Ramsar Information Sheet

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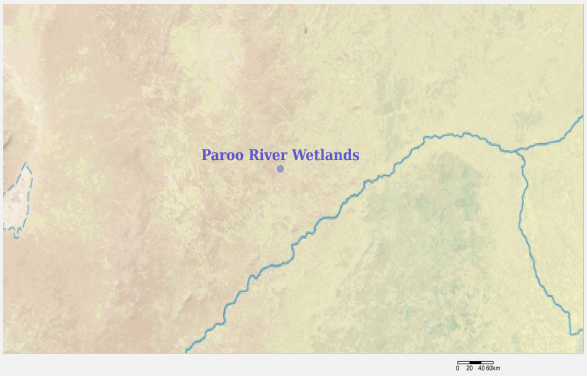
Australia

Paroo River Wetlands



Designation date	13 September 2007
Site number	1716
Coordinates	30°19'58"S 143°50'30"E
Area	138 304,00 ha

Color codes

Fields back-shaded in light blue relate to data and information required only for RIS updates.

Note that some fields concerning aspects of Part 3, the Ecological Character Description of the RIS (tinted in purple), are not expected to be completed as part of a standard RIS, but are included for completeness so as to provide the requested consistency between the RIS and the format of a 'full' Ecological Character Description, as adopted in Resolution X.15 (2008). If a Contracting Party does have information available that is relevant to these fields (for example from a national format Ecological Character Description) it may, if it wishes to, include information in these additional fields.

1 - Summary

Summary

The Paroo River Wetlands are located in far north-west New South Wales (NSW) and consists of the Nocoleche Nature Reserve (180 km west of Bourke) and the Peery component (240 km south-west of Bourke). Both components of the site lie on the floodplain of the Paroo River. Nocoleche is 120 km north of Peery. The Paroo River wetlands site is listed on the Ramsar Convention as a site of international significance and is protected under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).

The Paroo River is the last remaining free-flowing river in the Murray-Darling Basin, although some water is taken from the river by diversion of flow or overland flows. Wetland types within the site include large overflow lakes, tree-lined creeks and waterholes, lignum and canegrass swamps, and artesian mound springs which are listed as endangered under the EPBC Act. It is one of the most important wetland systems for waterbirds in eastern Australia constituting a key drought refuge in arid NSW and supporting waterbird breeding, Eleven species of waterbirds have been recorded breeding at Peery Lake and 38 species at Nocoleche Nature Reserve, including fifteen species covered by international migratory bird agreements. The springs at Peery Lake represent the largest active complex in New South Wales and one of the rarest landforms in Australia.

The wetlands have been recognised as a significant refuge for biological diversity, as they contain unique genetic, species and ecosystem diversity including a number of threatened plant and animal species and native fish communities.

The ecological character of the Paroo River Wetlands consists of biological components (waterbirds, invertebrates, fish and vegetation), chemical characteristics (water quality, nutrient levels and soil characteristics) and physical components (hydrology, fire, inundation, climate and geomorphology).

While the site provides provisioning services such as water supply and cultural services such as maintenance of heritage, scientific research, recreation and tourism, these are not considered critical to the site.

Climate change is predicted to have a significant impact on the sites wetlands ecology in terms of reduced rainfall; a reduction in water volume; a small reduction in the average frequency and total volume of high flows to the overflow lakes; increased high rainfall intensity and an increase in the frequency of the larger floods.

2 - Data & location

2.1 - Formal data

2.1.1 - Name and address of the compiler of this RIS

Responsible compiler

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

National Ramsar Administrative Authority

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

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

From year	2005
To year	2017

2.1.3 - Name of the Ramsar Site

Official name (in English, French or Spanish)	Paroo River Wetlands
Unofficial name (optional)	Nocoleche Nature Reserve, and Peery and Mandalay Blocks (to be referred to as 'Peery') in Paroo – Darling National Park

2.1.4 - Changes to the boundaries and area of the Site since its designation or earlier update

(Update) A. Changes to Site boundary	Yes ○ No ◉
(Update) B. Changes to Site area	No change to area
(Update) For secretariat only: This update is an extension	☐

2.1.5 - Changes to the ecological character of the Site

(Update) 6b i. Has the ecological character of the Ramsar Site (including applicable Criteria) changed since the previous RIS?	No

(Update) Optional text box to provide further information

Due to predicted climate change and changed flow conditions upstream the frequency of flooding to the site is likely to decrease and flows will become increasingly intermittent. Higher temperatures will cause greater evaporation.

2.2 - Site location

2.2.1 - Defining the Site boundaries

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

Former maps	0

Boundaries description

The Paroo River Wetlands consist of two main parts; the Nocoleche Nature Reserve component and the Peery component.

Nocoleche Nature Reserve coordinates: 141° 15’ 6”, -029° 90’ 2” (centroid)
Peery Lake coordinates: 143° 52’ 8”, -030° 76’ 4” (centroid)

The northern component of the Paroo Ramsar site is the boundary of Nocoleche Nature Reserve (as gazetted in September 1979). A travelling stock reserve (TSR) and the Wanaaring-Wilcannia road running from north to south divide the Nocoleche Nature Reserve and are not included in the Ramsar site. Areas of the channel of the Paroo River in the north and south of Nocoleche Nature Reserve are also excluded from the Ramsar site. These exclusions are clearly marked on the maps provided.

