific name	IUCN Red List*	CITES**	CMS***	EPBC Act****
Plants					
Regal pumpkin burr	<i>Sclerolaena walkeri</i>	-	-	-	vulnerable
Birds					
Australian Painted snipe	<i>Rostratula australis</i>	endangered	-	-	endangered
Fish					
Silver perch	<i>Bidyanus bidyanus</i>	vulnerable	-	-	critically endangered
Ecological Community					
Community of native species dependent on natural discharge of groundwater from the Great Artesian Basin		-	-	-	endangered

*International Union for the Conservation of Nature Red List of Threatened Species

**CITES – Convention on International Trade in Endangered Species of Wild Fauna and Flora

***CMS – Convention on the Conservation of Migratory Species of Wild Animals

****EPBC Act – *Environment Protection and Biodiversity Conservation Act 1999*.

Criterion 3: *Wetland supports populations of plants and/or animal species important for maintaining the biological diversity of a particular biogeographic region.*

The diversity of habitats provided by different wetland types within the Currawinya Lakes Ramsar site is critical in supporting a diversity of native fauna of the bioregion, particularly waterbirds that are supported by Lake Wyara, Lake Numalla, and the smaller lakes and floodplain wetlands. Of particular importance in maintaining biodiversity are the waterbodies that provide wildlife refuge habitat in drought conditions in this semi-arid environment.

No other wetlands in arid or southern Australia are thought to support such high numbers of waterbirds as consistently as Currawinya Lakes – see Criterion 5 (Kingsford and Porter, 1994). The Currawinya Lakes also form part of an inland route for migratory shorebirds – see Criterion 4.

Over 200 bird species have been recorded from the site. Lake Wyara supports large numbers of plant-eating birds, especially grey teal (*Anas gracilis*), freckled duck (*Stictonetta naevosa*) and Eurasian coots (*Fulica atra*). Australasian shovellers (*Anas rhynchos*), pink-eared ducks (*Malacorhynchus membranaceus*), black-winged stilts (*Himantopus himantopus*) and red-necked avocets (*Recurvirostra novaehollandiae*) have also been observed on the site. In Lake Numalla, large waterbirds, such as Australian pelicans (*Pelecanus conspicillatus*), and other birds feed on fish and invertebrates.

Seventeen amphibian species have been recorded on the site, including burrowing species such as the holy cross toad (*Notaden bennettii*) and the water-holding frog (*Cyclorana platycephala*).

A total of eight native fish species from seven families have been observed at the site in addition to three alien species (goldfish, carp and gambusia). This represents almost the entire known fish diversity of the Paroo River catchment. Silver perch (*Bidyanus bidyanus*) have been recorded at the site and are poorly known within the bioregion. Species abundant at the site include spangled perch (*Leiopotherapon unicolor*), bony bream (*Nematalosa erebi*) and Hyrtl's catfish (*Neosilurus hyrtlii*).

The site also supports 24 mammal species and 58 reptile species.

Another crucial component of the wetland systems within the Currawinya Lakes Ramsar site are the aquatic plants and invertebrate species they support, with abundances often linked to drying and wetting stages (see also section 20, Timms and McDougall, 2006).

Criterion 4: *Wetland supports plants and/or animals species at a critical stage in their life cycles or provides refuge during adverse conditions.*

The Currawinya Lakes Ramsar site supports substantial breeding effort by waterbirds. In particular, islands within Lake Wyara are important for colonial breeding waterbirds such as Australian pelican (*Pelecanus conspicillatus*), with up to 20,000 pairs, black swan (*Cygnus atratus*), Caspian tern (*Hydroprogne caspia*), red-necked avocet (*Recurvirostra novaehollandiae*), silver gull (*Chroicocephalus novaehollandiae*) and cormorants (*Phalacrocorax* spp.) (Kingsford and Porter, 1994, 1999). Occasionally, large colonies of Australian pelicans form on Lake Numalla and the dead trees in this lake also provide breeding sites for pied cormorants (*Phalacrocorax varius*), great cormorants (*P. carbo*), white-necked herons (*Ardea pacifica*), royal spoonbills (*Platalea regia*) and yellow-billed spoonbills (*Platalea flavipes*). Other duck species including Pacific black ducks (*Anas superciliosa*) also breed there.

Waterbird abundance is strongly dependent on the availability of suitable wetland habitats for both feeding and breeding activities. The size and storage capacity of the lakes at Currawinya make it an important habitat at large regional scales.

The Currawinya Lakes form part of an inland route for migratory shorebirds, with Currawinya National Park being a listed site within the East Asian-Australasian Flyway. Species listed under the Convention on

the Conservation of Migratory Species of Wild Animals (Bonn Convention), Japan-Australia Migratory Bird Agreement (JAMBA), China-Australia Migratory Bird Agreement (CAMBA) or Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA) recorded at the site includes those listed in the table below. Migratory species may stop at the lakes for summer feeding on their annual inland migratory route between Australia and their breeding grounds. Some will stay at Currawinya, while others will continue further south.

