

Information Sheet on Ramsar Wetlands (RIS) – 2006-2008 version

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

NSW Wetlands Officer
NSW Department of Environment and Conservation
59 Goulburn St
PO Box A290
South Sydney NSW 1232
Telephone: (02) 9995 6500
Fax: (02) 9995 5962
Email: alison.curtin@environment.nsw.gov.au

FOR OFFICE USE ONLY.

DD MM YY

--	--	--

Designation date

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

Site Reference Number

2. Date this sheet was completed/updated:

30 March 2006

3. Country:

Australia

4. Name of the Ramsar site:

Paroo River Wetlands
(Nocoleche Nature Reserve and Peery and Mandalay Blocks (to be referred to as “Peery”) in Paroo-Darling 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:

7. Map of site:

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

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

- i) a hard copy (required for inclusion of site in the Ramsar List): ;
- ii) an electronic format (e.g. a JPEG or ArcView image) ;
- iii) a GIS file providing geo-referenced site boundary vectors and attribute tables .

b) Describe briefly the type of boundary delineation applied:

The Paroo River Wetlands Ramsar site are located in far north-west New South Wales (NSW). The Paroo River Wetlands consist of two main parts; the Nocoleche Nature Reserve component of the Ramsar site is approximately 180 km west of Bourke and the Peery component is approximately 240 km south-west of Bourke. Both components of the site lie on the floodplain of the Paroo River, the Nocoleche component being approximately 120 km north of the Peery component (see Map 1).

The Nocoleche Nature Reserve boundary, as gazetted on 21 September 1979 (See Map 2), is the Ramsar site boundary for the Nocoleche component of the site. A travelling stock reserve (TSR) and the Wanaaring-Wilcannia road running from north to south between the two sides of Nocoleche Nature Reserve 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 (See Map 2).

The boundary for the Peery component of the Ramsar site is the reserve boundary of the north-western part of Paroo-Darling National Park, as gazetted on 31 March 2000, bounded by a line commencing at 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", then in an easterly and then northerly direction following the gazetted boundary of this part of Paroo-Darling National Park to the point of commencement (see Map 3). Excluded from the Paroo-Darling National Park is the Wilcannia-Wanaaring Road and road reserve approximately (60.35m wide) as gazetted on 31 March 2000. The two Travelling Stock Reserve camping areas on the eastern edge of the National Park and the Rural lands Protection Board camping and water reserve on the northeast corner of the National Park are not included in the Ramsar site. An area of land in the north of the reserve is also excluded from the Ramsar site as it is the site of a telecommunications tower.

The above coordinates are measured using geographic / GDA94 parameters.

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

Nocoleche	144.156°E, 29.902°S (Centroid)
Peery	143.528°E, 30.764°S (Centroid)

9. General location:

The Paroo River Wetlands are located in far north-west New South Wales (NSW). The Paroo River Wetlands consist of two main parts; the Nocoleche Nature Reserve component of the Ramsar site is approximately 180 km west of Bourke and the Peery component is approximately 240 km south-west of Bourke. Both components of the site lie on the floodplain of the Paroo River, Nocoleche being 120 km north of Peery (see Map 1).

10. Elevation: (in metres: average and/or maximum & minimum) 110 - 150m.: ASL

11. Area: (in hectares)	Nocoleche Nature Reserve	71 133 ha
	Peery -	67 171 ha
	Total:	13,8304 ha

12. General overview of the site:

The Paroo River is the last remaining free-flowing river in the Murray-Darling Basin. Wetland types within the site include large overflow lakes, tree-lined creeks and waterholes, lignum and canegrass swamps, and artesian mound springs. It is one of the most important wetland systems for waterbirds in eastern Australia and it supports a number of threatened plant and animal species as well as significant native fish communities. The artesian mound springs at Peery Lake represent the largest active complex in New South Wales and one of the rarest landforms in Australia.

The Ramsar nominated wetlands include two key wetland areas along the Paroo River: Nocoleche Nature Reserve and Peery and Poloko Lakes within the Paroo-Darling National Park. Nocoleche Nature Reserve protects temporary and permanent floodplain wetlands, and Lakes Peery and Poloko are freshwater lakes of which a significant proportion lies within Paroo-Darling National Park.

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:

Criterion 1 – Representative, rare or unique wetland types

The Paroo River is the last free-flowing river in the Murray-Darling Basin. It is a unique 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 an important factor for the maintenance of biological diversity in the region (NPWS 2000). The community of the Paroo River and the Governments of NSW and Queensland, through the Border Rivers Catchment Commission, have signed an agreement to continue to allow the River to flow freely.