The boundary for the Peery component of the Ramsar site is the reserve boundary of the north-western most component of Paroo-Darling National Park (as gazetted on 31 March 2000), except for the area south of a line commencing at approximate coordinate 143°24’20.69’’, -30°49’3.75’’ on the south-western corner of Arrow Bar (DP766091) then following the Arrow Bar/Mandalay boundary (DP766091 and DP822042 of NSW cadastre dated 2004) east and then south to approximately 143°25’24.43’’, -30°49’46.60’’, then following the Arrow Bar/Mandalay boundary southward to approximately 143°27’7.32’’, -30°57’2.51’’, then east to approximately 143°29’25.37’’, -30°57’11.91’’. The boundary of this portion of the Ramsar site then continues, initially in an easterly and then northerly direction, to follow the gazetted boundary of this part of Paroo-Darling National Park. The Wilcannia-Wanaaring Road (60.35m wide), running through Peery (DP766074, DP822042 and DP822042), is excluded from the Ramsar site. There are several parcels that are excluded from this part of the Ramsar site, as shown on the map. These include an area within the Ramsar site that contains a telecommunications tower and several parcels along the eastern boundary of the site that are set aside as travelling stock reserves.

2.2.2 - General location

a) In which large administrative region does the site lie? Central Darling (Western Division), NSW

b) What is the nearest town or population centre? Wilcannia (population 745), approximately 110 km drive from Peery Lake and approximately 240 km drive to Nocoleche Nature Reserve.

2.2.3 - For wetlands on national boundaries only

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

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

2.2.4 - Area of the Site

Official area, in hectares (ha): 138304

Area, in hectares (ha) as calculated from GIS boundaries: 138190.474

2.2.5 - Biogeography

Biogeographic regions

Regionalisation scheme(s)	Biogeographic region
Other scheme (provide name below)	Murray-Darling Basin: Paroo River

Other biogeographic regionalisation scheme

Australian Hydrological Geospatial Fabric (Geofabric): Topographic Drainage Divisions and River Regions (BOM 2012) – Murray-Darling Basin: Paroo River

3 - Why is the Site important?

3.1 - Ramsar Criteria and their justification

☑ Criterion 1: Representative, rare or unique natural or near-natural wetland types

Hydrological services provided	The Paroo River is the last free-flowing river in the Murray-Darling Basin athough some water is taken from the river by diversion of flow or overland flows. It is a unique example of a near natural, arid, inland wetland system. The extent and duration of flooding and drying of the river and it's natural drainage features, remains as a near natural regime. This is an important factor for the maintenance of biological diversity in the region (NPWS 2000). Water flows in the Paroo are episodic in nature with 'permanent' water holes within the river system being important refugia for fish and other aquatic species during periods of low water flows. Water from the Paroo reaches the Darling only during infrequent major flooding events. More often flows terminate in the floodplains and wetland systems south of the Nocoleche component. High water flows in the Warrego River also contribute to the Paroo through the Cuttaburra Creek, connecting the two systems. Peery Lake, the largest overflow lake on this system, contains two distinct sets of artesian mound springs comprising the largest active spring complex in the state and the only known springs to occur on lake beds in NSW. The springs are characterised either by mounds of sediment and salts deposited as water evaporates (Ponder 1986, 1999) or depressions. The mound springs are caused by pressure of the Great Artisian Basin and groundwater is a critical process in the wetland diversity of this site.
Other ecosystem services provided	The site provides a unique example of a near natural, arid, inland wetland system. The pattern of water flow remains largely natural. This is important for maintaining the biological diversity in the region. The wetlands and their associated flora and fauna are unusually diverse because of huge variations in the water regime, mainly resulting from unpredictable rainfall across the catchment.

☑ Criterion 2 : Rare species and threatened ecological communities

☑ Criterion 3 : Biological diversity

Justification	The Paroo River Wetlands have been recognised as a significant refuge for biological diversity, as they contain unique genetic, species and ecosystem diversity. Understanding of each of these levels is limited, but several studies have shown the existence of unique biological diversity (Watts 1999). For example, there are newly identified plant and crustacean species, and a separate breeding population of golden perch (Macquaria ambigua). In addition, the biodiversity of the bird populations is well known, with the wetlands of the Paroo and the Warrego rivers being arguably the most important area for waterbirds in the Murray-Darling Basin (Kingsford and Porter 1999). See Attachment 1 for detailed information on the biodiversity of the Paroo River Wetlands. Significantly, the Paroo River Wetlands support a number of endemic species such as yapunyah (Eucalyptus ochrophloia); fairy shrimps (Branchinella budjiti and B. campbelli); a new genus in the family Branchipodidae and a new species of Parastreptocephalus (Streptocephalidae) (Timms 2001); golden perch (Macquaria ambigua) (Keenan et al. 1996, 1998); Striped Skink (Ctenotus sp.); earless dragon (Tympanocryptis sp.) (Ross Sadlier pers. comm.); starfruit (Dentella minutissima); aquatic plants (Aponogeton queenslandicus and Goodenia 'nocoleche') (Pellow and Porter in press); a charophyte algal (Nitella partita) and Nitella 'parooensis'; and Peery Lake Mound Springs supports an undescribed species of Utricularia (Westbrooke et al. 2003).