Common name	Scientific name	Listing
common sandpiper	<i>Actitis hypoleucos</i>	Bonn, CAMBA, JAMBA, ROKAMBA
ruddy turnstone	<i>Arenaria interpres</i>	Bonn, CAMBA, JAMBA, ROKAMBA
sharp-tailed sandpiper	<i>Calidris acuminata</i>	Bonn, CAMBA, JAMBA, ROKAMBA
curlew sandpiper	<i>Calidris ferruginea</i>	Bonn, CAMBA, JAMBA, ROKAMBA
pectoral sandpiper	<i>Calidris melanotos</i>	Bonn, JAMBA, ROKAMBA
red-necked stint	<i>Calidris ruficollis</i>	Bonn, CAMBA, JAMBA, ROKAMBA
long-toed stint	<i>Calidris subminuta</i>	Bonn, CAMBA, JAMBA, ROKAMBA
oriental plover	<i>Charadrius veredus</i>	Bonn, JAMBA, ROKAMBA
white-winged black tern	<i>Chlidonias leucopterus</i>	CAMBA, JAMBA, ROKAMBA
Latham's snipe	<i>Gallinago hardwickii</i>	Bonn, CAMBA, JAMBA, ROKAMBA
bar-tailed godwit	<i>Limosa lapponica</i>	Bonn, CAMBA, JAMBA, ROKAMBA
black-tailed godwit	<i>Limosa limosa</i>	Bonn, CAMBA, JAMBA, ROKAMBA
glossy ibis	<i>Plegadis falcinellus</i>	Bonn, CAMBA
Caspian tern	<i>Hydroprogne caspia</i>	CAMBA, JAMBA
wood sandpiper	<i>Tringa glareola</i>	Bonn, CAMBA, JAMBA
common greenshank	<i>Tringa nebularia</i>	Bonn, CAMBA, JAMBA, ROKAMBA
marsh sandpiper	<i>Tringa stagnatilis</i>	Bonn, CAMBA, JAMBA, ROKAMBA

During drought conditions, lakes and waterholes within the Ramsar site are important refuge for waterbirds, as well as amphibians, fish, reptiles (such as turtles), and aquatic invertebrates. The lakes are considered to be probably the most important dry refuge habitat on the continent for the freckled duck (*Stictonetta naevosa*) (Kingsford and Porter, 1994).

Criterion 5: Wetland regularly supports 20,000 or more waterbirds.

The Currawinya Lakes Ramsar site supports an abundance of waterbirds, with counts in excess of 100,000 individuals recorded on several occasions. Currawinya National Park is a listed site within the East Asian-Australasian Flyway Site Network, and is listed as an Important Bird Area by BirdLife International.

Counts in excess of 20,000 waterbirds on the Currawinya Lakes (individually and/or collectively) have been recorded on a number of survey events since 1987. These counts were recorded in:

- 1987 - 3 separate surveys (Kingsford and Porter, 1994)
- 1988 - 3 separate surveys, including ground surveys demonstrating that the wetlands support over 280,000 waterbirds in March 1988 (Kingsford and Porter, 1994)
- 1989 - 2 separate surveys (Kingsford and Porter, 1994)
- 1998 - including a survey count in excess of 100,000 waterbirds (Jaensch, 1998)
- 2008 – with total abundance on Lake Wyara of 29,700 in February, and on Lake Numalla of 34,600 in May (Kingsford et al., 2011).
- 2010 – an estimated 21,000 Australian pelicans (*Pelecanus conspicillatus*) on Lake Wyara (Korn and Terrill, 2010)
- 2010-2013 - 29,288, 23,240, 141,347 and 59,205 waterbirds in November of respective years (Kingsford, R.T., and J.L., Porter unpubl. data).

- 2013 – greater than 100,000 waterbirds observed in ground surveys (limited due to flooding) conducted on Lake Wyara, Lake Yumberarra and Lake Kaponyee (C. Crafter pers. comm.).

Criterion 6: *Wetland regularly supports 1% of the individuals in a population of one species or subspecies of waterbird.*

The Currawinya Lakes Ramsar site support significant numbers of individual waterbird species. Survey data demonstrates that the 1% species population threshold has been exceeded at Currawinya Lakes for at least 10 waterbird species, namely: pink-eared duck (*Malacorhynchus membranaceus*), Eurasian coot (*Fulica atra*), black swan (*Cygnus atratus*), freckled duck (*Stictonetta naevosa*), grey teal (*Anas gracilis*), sharp-tailed sandpiper (*Calidris acuminata*), hardhead (*Aythya australis*), Australasian shoveler (*Anas rhynchos*), banded stilt (*Cladorhynchus leucocephalus*) and red-necked Avocet (*Recurvirostra novaehollandiae*) – refer to the table below (Martindale, 1983; Kingsford and Porter, 1994; Jaensch, 1998; Kingsford and Porter, 1999; Bamford et al., 2006; and C. Crafter pers. comm., 2013).

The remoteness of the Currawinya Lakes Ramsar site makes regular ground surveys of waterbirds logistically difficult and costly but regular aerial surveys do occur. Australia’s highly variable climate leads to both spatial and temporal changes in available wetland habitats, with many bird species responding to environmental conditions moving to feed and/or breed. As a consequence, numbers of waterbirds may fluctuate significantly. The wetlands of the Currawinya Lakes Ramsar site provide vital refuge for many species in times of drought.

Common Name	Scientific Name	Count	1% Threshold ¹
Pink-eared duck	<i>Malacorhynchus membranaceus</i>	26,680 (max Lake Wyara from surveys every 3 mths 1987-1990), 52,470 (max Lake Wyara 1998)	10,000
Eurasian coot	<i>Fulica atra</i>	12,987 (max Lake Wyara and Lake Numalla 1998)	10,000
Black swan	<i>Cygnus atratus</i>	13 262 (max Lake Wyara from surveys every 3 mths 1987-1990)	10,000
Freckled duck	<i>Stictonetta naevosa</i>	9,720 (max Lake Numalla from surveys every 3 mths 1987-1990) 5,540 (max Lake Wyara from surveys every 3 mths 1987-1990) 1,000 (shore-based counts Lakes Kaponyee, Yumberarra and Wyara 2013)	250
Sharp-tailed sandpiper	<i>Calidris acuminata</i>	2,000 (1983 Lake Numalla) 2,500 (Lake Numalla 2013)	1,600

¹ The 1% population threshold is determined using the Wetlands International Waterbird Population Estimates database: <http://wpe.wetlands.org/>

Common Name	Scientific Name	Count	1% Threshold ¹
Grey teal	<i>Anas gracilis</i>	35 587 (max Lake Wyara from surveys every 3 mths 1987-1990)	20,000
Hardhead	<i>Aythya australis</i>	19,700 (max Lake Wyara from surveys every 3 mths 1987-1990)	10,000
Australasian shoveler	<i>Anas rhynchos</i>	1,440 (max Lake Wyara from surveys every 3 mths 1987-1990)	1,000
Banded stilt	<i>Cladorhynchus leucocephalus</i>	4,680 (max Lake Wyara from surveys every 3 mths 1987-1990) 5,000 (breeding - shore based count Lake Wyara 2013)	3,700
Red-necked avocet	<i>Recurvirostra novaehollandiae</i>	11,965 (max Lake Wyara from surveys every 3 mths 1987-1990) 400 (Lake Yumberarra 2013) and in excess of 1,000 (Lake Wyara 2013)	1,100

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:

Murray-Darling Basin Drainage Division and Mulga Lands Bioregion.

b) biogeographic regionalisation scheme (include reference citation):

Commonwealth of Australia (Bureau of Meteorology). 2012. *Australian Hydrological Geospatial Fabric – Topographic Drainage Divisions and River Regions*. Website <http://www.bom.gov.au/water/about/riverBasinAuxNav.shtml>.

Commonwealth of Australia. 2012. *Interim Biogeographic Regionalisation for Australia (IBRA) Version 7.0*. Website <http://www.environment.gov.au/topics/land/national-reserve-system/science-maps-and-data/australias-bioregions-ibra>.

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.

Extensive sand plains and dunefields occupy much of the Currawinya Lakes Ramsar site, mostly composed of aeolian (wind driven) sands derived from Tertiary and Cretaceous sandstones that overlie Quaternary alluvial deposits. Soils on the plains are predominantly shallow to moderately deep sandy red earths in which hard pans are common; while low dunes consist of very deep sandy red earths, with grey and brown clays in the associated claypans and salt pans. Rugged hills and scarps on the north and west of the park represent a southern extension of the Hoods Range. This range consists of deeply weathered sediments of the Cretaceous Winton Formation, which may be overlain by remnants of the Tertiary

Glendower Formation Quartz sandstones in some areas. Alluvial plains have a low gradient and are mostly associated with the Paroo River and its local tributaries in the eastern section of the Ramsar site. These floodplains are derived from Quaternary alluvial deposits and associated soils are predominantly alluvial grey clays.

The topography and physical features of the various wetland types present within the site are affected by natural processes of sedimentation and deposition as part of rainfall and flooding events, natural deflation of the soft lake beds and pans, and the aeolian transport of fine sediments when lakes and other waterbodies are drying or entirely dried out.

Geomorphology of the larger lakes, such as Lake Wyara and Lake Numalla, is affected by wind-induced waves and currents (forming sandy beaches and similar features) and from the flows of the larger inlets into them.

Currawinya Lakes is characterised by a high degree of hydrological variability. The water levels of the lakes on the site are controlled by local rainfall and flood inflows from the Paroo River. The Paroo River is free flowing, with a large catchment north of Currawinya Lakes. This catchment is influenced by summer monsoon rainfall; so that river flows are irregular but annual floods within the Ramsar site are typical during summer and/or autumn months.