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

☑ Criterion 5 : >20,000 waterbirds

Overall waterbird numbers	257,907
Start year	2010
Source of data:	UNSW (2019), National Waterbird Survey 2019

☑ Criterion 7 : Significant and representative fish

Justification	The Paroo River Wetlands support one of the healthiest native fish communities in the Murray Darling Basin. Recent research has found the population of golden perch (Macquaria ambigua) is genetically distinct and effectively a separate breeding population from golden perch elsewhere in the Murray-Darling Basin (Watts, 1999; Keenan et al. 1996, 1998). This species has a higher dispersal capability than the six other native fish species (silver perch Bidyanus bidyanus, spangled perch Leiopotherapon unicolor, bony herring Nematalosa erebi, Hyrtl's tandan Neosilurus hrytlii, crimson-spotted rainbowfish Melanotaenia fluviatili and Australian smelt Retropinna semoni) found in the Paroo River Wetlands. Although research has not been undertaken it is highly likely that these seven species will show similar genetic distinctiveness. The Paroo River wetlands support a significant discrete component of the genetic diversity of fish in the Murray-Darling Basin (Watts 1999).

3.2 - Plant species whose presence relates to the international importance of the site

Phylum	Scientific name	Criterion 2	Criterion 3	Criterion 4	IUCN Red List	CITES Appendix I	Other status	Justification
Plantae								
TRACHEOPHYTA / LILIOPSIDA	*Eriocaulon carsonii*	☑	☐	☐		☐	National (EPBC Act) - endangered.	Nationally listed threatened species (EPBC Act).

3.3 - Animal species whose presence relates to the international importance of the site

Phylum	Scientific name	Species qualifies under criterion				Species contributes under criterion				Pop. Size	Period of pop. Est.	% occurrence 1)	IUCN Red List	CITES Appendix I	CMS Appendix I	Other Status	Justification
		2	4	6	9	3	5	7	8								
Fish, Mollusc and Crustacea																	
CHORDATA / ACTINOPTERYGII	*Bidyanus bidyanus*	☑	☐	☐	☐	☐	☐	☑	☐				VU	☐	☐	Nationally critically endangered (EPBC)	Nationally listed threatened species.
Birds																	
CHORDATA / AVES	*Actitis hypoleucos*	☐	☑	☐	☐	☐	☑	☐	☐				LC	☐	☐	Migratory (EPBC) Marine (EPBC)	Listed on JAMBA CAMBA ROKAMBA
CHORDATA / AVES	*Calidris acuminata*	☐	☑	☐	☐	☐	☑	☐	☐				LC	☐	☐	Migratory (EPBC)	Listed on JAMBA CAMBA ROKAMBA
CHORDATA / AVES	*Calidris ferruginea*	☐	☑	☐	☐	☐	☑	☐	☐				NT	☐	☐	Nationally critically endangered (EPBC) Migratory (EPBC)	Nationally listed threatened species. Listed on JAMBA CAMBA ROKAMBA
CHORDATA / AVES	*Calidris ruficollis*	☐	☑	☐	☐	☐	☑	☐	☐				NT	☐	☐	Migratory (EPBC)	Listed on JAMBA CAMBA ROKAMBA
CHORDATA / AVES	*Calidris subminuta*	☐	☑	☐	☐	☐	☑	☐	☐				LC	☐	☐	Migratory (EPBC)	Listed on JAMBA CAMBA ROKAMBA
CHORDATA / AVES	*Falco hypoleucos*	☑	☐	☐	☐	☐	☐	☐	☐				VU	☑	☐	Nationally vulnerable (EPBC).	Nationally listed threatened species.
CHORDATA / AVES	*Grus rubicunda*	☐	☐	☐	☐	☑	☑	☐	☐				LC	☑	☐	Vulnerable in NSW	This species is threatened at the state level (vulnerable) and is likely to contribute to waterbird abundance at the site.
CHORDATA / AVES	*Limosa lapponica*	☑	☑	☐	☐	☐	☑	☐	☐				NT	☐	☐	Migratory (EPBC)	Listed on JAMBA CAMBA ROKAMBA
CHORDATA / AVES	*Limosa limosa*	☑	☑	☐	☐	☐	☑	☐	☐				NT	☐	☐	Nationally vulnerable (EPBC) Migratory (EPBC)	Nationally listed threatened species. Listed on JAMBA CAMBA ROKAMBA
CHORDATA / AVES	*Oxyura australis*	☐	☐	☐	☐	☑	☑	☐	☐				NT	☐	☐	Vulnerable in NSW	This species is threatened at the state level (vulnerable) and is likely to contribute to waterbird abundance at the site.
CHORDATA / AVES	*Plegadis falcinellus*	☑	☑	☐	☐	☐	☑	☐	☐				LC	☐	☐	Migratory (EPBC)	Conservation concern in western NSW. Listed on JAMBA CAMBA. Likely to contribute to waterbird abundance at the site.
CHORDATA / AVES	*Rostratula benghalensis*	☑	☑	☐	☐	☐	☐	☐	☐				LC	☐	☐	Nationally endangered (EPBC) Migratory (EPBC)	Nationally listed threatened species. Listed on JAMBA CAMBA
CHORDATA / AVES	*Stictonetta naevosa*	☐	☐	☐	☐	☑	☑	☐	☐				LC	☐	☐	Vulnerable in NSW	This species is threatened at the state level (vulnerable) and is likely to contribute to waterbird abundance at the site.
CHORDATA / AVES	*Tringa glareola*	☐	☑	☐	☐	☐	☐	☐	☐				LC	☐	☐	Migratory (EPBC)	Listed on JAMBA CAMBA ROKAMBA
CHORDATA / AVES	*Tringa nebularia*	☐	☑	☐	☐	☐	☑	☐	☐				LC	☐	☐	Nationally critically endangered (EPBC) Migratory (EPBC)	Nationally listed threatened species. Listed on JAMBA CAMBA ROKAMBA
CHORDATA / AVES	*Tringa stagnatilis*	☐	☑	☐	☐	☐	☑	☐	☐				LC	☐	☐	Nationally critically endangered (EPBC) Migratory (EPBC)	Nationally listed threatened species. Listed on JAMBA CAMBA ROKAMBA

1) Percentage of the total biogeographic population at the site

Newly identified endemic crustacean species (Nocoleche NR) – macroinvertebrate community includes two new species of fairy shrimp Branchinella budjiti and B. campbelli, a new genus in the family Branchipodidae, and a new species of Parrastreptocephalus (Streptocephalidae) – (not found in Peery Lake or Poloko Lake). These species contribute to the biological diversity of the site (criterion 3).