The two major lakes within the Ramsar site are permanent waterbodies except during extreme drought, and have different catchments: saline Lake Wyara receives water from Werewilka Creek, whereas freshwater Lake Numalla receives water from Boorara Creek and Carwarra Creek. Other smaller lakes within the Ramsar site are semi-permanent, such as Lake Kaponyee, Lake Yumberarra and Lake Karetta and also receive flood inflows from the Paroo River but only as part of large flooding events. A few springs and permanent waterholes also occur, mostly associated with the Paroo River channels.

Groundwater resources in the Paroo region include some shallow alluvial and sandstone aquifers and the deeper confined aquifers of the Great Artesian Basin.

Currawinya Lakes has a very hot, dry climate with a marked summer rainfall pattern (average 285.7 mm per annum, with an average of 41.3 mm in January and 12.5 mm in September). At Thargomindah the mean annual maximum temperature is 29°C and the mean annual minimum is 15°C (the January average minimum is 24°C and maximum is 37°C, and July is 6°C to 20°C). The dominant wind regime at the site is from the west.

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 Currawinya Lakes Ramsar site is located in a region characterised by broad semi-arid plains. An extensive dissected tableland with steep escarpments, rubble slopes and occasional isolated mesas occur to the west of the Ramsar site. This area consists of Tertiary Glendower sediments that are frequently silicified, overlying fresh or chemically altered Cretaceous Winton Formation sediments that are often exposed.

Undulating plains and low hills associated with the tablelands consist of remnants of Tertiary Glendower Formation sediments, interspersed with superficial Quaternary silcrete gravel deposits. Soils associated with the ranges and hills are predominantly lithosols and very shallow red earths that often have a surface cover of silcrete stones and boulders. Soils on the plains are predominantly shallow to moderately deep red earths and loamy red earths, with silcrete frequently present on the surface and throughout the profile.

The site is within the Paroo River catchment. The Paroo stretches from a series of low ranges in central southern Queensland to the Darling River in New South Wales. The river is approximately 640 kilometres in length and has a catchment area of over 73,000 square kilometres. Most commonly, the

Paroo River terminates on the floodplain south of Wanaaring; and only reaches the Darling River in the wettest of years.

The Paroo Catchment lies within the arid zone, characterised by high average temperatures, high levels of solar radiation and low rainfall (average annual rainfall of 314 mm). Long term average rainfall has remained relatively constant over the past century, despite significant inter-annual variability. Average evaporation is about 2000 mm per annum.

18. Hydrological values:

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

Diversity of wetland types: The unique geomorphologic and hydrologic features of the site provide a diversity of permanent, semi-permanent and intermittent wetland types including salt and freshwater lakes, swamps, claypans, springs, channels, pools and claypans.

Currawinya Lakes has a combination of terminal lakes and flow-through areas (Paroo River channels) that act as a drought refuge for wildlife. Lake Numalla is a freshwater lake fed by local streams and backflow from the Paroo River floodwaters, while Lake Wyara is a saltwater lake, which rises from local catchment sources. 'Wyara' means 'bitter water' in the local Budjari tongue, an acknowledgement of the fact that its waters reach extreme salinities (350 g/L).

Variable flows: The Paroo River is the last remaining free-flowing river in the northern Murray-Darling Basin with no significant surface water storages (dams, weirs, etc.).

Long term hydrological and climatic data indicate that the wetlands of the site display considerable natural variation in response to the unpredictability of rainfall and flooding events characteristic of the semi-arid zone of Australia. The natural hydrology of the site, including the frequency and duration of flood inundation, is viewed as the most important underlying wetland process for the provision of the range of critical components, processes and ecosystem services. General hydrological functions of the wetland system include flood control, sediment collection and water quality improvement.

Flows in the Paroo are highly variable as the river receives water from local rainfall in the upper and lower catchment. The wetlands and the species they support depend on the episodic nature of the flood events in the Paroo, including their size, duration, frequency, timing and rates of flow (Kingsford, 1999). The Paroo River is highly turbid like most inland rivers. For much of the time the Paroo River exists as a string of highly turbid water holes. In flood, large amounts of nutrient and sediment are deposited onto the floodplain increasing the fertility of the floodplain and improving water quality in the river. Floodplains become breeding grounds for riverine plants and animals, while supplying rivers with carbon and living organisms.

Great Artesian Basin springs: Artesian springs occur on the margins of the Great Artesian Basin as vents for the natural discharge of artesian water. These springs support an endangered ecological community (see section 14, Criterion 2)

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.

Permanent and seasonal saline, brackish or alkaline marshes/pools - Sp and Ss (8,535 ha);

Seasonal freshwater and saline lakes - P and R (5,331 ha);

Permanent freshwater lakes - O (3,748 ha);

Permanent Saline lakes - Q (3,114 ha);

Seasonal/intermittent freshwater rivers/creeks/streams - N (540 ha);

Seasonal/intermittent freshwater marshes on inorganic soils - Ts;

Freshwater springs - Y (80 ha).

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.

Wetlands within the Ramsar site are diverse, ranging from large freshwater and saline lakes, ephemeral lakes and pans, marshes, riverine waterholes and freshwater springs.

The vegetation is dominated by mulga (*Acacia aneura*), which grows as tall shrublands (in the west) to open forests (in the east) on the extensive sand plains, along with poplar box (*Eucalyptus populnea*) low open woodlands. Channels and floodplains of the Paroo River and other creeks are fringed with yapunyah (*Eucalyptus ochrophloia*), coolibah (*E. coolabah*) and river red gum (*E. camaldulensis*). Lake Numalla is fringed by black box (*Eucalyptus largiflorens*) woodlands, belalie (*Acacia stenophylla*) shrublands and sedgeland. Dense groves of black box saplings parallel to the shoreline are evidence of fluctuating water levels. Vegetation along Lake Wyara is remarkably different, reflecting its salinity with dense samphire (*Tecticornia pergranulata*) shrubs growing on the muddy flats and lower slopes of the fringing dunes. Vegetation that can tolerate waterlogging grows in swampy areas - lignum (*Duma florenta*), canegrass (*Eragrostis australasica*) and creek wilga (*Eremophila bignoniiflora*) and belalie.

Critical ecosystem services that characterise the wetland are that it supports a unique diversity of wetland habitats represented in a natural condition; wildlife refugia in drought conditions for amphibians, fish, reptiles and birds; waterbird diversity, abundance and habitat value; threatened wetland fauna; a notable diversity of vertebrate terrestrial fauna; an endangered ecological community; and threatened flora species. The site also contains Indigenous cultural heritage values and education and research opportunities.

The natural hydrology of the site is viewed as the most important underlying process in maintaining the wetlands. In particular, the frequency, duration and timing of flood inundation are critical. Additional processes of importance include climate, biological processes, natural sedimentation regime, water quality and nutrient cycling.

There are many factors that influence the fluctuation of bird numbers in semi-arid Queensland, including food availability and the state of wetlands within Queensland and elsewhere (Timms, 2009). Many of the bird species inhabiting Currawinya Lakes Ramsar site are nomadic or migratory. As wetlands fill episodically, they may be colonised in what is often referred to as the highly productive 'boom' stage. As the wetland dries moving into a 'bust' phase some waterbirds may either move to another system in 'boom', go to the coast or occasionally crash catastrophically (Kingsford et al., 1999). The availability of fish, aquatic plants and invertebrates within the wetlands at the different stages in these 'boom' and 'bust' cycles is one of the critical factors driving usage of the Currawinya wetlands by waterbirds and the species assemblages present. This example of waterbirds at Currawinya highlights an important aspect of the ecology of these wetlands, which is their critical role in supporting wildlife that have life history stages that require wetting and drying.

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.*

Noteworthy wetland flora of the Ramsar site include the nationally vulnerable species, the regal pumpkin burr (*Sclerolaena walkeri*) and endangered community – the community of native species dependent on natural discharge of groundwater from the Great Artesian Basin (see Criterion 2 in section 14). Flora species listed as near threatened at the State level include the poached egg daisy *Calocephalus* sp. (Eulo M.E. Ballingall MEB2590), which is restricted to small isolated populations between Eulo and Currawinya.

Additional noteworthy flora includes species that are found at the extremes of their natural geographic distribution, including black box (*Eucalyptus largiflorens*), poplar box (*E. populnea*), lancewood (*Acacia petraea*), leopardwood (*Flindersia maculosa*) and wilga (*Geijera parviflora*). An uncommon species that is known to occur within the Ramsar site, namely *Melaleuca densispicata*, is also of significance in that it has a spreading and clumping growth habit which provides shade and shelter, enabling it to serve as valuable habitat for wildlife (including birds and kangaroos).

Uncommon community types that occur within the Ramsar site include sedgeland communities dominated by pinrush (*Cyperus gymnocaulos*), and shrublands dominated by samphires (*Tecticornia* spp.), budda (*Eremophila sturtii*) and belalie (*Acacia stenophylla*).

There are 15 weed species found within Currawinya National Park. Some weed species are present in disturbed areas (e.g. Mexican poppy *Argemone ochroleuca*), but are not considered to pose a major threat to the values of the Ramsar site.

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.*

Noteworthy wetland fauna of the Ramsar site include the nationally endangered Australian painted snipe (*Rostratula australis*), listed under Criterion 2 in section 14. Wetland fauna species listed as threatened or near threatened at the State-level recorded on the site include the endangered grey snake (*Hemiaspis damelii*) and the near threatened freckled duck (*Stictonetta naevosa*), little pied bat (*Chalinolobus picatus*), black-chinned honeyeater (*Melithreptus qularis*), redthroat (*Pyrrholaemus brunneus*), grey falcon (*Falco hypoleucos*) and square-tailed kite (*Lophoictinia isura*). The vulnerable painted honeyeater (*Grantiella picta*) and Major Mitchell's cockatoo (*Lophochroa leadbeateri*) are also recorded for the site.

Additional noteworthy fauna species are those that are found at the extremes of their natural geographic distribution, including the western grey kangaroo (*Macropus fuliginosus*), at the north-eastern area of its range.