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

Name of ecological community	Community qualifies under Criterion 2?	Description	Justification
Artesian Springs Ecological Community	☑	Community of native species dependent on natural discharge of groundwater from the Great Artesian Basin	Listed endangered under the EPBC Act

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

4.1 - Ecological character

The Paroo River is the last free-flowing river in the Murray-Darling Basin and hence is a unique example of a near natural arid inland river system. There is a range of different wetland types in the catchment including claypans and canegrass swamps, river channels and waterholes, black box swamps, Eleocharis swamps, Lignum swamps and overflow plains, freshwater lakes, salt lakes and mound springs. The Nocoleche Nature Reserve component of the Ramsar site has all but freshwater lakes, salt lakes and mound springs. The Peery component includes freshwater lakes (Peery and Poloko Lakes) and intermittent river channels and swamps. Peery Lake also contains several examples of active mound springs (natural discharge points from the Great Artesian Basin), the rarest landform in Australia, and these have significant conservation value due to their being the largest active spring complex in New South Wales on a lakebed.

Wetlands within the Paroo River Wetlands Ramsar Site support endangered flora and fauna of restricted distribution, support endangered ecological communities, support a high abundance and diversity of waterbirds during critical stages of their life cycles, provide drought refuge for fauna, and are significant for native fish communities. Flooding and drying cycles of the Paroo River, which are driven by climate and affected by geomorphology, are critical for supporting the flora and fauna of the Paroo, along with the physicochemical environments of wetlands.

The ecological character of the Paroo River Wetlands consists of biological components (waterbirds, invertebrates, fish and vegetation), chemical characteristics (water quality, nutrient levels and soil characteristics) and physical components (hydrology, fire, inundation, climate and geomorphology).
While the site provides provisioning services such as water supply and cultural services such as maintenance of heritage, scientific research, recreation and tourism, these are not considered critical to the site.

A full description of the ecological character of the Paroo River Wetlands Ramsar site can be found in Ecological Character Description of the Paroo River Wetlands Ramsar Site (Richard T. Kingsford & Enhua Lee, March 2007), see link at Section 5 of this RIS.

4.2 - What wetland type(s) are in the site?

Inland wetlands

Wetland types (code and name)	Local name	Ranking of extent (1: greatest - 4: least)	Area (ha) of wetland type	Justification of Criterion 1
Fresh water > Flowing water >> N: Seasonal/ intermittent/ irregular rivers/ streams/ creeks	Paroo River	2		Unique
Fresh water > Lakes and pools >> P: Seasonal/ intermittent freshwater lakes	Lake Poloko	4		Unique
Fresh water > Lakes and pools >> Tp: Permanent freshwater marshes/ pools				
Fresh water > Marshes on inorganic soils >> Ts: Seasonal/ intermittent freshwater marshes/ pools on inorganic soils	Nocoleche	1		
Fresh water > Marshes on inorganic soils >> W: Shrub-dominated wetlands	Lake Peery	3		
Fresh water > Flowing water >> Y: Permanent Freshwater springs; oases				

Other non-wetland habitat

Other non-wetland habitats within the site	Area (ha) if known
unknown	

4.3 - Biological components

4.3.1 - Plant species

Other noteworthy plant species

Phylum	Scientific name	Position in range / endemism / other
TRACHEOPHYTA/LILIOPSIDA	*Cyperus difformis*	Important component of very rare ecological community
TRACHEOPHYTA/LILIOPSIDA	*Cyperus gymnocaulos*	Important component of very rare ecological community
TRACHEOPHYTA/LILIOPSIDA	*Cyperus laevigatus*	Important component of very rare ecological community
TRACHEOPHYTA/MAGNOLIOPSIDA	*Dentella minutissima*	Listed as endangered in NSW. It is highly endemic, occurring in only 2 locations in NSW, both on the Paroo floodplain.
TRACHEOPHYTA/LILIOPSIDA	*Eleocharis pallens*	Important component of very rare ecological community
TRACHEOPHYTA/LILIOPSIDA	*Elytrophorus spicatus*	This is the only recorded occurrence in NSW.
TRACHEOPHYTA/MAGNOLIOPSIDA	*Eucalyptus ochrophloia*	Highly endemic.
TRACHEOPHYTA/MAGNOLIOPSIDA	*Glinus orygioides*	Listed as threatened in NSW. It is believed to occur at Peery Lake.
TRACHEOPHYTA/LILIOPSIDA	*Schoenoplectus pungens*	Highly endemic. This is the only known population in western NSW. This species is considered of conservation concern,
TRACHEOPHYTA/MAGNOLIOPSIDA	*Utricularia dichotoma*	Important component of very rare ecological community