Currawinya is roughly the centre of the former geographical range of the bilby (*Macrotis lagotis*). A 29 square kilometre electrified predator and feral-animal proof enclosure was established in 2001 within Currawinya National Park to assist in the recovery of this endangered species. Captive bred bilbies have been released into the enclosure to attempt to re-establish a breeding population.

The presence of feral pigs, goats, cats and foxes on the park continue to be a management issue for the site. Three species of non-native fish (goldfish, carp and gambusia) have been detected in the Paroo River system.

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 Currawinya Lakes Ramsar site is highly significant to the Budjiti (Budjari/Bidjara) people in terms of archaeological, traditional and contemporary values, while other Aboriginal tribes also have a strong affiliation with the area. The eight Traditional Owner groups in the Queensland Murray Darling Basin include: Barunggam, Bidjara, Bigambul, Gunggari, Kambuwal, Kamilaroi/Goomeroi, Kooma and Mandandanji.

Stone arrangements, native wells, scarred trees, stone artefacts, and burial grounds are evident. The cultural significance of the area is generally focussed around the waterholes, lakes and springs, some of which are known amongst Aboriginal people for their ceremonial and spiritual importance.

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:

Archaeological research has found evidence of extremely large numbers of artefact scatters across the area, with higher densities of artefacts found in areas in closer proximity to water and stone sources. It has been estimated that there are 26,000 artefacts per km², with areas that are both close to mound springs and sources of stone having up to two million artefacts per km² (Robins, 1997). Currawinya is a cultural landscape with a long history of use and there are some areas of very high artefact density that may have been of greater importance to previous inhabitants.

- 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:

Many of the waterholes of the area have mythologies associated with them and are known for their spiritual and ceremonial importance.

24. Land tenure/ownership:

a) within the Ramsar site:

Currawinya National Park – Queensland Government (Queensland Department of National Parks, Recreation, Sport and Racing)

There is an active Native Title Claim by the Budjiti People which includes the Ramsar site (lodged 20 Feb 2007 - Tribunal File QC2007/002).

b) in the surrounding area:

The park is predominantly bounded by leasehold grazing land. There are Exploration Permits for Minerals adjoining the site to the north and east.

25. Current land (including water) use:

a) within the Ramsar site:

As the site is a protected area under Queensland legislation, land uses are restricted. Principal human activities include recreation (see section 31) and scientific research (see section 29). The Paroo River system is largely unregulated (i.e. free flowing with no significant water storages, such as dams or weirs, in the region).

b) in the surroundings/catchment:

Leasehold land surrounding the Ramsar site is used for grazing cattle for beef production and grazing sheep for wool production.

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

a) within the Ramsar site:

Key threats to the site's ecological character include:

- Sedimentation in Lake Wyara and Lake Karatta with potential impacts on bird breeding activities, including through formation of land bridges (e.g. in Lake Wyara), allowing predator access to otherwise isolated waterbird breeding habitat.
- Increased abundance and distribution of non-native fish species. Three alien fish species (goldfish, carp and gambusia) have been identified, although further work is needed on their abundance and biomass within the Ramsar site.
- The presence of feral pigs and goats continues to be a management issue for the site. While some weed species are recorded within the park, they are not considered to pose a major threat to the values of the Ramsar site.

b) in the surrounding area:

Livestock grazing leading to soil erosion is a major threat within the catchment. Carp have caused major damage to aquatic ecosystems elsewhere in the Paroo River.

Under most projections, climate change is likely to lead to increased temperatures and evaporation, more prolonged drought, combined with periodic extreme flow events in south west Queensland. This would impact wetland species, processes and values within the Ramsar site.

Potential threats to the site's ecological character could include changes to the hydrology of the site as a result of water extraction and use for agriculture and mining activities. Change to the existing flow regime of the Paroo River through diversions or extractions could have a negative impact on wetlands and their values. Increases in groundwater use in the Great Artesian Basin could have adverse impacts on the Great Artesian Basin springs.

Mining for petroleum or coal in the region is a potential threat, which may result in:

- water extraction and use, which could lead to changes to groundwater and surface flows and flooding causing detrimental impacts on water dependent species, eg waterbirds, and ecosystems, eg Great Artesian Basin spring communities
- infrastructure development, including clearing that may result in erosion and sedimentation of rivers
- land and water pollution, including salinity

- noise and other disturbance, which could affect bird breeding, fishing, recreation, etc.

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.

Currawinya was gazetted as a national park in 1991 and is protected under the Queensland *Nature Conservation Act 1992*. This Act affords the highest level of protection for conservation of wildlife habitat values that the Queensland Government is able to bestow on an area. Additionally, Japan-Australia, Republic of Korea - Australia and China-Australia Migratory Bird Agreements are applicable for the site. Currawinya National Park is also a listed site within the East Asian-Australasian Flyway Site Network.