Invasive alien plant species

Phylum	Scientific name	Impacts	Changes at RIS update
TRACHEOPHYTA/MAGNOLIOPSIDA	*Carthamus lanatus*	Potential	unknown
TRACHEOPHYTA/MAGNOLIOPSIDA	*Heliotropium europaeum*	Potential	unknown
TRACHEOPHYTA/MAGNOLIOPSIDA	*Opuntia stricta*	Potential	unknown
TRACHEOPHYTA/MAGNOLIOPSIDA	*Tamarix aphylla*	Potential	unknown
TRACHEOPHYTA/MAGNOLIOPSIDA	*Xanthium spinosum*	Potential	unknown

4.3.2 - Animal species

Other noteworthy animal species

Phylum	Scientific name	Pop. size	Period of pop. est.	% occurrence	Position in range /endemism/other
CHORDATA/AVES	*Acanthiza reguloides*				Conservation concern in western NSW
CHORDATA/AVES	*Anhinga melanogaster*				Conservation concern in western NSW
CHORDATA/AVES	*Ardea alba*				Of conservation concern in western NSW
CHORDATA/AVES	*Ardeotis australis*				Listed as vulnerable in NSW.
CHORDATA/AVES	*Cacatua leadbeateri*				Listed as vulnerable in NSW.
CHORDATA/AVES	*Certhionyx variegatus*				Listed as vulnerable in NSW.
CHORDATA/MAMMALIA	*Chalinolobus picatus*				Listed as vulnerable in NSW.
CHORDATA/AVES	*Climacteris picumnus*				Listed as vulnerable in NSW.
CHORDATA/AMPHIBIA	*Crinia deserticola*				Conservation concern in western NSW
CHORDATA/AMPHIBIA	*Crinia parinsignifera*				Conservation concern in western NSW

Phylum	Scientific name	Pop. size	Period of pop. est.	% occurrence	Position in range /endemism/other
CHORDATA/REPTILIA	*Ctenotus strauchii*				Conservation concern in western NSW
CHORDATA/REPTILIA	*Diplodactylus conspicillatus*				Listed as vulnerable in NSW.
CHORDATA/REPTILIA	*Gehyra dubia*				Conservation concern in western NSW
CHORDATA/AVES	*Hamirostra melanosternon*				Listed as vulnerable in NSW.
CHORDATA/MAMMALIA	*Hydromys chrysogaster*				Conservation concern in western NSW
CHORDATA/AVES	*Larus novaehollandiae*				Conservation concern in western NSW
CHORDATA/AMPHIBIA	*Litoria alboguttata*				Conservation concern in western NSW
CHORDATA/AVES	*Lophoictinia isura*				Listed as vulnerable in NSW.
CHORDATA/ACTINOPTERYGII	*Macquaria ambigua*				Conservation concern in western NSW
CHORDATA/AVES	*Melithreptus gularis*				Conservation concern in western NSW
CHORDATA/REPTILIA	*Morelia spilota variegata*				Conservation concern in western NSW
CHORDATA/AVES	*Pelecanus conspicillatus*				Conservation concern in western NSW
CHORDATA/AVES	*Phalacrocorax carbo*				Conservation concern in western NSW
CHORDATA/AVES	*Phalacrocorax varius*				Conservation concern in western NSW
CHORDATA/AVES	*Platalea regia*				Conservation concern in western NSW
CHORDATA/AVES	*Podiceps cristatus*				Conservation concern in western NSW
CHORDATA/AVES	*Pomatostomus halli*				Listed as vulnerable in NSW.
CHORDATA/MAMMALIA	*Saccolaimus flaviventris*				Listed as vulnerable in NSW.
CHORDATA/MAMMALIA	*Vespadelus baverstocki*				Listed as vulnerable in NSW.

Invasive alien animal species

Phylum	Scientific name	Impacts	Changes at RIS update
ARTHROPODA/INSECTA	*Apis mellifera*	Actual (major impacts)	No change
CHORDATA/MAMMALIA	*Capra hircus*	Actual (major impacts)	No change
CHORDATA/MAMMALIA	*Felis catus*	Actual (major impacts)	No change
CHORDATA/MAMMALIA	*Sus scrofa*	Actual (major impacts)	No change
CHORDATA/MAMMALIA	*Vulpes vulpes*	Actual (major impacts)	No change

4.4 - Physical components

4.4.1 - Climate

Climatic region	Subregion
B: Dry climate	BWk: Mid-latitude desert (Mid-latitude desert)

The best estimate for climate change impacts by 2030 is for a 3 % reduction in average surface water availability in the Paroo, or about 13 GL/year less water on average (CSIRO, 2007). By 2030, CSIRO suggests there would be only minor changes to the average frequency and total volume of beneficial high flows to the Paroo Overflow Lakes. While average rainfall may be lower under these conditions, an increase in the highest rainfall intensities are estimated and would increase the frequency of the larger floods (CSIRO, 2007). Both the wet and dry extreme predictions for climate change scenarios for 2030 have implications for the volume and frequency of beneficial high flow events to the Paroo Overflow. The dry extreme is likely to be the most detrimental. For this scenario the average period between inflow events would increase by 13 % for the Paroo Overflow Lakes and total inflow volumes would decline by 15 %, which would have significant impacts on the sites ecology (CSIRO, 2007).

4.4.2 - Geomorphic setting

a) Minimum elevation above sea level (in metres): 110

a) Maximum elevation above sea level (in metres): 150

- Entire river basin ☐
- Upper part of river basin ☑
- Middle part of river basin ☑
- Lower part of river basin ☐
- More than one river basin ☐
- Not in river basin ☐
- Coastal ☐

Please name the river basin or basins. If the site lies in a sub-basin, please also name the larger river basin. For a coastal/marine site, please name the sea or ocean.

Paroo River Wetlands receive bulk of their water from the Paroo and Warrego Rivers (both rivers originate in south-west Queensland), and from local rainfall. The Paroo River is in the mid/upper Murray-Darling Basin.

4.4.3 - Soil

- Mineral ☑
- (Update) Changes at RIS update: No change ◉ Increase ○ Decrease ○ Unknown ○
- No available information ☐

Are soil types subject to change as a result of changing hydrological conditions (e.g., increased salinity or acidification)? Yes ○ No ◉

4.4.4 - Water regime

Water permanence

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

Source of water that maintains character of the site

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

Water destination

Presence?	Changes at RIS update
Feeds groundwater	unknown

Stability of water regime

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

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

The Paroo River flows through extensive floodplains before reaching the network of channels and wetlands known as the Paroo Overflow. Note that wetlands in the lower section of this catchment can also receive flows from the neighbouring Warrego River and during very high flows in the Darling River, water can also move from the Darling River into the Paroo River.
Wetlands in the Nocoleche NR depend mainly on flows from the Paroo River (and local rainfall);
Peery and Poloko lakes rely predominantly on flows from the Paroo River and fill after other overflow lakes further north are flooded, also from local rainfall, and from (permanent) artesian springs.

Waters in the Peery system can only leave through evaporation or when it overflows.
Flow variability is complex; a combination of frequency (how often filling and drying occurs), timing (when water is present), duration (period of inundation), extent and depth, and the variability over time of flooding.

(ECD) Connectivity of surface waters and of groundwater	The underlying bedrock of Peery and Poloko lakes prevents floodwater or rainwater from infiltrating the ground. Water flows from artesian springs into Peery Lake.

4.4.5 - Sediment regime

Significant accretion or deposition of sediments occurs on the site ☐

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

Significant transportation of sediments occurs on or through the site ☐

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

Sediment regime is highly variable, either seasonally or inter-annually ☑

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

Sediment regime unknown ☐

Please provide further information on sediment (optional):

During floods large amounts of sediments (and nutrients) are deposited onto the floodplains (including into wetland systems) – increasing fertility of the floodplains and improving water quality in the river.
Turbidity can range from high in the claypans, river channels and waterholes, and freshwater lakes, to moderate to low in black box, Eleocharis and lignum swamps, and low around the artesian springs.

(ECD) Water turbidity and colour	Turbidity: Low<100 FTU, medium>100 FTU and high>1000 FTU.
(ECD) Light - reaching wetland	Turbidity in wetlands in the Paroo River Wetlands Ramsar site determines the depth distribution of plant species.
(ECD) Water temperature	Water discharged into Peery Lake from the artesian springs is moderate to high in temperature (20–45°C).

4.4.6 - Water pH

Unknown ☑

Please provide further information on pH (optional):

Close to neutral pH - claypans, river channels and water holes
Weakly alkaline - black box, Eleocharis and lignum swamps, and artesian springs
Alkaline - freshwater lakes

4.4.7 - Water salinity

Fresh (<0.5 g/l) ☑

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

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

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

Unknown ☐

Please provide further information on salinity (optional):

Claypans, river channels and water holes, artesian springs and freshwater lakes have low (< 2000 µS/cm) salinity (the latter increases on drying); black box, Eleocharis and lignum swamps have moderate (~5000 µS/cm) salinity

4.4.8 - Dissolved or suspended nutrients in water

Unknown ☑

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

Flooding releases and transports nutrients that drive food webs – this is the main abiotic determinant of the structure and composition of aquatic plant, invertebrate, fish and waterbird communities in the system.
Nutrients include phosphorus, nitrogen, potassium, sodium, magnesium, calcium, and trace elements such as iron, manganese, copper, zinc and silicon.

(ECD) Dissolved organic carbon	Dissolved organic carbon is identified as a major chemical ecosystem component (Kingsford, R.T. and Lee, E. 2010).
(ECD) Redox potential of water and sediments	The redox potential of water and sediment is identified as a major chemical ecosystem component (Kingsford et al., 2010)

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

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

4.5 - Ecosystem services

4.5.1 - Ecosystem services/benefits

Provisioning Services

Ecosystem service	Examples	Importance/Extent/Significance
Food for humans	Sustenance for humans (e.g., fish, molluscs, grains)	Low
Fresh water	Drinking water for humans and/or livestock	Medium

Regulating Services

Ecosystem service	Examples	Importance/Extent/Significance
Maintenance of hydrological regimes	Groundwater recharge and discharge	High
Erosion protection	Soil, sediment and nutrient retention	Medium
Hazard reduction	Flood control, flood storage	Medium

Cultural Services

Ecosystem service	Examples	Importance/Extent/Significance
Recreation and tourism	Picnics, outings, touring	Low
Recreation and tourism	Recreational hunting and fishing	Low
Recreation and tourism	Nature observation and nature-based tourism	Low
Spiritual and inspirational	Cultural heritage (historical and archaeological)	High
Spiritual and inspirational	Contemporary cultural significance, including for arts and creative inspiration, and including existence values	High
Spiritual and inspirational	Spiritual and religious values	High
Spiritual and inspirational	Aesthetic and sense of place values	High
Scientific and educational	Important knowledge systems, importance for research (scientific reference area or site)	Low
Scientific and educational	Educational activities and opportunities	Medium