The site is subject to the *Environment Protection and Biodiversity Conservation Act 1999*, which protects Matters of National Environmental Significance, including Ramsar wetlands and threatened and migratory species. The Commonwealth *Water Act 2007* also applies to the site; one of its objects is to protect, restore and provide for the ecological values and ecosystem services of the Murray-Darling.

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 *Currawinya National Park Management Plan* (QPWS, 2001) specifies programs for weed and feral animal control, fire management and soil and catchment protection. While it has not been updated since 2001, it continues to guide management of the National Park.

The Queensland Parks and Wildlife Service undertakes pest control measures to remove feral goats and pigs from the Currawinya National Park, with up to 25,000 goats removed in recent years. Additionally, fencing of springs assists with limiting the impacts of pest species on these areas.

d) Describe any other current management practices:

The Currawinya Lakes Ramsar site is managed as part of the Queensland Murray-Darling Basin. Under the Basin Plan 2012 each Basin State is required to prepare a Water Resource Plan for each water resource plan area. There is a Warrego, Paroo, Bulloo and Nebine Water Resource Plan (2003) in place and a Great Artesian Basin Water Resource Plan (2006). These set the strategic framework for the allocation and sustainable management of an area's water resources. The Warrego, Paroo, Bulloo and Nebine Water Resource Plan is currently under review. The accredited Water Resource Plan is required to include a Water Quality Management Plan that includes specific objectives and water quality targets for Ramsar wetlands under Schedule 11 of the Basin Plan. The Healthy Waters Management Plan to be prepared under the Queensland Environmental Protection (Water) Policy 2009 will form the Water Quality Management Plan component of the accredited Water Resource Plan (see section 28).

There is also a Regional Natural Resource Management (NRM) Plan in place for the South West Queensland Region, which sets out the priorities, targets and milestones for natural resource management in the region. The Plan is managed by South West NRM, one of 14 NRM bodies in Queensland, which implement Queensland and Australian Government programs and projects.

28. Conservation measures proposed but not yet implemented:

e.g. management plan in preparation; official proposal as a legally protected area, etc.

A Ramsar Management Summary for Currawinya Lakes Ramsar site is in preparation. This summary will provide information and guidance for land managers responsible for the management of Ramsar sites in Queensland.

A draft Healthy Waters Management Plan / Water Quality Management Plan is currently being prepared by the Queensland Department of Environment and Heritage Protection and South West NRM for inclusion in the Warrego, Paroo, Bulloo and Nebine Water Resource Plan as part of Queensland commitments to the management of the Queensland Murray-Darling Basin under the Basin Plan 2012.

29. Current scientific research and facilities:

e.g., details of current research projects, including biodiversity monitoring; existence of a field research station, etc.

Although there are no facilities such as research stations within the Ramsar site, Currawinya Lakes is a well-studied region and continues to represent an important site for scientific research. At least 32 permits for scientific research have been issued since 2002. Projects that have been conducted have examined vegetation dynamics, habitat requirements, limnology, archaeology, waterbird use and climatic effects.

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.

Due to the remoteness of the region, there is no formal visitors' centre within the Ramsar site; however the park office has a limited display and information area for visitors. A park map and information brochure is available online – see <http://www.npsr.qld.gov.au/parks/currawinya>. The Ramsar site provides an ideal resource for educational programs focussed on inland wetlands, with school groups routinely visiting Currawinya National Park.

31. Current recreation and tourism:

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

Visitors to the Ramsar site are offered a number of nature-based, low-impact, recreational activities. These include nature walks and drives, wildlife watching, camping, canoeing and fishing. An increasing trend in the number of visitors is evident over the past decade, with a total of 779 campers in 1996 as compared to an estimated 3000 campers in 2007, including local, interstate and international visitors. However, visitor numbers vary according to seasonal conditions, for example 3,588 camper nights were recorded in 2011, 2500 in 2012 and 1810 in 2013. Day visitors are estimated to be in excess of 5000 persons per year.

32. Jurisdiction:

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

Territorial: Queensland Government

Functional: Department of Environment and Heritage Protection/Department of National Parks, Recreation, Sport and Racing

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.

QLD National Parks & Wildlife PO Box 149, Charleville QLD 4470 Ph: +61 7 4654 4703	QLD Department of National Parks, Recreation, Sport and Racing GPO Box 2454, Brisbane, QLD 4001 Ph: +61 7 137 468 Email: info@nprsr.qld.gov.au	Currawinya National Park PMB 25, Cunnamulla, QLD 4490 Ph: +61 7 4655 4001 Fax: +61 7 4655 4085
---	---	--

34. Bibliographical references:

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

Bamford, M, D. Watkins, W. Bancroft, G. Tischler and J. Wahl. (2008). *Migratory Shorebirds of the East Asian – Australasian Flyway; Population Estimates and Internationally Important Sites*. Wetlands International – Oceania. Canberra, Australia.

BMT WBM. (2009). *Draft Ecological Character Description of Currawinya Lakes Ramsar Site*. A report for the Queensland Government, Environmental Protection Agency. Brisbane, Australia.