Supporting Services

Ecosystem service	Examples	Importance/Extent/Significance
Biodiversity	Supports a variety of all life forms including plants, animals and microorganizms, the genes they contain, and the ecosystems of which they form a part	High
Soil formation	Sediment retention	Medium
Soil formation	Accumulation of organic matter	Medium
Nutrient cycling	Storage, recycling, processing and acquisition of nutrients	High
Nutrient cycling	Carbon storage/sequestration	Low
Pollination	Support for pollinators	Medium

Optional text box to provide further information

Wetlands in the Paroo River catchment are important to Aboriginal people for their traditional, spiritual and cultural values. The Paroo River Wetlands are particularly important to the Baakandji people due to their significant role in the regional system of ‘dreaming tracks’. Aboriginal people believe that ancestral beings, such as Kuluwirru (a big fellow) and the two Ngyati (water serpents), travelled through the area, creating many of the landscape features including boulders, rivers, lakes and the springs. Some of the areas created by Kuluwirru are important as law enforcement sites to punish tribal members for unacceptable social behaviour (Wharton 2000). Although the traditional lifestyles of the Aboriginal people were disrupted by the arrival of graziers, there was no government interference until the 1930s, and traditional ceremonies continued to be held in the Paroo River catchment until at least the 1930s. Thus, many present-day Budjiti and Baakandji retain a strong affiliation with their country and maintain a strong oral history of the region (RIS 2007). The Paroo River Wetlands Ramsar site contains a significant numbers of Aboriginal artefacts such as ground stone artefacts, stone tools and stone arrangements (NPWS 2000, 2012) (Kingsford and Lee 2010).

Within the site: 100s

Outside the site: 1000s

Have studies or assessments been made of the economic valuation of ecosystem services provided by this Ramsar Site? Yes ○ No ○ Unknown ◉

4.5.2 - Social and cultural values

i) the site provides a model of wetland wise use, demonstrating the application of traditional knowledge and methods of management and use that maintain the ecological character of the wetland ☐

ii) the site has exceptional cultural traditions or records of former civilizations that have influenced the ecological character of the wetland ☐

iii) the ecological character of the wetland depends on its interaction with local communities or indigenous peoples ☐

iv) relevant non-material values such as sacred sites are present and their existence is strongly linked with the maintenance of the ecological character of the wetland ☐

<no data available>

4.6 - Ecological processes

(ECD) Nutrient cycling	Soil: Flooding- pulse of nutrients, sedimentation; drying- nutrients lock up, soils crack. Microorganisms process nutrients and organic matter on flooding; on drying change from anaerobic to aerobic forms, resistant stages.
(ECD) Animal reproductive productivity	On flooding, waterbirds, amphibians and zooplankton breed/reproduce. On drying, amphibians lay briefly resistant eggs in riparian vegetation; and zooplankton and benthic invertebrates propagule bank of resistant eggs.
(ECD) Vegetational productivity, pollination, regeneration processes, succession, role of fire, etc.	Aquatic plants: on flooding- germinate, grow and reproduce; on drying- seed bank of resistant spores.
(ECD) Notable species interactions, including grazing, predation, competition, diseases and pathogens	On flooding of wetlands birds of prey feed on small mammals; on drying of wetland, birds disperse to areas with greater prey resources. The Freshwater Yabbie (Cherax destructor) likely plays an important role in the trophic web within these systems.
(ECD) Notable aspects concerning migration	Birds, mammals and reptiles: move between dry areas and wetland for water and food supply; on drying of wetland, some species move to find food; others remain in dry country.
(ECD) Pressures and trends concerning any of the above, and/or concerning ecosystem integrity	A major issue in the Great Artesian Basin is the sustainable use of its groundwater resources. Loss of groundwater pressure can lead to reduced flows to artesian springs.

5 - How is the Site managed? (Conservation and management)

5.1 - Land tenure and responsibilities (Managers)

5.1.1 - Land tenure/ownership

Public ownership

Category	Within the Ramsar Site	In the surrounding area
Other public ownership	☐	☑
Provincial/region/state government	☑	☑
Local authority, municipality, (sub)district, etc.	☐	☑

Private ownership

Category	Within the Ramsar Site	In the surrounding area
Commercial (company)	☐	☑

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

Surrounding lands are Western Lands Leases (State Government), leased to pastoralists for grazing purposes; also includes travelling stock routes (TSR) on Crown lands – rights of passage – administered by NSW Rural Lands Protection Board (State Government).

5.1.2 - Management authority

Please list the local office / offices of any agency or organization responsible for managing the site:

Nocoleche Nature Reserve
NSW National Parks & Wildlife Service
Far West Region
183 Argent Street
BROKEN HILL NSW 2880

Provide the name and/or title of the person or people with responsibility for the wetland: A/Manager, Bourke Area is Andrew Wall and Manager, West Darling Area is John Holcombe

Postal address:

PO Box 788
BROKEN HILL NSW 2880

E-mail address: andrew.wall@environment.nsw.gov.au

5.2 - Ecological character threats and responses (Management)

5.2.1 - Factors (actual or likely) adversely affecting the Site's ecological character

Water regulation

Factors adversely affecting site	Actual threat	Potential threat	Within the site	Changes	In the surrounding area	Changes
Water abstraction		Medium impact	☐	No change	☑	unknown

Agriculture and aquaculture

Factors adversely affecting site	Actual threat	Potential threat	Within the site	Changes	In the surrounding area	Changes
Livestock farming and ranching	Low impact	Low impact	☐	No change	☑	No change

Biological resource use

Factors adversely affecting site	Actual threat	Potential threat	Within the site	Changes	In the surrounding area	Changes
Fishing and harvesting aquatic resources	Low impact	Medium impact	☑	unknown	☑	unknown

Invasive and other problematic species and genes

Factors adversely affecting site	Actual threat	Potential threat	Within the site	Changes	In the surrounding area	Changes
Invasive non-native/ alien species		unknown impact	☐	unknown	☑	unknown

Climate change and severe weather

Factors adversely affecting site	Actual threat	Potential threat	Within the site	Changes	In the surrounding area	Changes
Habitat shifting and alteration		High impact	☑	unknown	☑	unknown
Droughts		High impact	☑	unknown	☑	unknown

Please describe any other threats (optional):

This Ramsar site is an example of a near natural, arid, inland wetland system; There are no major diversions, dams or weirs, and the pattern of water flow, particularly the extent and duration of flooding and drying of the river and its natural drainage features, remains as a natural regime – this is important for the maintenance of biological diversity. Therefore, the greatest perceived threats are: changes in flooding patterns and climate change, followed by introduced flora and fauna, and fire.
Increased water resource development within the Warrego catchment could subsequently affect flows down Cuttaburra Creek that can feed the Ramsar (Nocoleche) wetlands.

5.2.2 - Legal conservation status

National legal designations

Designation type	Name of area	Online information url	Overlap with Ramsar Site
National Park			whole
State Protected Area (NSW)"	Nocoleche Nature Reserve		whole

5.2.3 - IUCN protected areas categories (2008)

- Ia Strict Nature Reserve ☑
- Ib Wilderness Area: protected area managed mainly for wilderness protection ☐
- II National Park: protected area managed mainly for ecosystem protection and recreation ☑
- III Natural Monument: protected area managed mainly for conservation of specific natural features ☐
- IV Habitat/Species Management Area: protected area managed mainly for conservation through management intervention ☐
- V Protected Landscape/Seascape: protected area managed mainly for landscape/seascape conservation and recreation ☐
- VI Managed Resource Protected Area: protected area managed mainly for the sustainable use of natural ecosystems ☐

5.2.4 - Key conservation measures

Legal protection

Measures	Status
Legal protection	Implemented

Habitat

Measures	Status
Catchment management initiatives/controls	Implemented
Hydrology management/restoration	Partially implemented

Species

Measures	Status
Control of invasive alien plants	Partially implemented
Control of invasive alien animals	Partially implemented

Human Activities

Measures	Status
Livestock management/exclusion (excluding fisheries)	Partially implemented
Harvest controls/poaching enforcement	Implemented
Regulation/management of wastes	Implemented
Communication, education, and participation and awareness activities	Implemented
Research	Implemented

Other:

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

5.2.5 - Management planning

Is there a site-specific management plan for the site? In preparation

Has a management effectiveness assessment been undertaken for the site? Yes ○ No ◉

If the site is a formal transboundary site as indicated in section Data and location > Site location, are there shared management planning processes with another Contracting Party? Yes ○ No ◉

Please indicate if a Ramsar centre, other educational or visitor facility, or an educational or visitor programme is associated with the site:

Visitors Centre (outside the Ramsar site due to the remote location and restricted access to some parts of the site) – for educational and tourism purposes.

URL of site-related webpage (if relevant): http://www.environment.nsw.gov.au/wetlands/ParooRiverRamsar.htm

5.2.6 - Planning for restoration

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

Further information

NA

5.2.7 - Monitoring implemented or proposed

Monitoring	Status
Water regime monitoring	Proposed
Animal species (please specify)	Implemented
Birds	Proposed
Plant species	Proposed

Monitoring to allow benchmarking/setting limits of acceptable change (to be established);
Ongoing monitoring of birds as part of larger bird study (Eastern Water Bird Survey)
Monitoring of threats to allow assessment of whether management actions for reducing the impacts of threats are effective in maintaining the ecological character.

Weed control programs are run annually within Sturt National Park. The majority of weed spraying, particularly of Noogoora burr occurs in late summer. Future monitoring of Noogoora weed is proposed for within the Ramsar site.

Pest monitoring in and around the site includes; feral pigs, fox, goats, cats and dogs.

6 - Additional material

6.1 - Additional reports and documents

6.1.1 - Bibliographical references

Refer to Attachment 1, in published literature attachments, as cannot fit in word limit.

6.1.2 - Additional reports and documents

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

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

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

iv. relevant Article 3.2 reports
<no file available>

v. site management plan
<no file available>

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

6.1.3 - Photograph(s) of the Site

Please provide at least one photograph of the site:

Paroo Mound Spring (*Mark Richardson/OEH, 12-12-2016*)

Aerial view of Peery Lake from north to south down western side (*Dragi Markovic/Department of the Environment, 26-03-2008*)

King Charlie Waterhole, Nocoleche Nature Reserve (*Neal Foster/OEH, 02-03-2011*)

Paroo Mound Spring (*Neal Foster/OEH, 10-01-2014*)

Aerial view of Peery Lake (*Neal Foster/OEH, 02-03-2009*)

Peery Lake shoreline (*Neal Foster/OEH, 02-03-2011*)

6.1.4 - Designation letter and related data

Designation letter
<1 file(s) uploaded>

Date of Designation: 2007-09-13