Bunn, S. and P. Davies. (1999). Aquatic food webs in turbid, arid-zone rivers: Preliminary data from Cooper Creek. In: Kingsford, R. (ed) (1999). *A free flowing river – The ecology of the Paroo River*. NSW Parks and Wildlife Service. Sydney, Australia.

Commonwealth of Australia (Bureau of Meteorology). (2012). *Australian Hydrological Geospatial Fabric – Topographic Drainage Divisions and River Regions*. Website <http://www.bom.gov.au/water/about/riverBasinAuxNav.shtml>.

Commonwealth of Australia. (2012). *Interim Biogeographic Regionalisation for Australia (IBRA) Version 7.0*. Website <http://www.environment.gov.au/topics/land/national-reserve-system/science-maps-and-data/australias-bioregions-ibra>.

Department of Environment and Heritage Protection. (2013). *Currawinya Lakes Ramsar internationally important wetland — facts and maps*. WetlandInfo Queensland Government Department of Environment and Heritage Protection. Website viewed 20 December 2013, <<http://wetlandinfo.ehp.qld.gov.au/wetlands/facts-maps/ramsar-wetland-currawinya-lakes/>>.

Department of Environment and Resource Management. (2009). *Queensland Wetland Mapping and Classification Version 2.0*. Queensland Government Department of Environment and Resource Management. Brisbane, Australia.

Fielder, D.P. (2012). *A risk assessment of water dependent threatened species and communities and water assets of southwest Queensland from coal seam gas and coal mining*. Prepared by Red Leaf Projects for the South West NRM Ltd. Charleville, Australia.

Jaensch, R.P. (1998). *An aerial and ground survey of waterbirds at Lakes Wyara and Numalla, Currawinya National Park, on 20-21 June 1998*. An unpublished report to the Queensland Department of Environment and Heritage, Wetlands International-Oceania. Canberra, Australia.

- Kingsford, R.T., Brandis, K. and J. L. Porter. (2011). *Waterbird response to flooding in the northern Murray-Darling Basin 2008*. Australian Wetlands and Rivers Centre. School of Biological, Earth and Environmental Sciences, University of New South Wales. Sydney, Australia.
- Kingsford, R.T. and J. L. Porter. (1994). Waterbirds on an adjacent freshwater lake and salt lake in arid Australia. *Biological Conservation* 69: 219-228.
- Kingsford, R.T. and J. L. Porter. (1999). Wetlands and waterbirds of the Paroo and Warrego Rivers. In: Kingsford, R.T. (ed). (1999). *A free flowing river: the ecology of the Paroo River*. NSW National Parks and Wildlife Service. Sydney, Australia.
- Kingsford, R.T., Curtin, A.L. and J. Porter. (1999). Water flows on Cooper Creek in arid Australia determine 'boom' and 'bust' periods for waterbirds. *Biological Conservation* 88: 231-248.
- Korn, T. and P. Terrill. (2010). *Aerial survey of wetlands and waterbirds: 3-7 May 2010*. New South Wales Department of Environment, Climate Change and Water. Sydney, Australia.
- Martindale, J. (1983). *Counts of the Freckled Duck Stictonetta naevosa in Eastern Australia during January- February 1983. Report No. 13*. Royal Australasian Ornithologists Union. Moonee Ponds, Victoria.
- McDougall, A. and B. Timms. (2001). The influence of turbid waters on waterbirds numbers and diversity: A comparison of Lakes Yumberarra and Karatta, Currawinya National Park, South-west Queensland. *Corella* 25: 25-31.
- Mussared, D. (1997). *Living on Floodplains*, CRC for Freshwater Ecology/The Murray-Darling Basin Commission. Canberra, Australia.
- Page, M., Everson, C. and A. Whittington. (2001). *Research needs for managing a changed landscape in the Hungerford Region*. University of Queensland. Brisbane, Australia.
- QPWS. (2001). *Currawinya National Park Management Plan*. Queensland National Parks and Wildlife Service. Brisbane, Australia.
- Robins, R.P. (1997). Patterns in the landscape: A case study in onsite archaeology from southwest Queensland. *Memoirs of the Queensland Museum, Cultural Heritage Series* 1(1): 23-56.
- Timms, B.V. (2009). Waterbirds of the Saline Lakes of the Paroo, arid-zone Australia: A review with special reference to diversity and conservation. *Natural Resources and Environmental Issues*: Vol 15, Article 46. Available at: <http://digitalcommons.usu.edu/nrei/vol15/iss1/46>.
- Timms, B.V. and A. McDougall. (2006). Changes in the waterbirds and other biota of Lake Yumberarra, an episodic arid zone wetland. *Wetlands (Australia)* 22 (1): 11-28.
- Timms, B.V. (1999). Local runoff, Paroo floods and water extraction impacts on wetlands of Currawinya National Park in Kingsford., R.T (ed). (1999) *A free-flowing river: the ecology of the Paroo River*. NSW National Parks and Wildlife Service. Sydney, Australia.

Attachment 1: Location map of the Currawinya Lakes (Currawinya National Park) Ramsar site