Peery Lake, the largest overflow lake on this system, contains 2 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.

Criterion 2 – Threatened species and threatened ecological communities

Salt Pipewort: Paroo-Darling National Park supports the plant species, Salt Pipewort (*Eriocaulon carsonii*) which is listed under the NSW *Threatened Species Conservation Act 1995* (TSC), the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC), the IUCN Red List of threatened plants (Vulnerable) and the ROTAP list of vulnerable species (Briggs and Leigh 1996). It is considered one of the rarest vascular plant species in NSW. The ‘Artesian Springs Ecological Community’ of which *Eriocaulon carsonii* is a key component, on Peery, is listed as endangered under the NSW TSC Act (1995) and ‘the community of native species dependent on natural discharge of groundwater from the Great Artesian Basin’ is listed under the EPBC Act (1999).

At Peery Lake the mound springs provide habitat for a nationally threatened plant species, the endemic Salt Pipewort (*Eriocaulon carsonii*). This is the only remaining population in NSW and consists of a single population with highly variable numbers. The largest number of individuals was estimated at a few thousand and more recently, the numbers have dropped to a few hundred. These variations are related to the filling of Peery Lake and additional unknown causes. *Eriocaulon carsonii* is a mound spring endemic, entirely restricted to flowing mound springs. It is known from mound springs in Queensland, NSW and South Australia. Within NSW it has been recorded from only 2 springs, but within the last 100 years, is only known from a single spring on the western side of Peery Lake. The population and cover of *E. carsonii* at Peery was assessed using quadrats. It was estimated that *E. carsonii* covers an area of 6500 cm² and the maximum number of individual plants is 3000 (Pickard 1996). This

is considered to be a crude upper estimate of the population. Knowledge of seasonal variability and reproduction of this plant is lacking. Threats to *E. carsonii* include reduction of water flow in the mound springs and trampling by vertebrate herbivores.

The Desert Carpet-weed (*Glinus orygiodes*), listed as threatened in NSW, is also believed to occur at Peery Lake. The population of *Schoenoplectus pungens* at Paroo-Darling National Park is the only known in western NSW and is considered of conservation concern (Bowen and Pressey 1993). *Dentella minutissima*, a prostrate herb that colonises wet sediments as floodwaters recede, is known from only two locations in NSW both of which are on the Paroo floodplain. It is listed as an endangered plant under the NSW, Threatened Species Conservation Act (1995).

The only known population of the aquatic plant *Aponogeton queenslandicus* in NSW is found on Nocoleche Nature Reserve. It is listed as endangered under the NSW Threatened Species Conservation Act. The only record of Spike Grass (*Elytrophorus spicatus*) in western NSW is recorded from Nocoleche Nature Reserve. Nocoleche Nature Reserve provides habitat for the tree Yapunyah (*Encalyptus ochrophloia*) whose Australian distribution is restricted to the floodplains of the Paroo and Warrego Rivers.

The endangered amphibious herb *Goodenia* “nocoleche” has recently been described and is restricted to wetlands of the Paroo and Bulloo River basins. *Nitella partita* is another endangered aquatic species known from only a few locations; the largest population is found within Nocoleche Nature Reserve. Another charophyte algae *Nitella* “parooensis” has also been discovered, and is restricted to temporary wetlands on Nocoleche.

Numerous species that occur within the Ramsar site are also identified by CITES. They include the following birds: brown goshawk *Accipiter fasciatus*, wedge-tailed eagle *Aquila audax*, whistling kite *Haliastur sphenurus*, black-breasted buzzard *Hamirostra melanosternon*, little eagle *Hieraaetus morphnoides*, square-tailed kite *Lophoictinia isura*, black kite *Milvus migrans*, brown falcon *Falco berigora*, Australian kestrel *Falco cendoroides*, grey falcon *Falco hypoleucos*, Australian hobby *Falco longipennis*, peregrine falcon *Falco peregrinus*, black falcon *Falco subniger*, brolga *Grus ribicunda*, Australian bustard *Ardeotis australis*, sulphur-crested cockatoo *Cacatua galerita*, pink cockatoo *Cacatua leadbeateri*, little corella *Cacatua alba*, red-winged parrot *Aprosmictus erythropterus*, Australian ringneck *Barnardius zonarius*, blue bonnet *Northiella haematogaster*, red-rumped parrot *Psephotus haemototus*, mulga parrot *Psephotus varius*, blue-winged parrot *Neophema chrysostoma*, Bourke’s parrot *Neopsephotus bourkii*, and southern boobook *Ninox novaeseelandiae*; and reptiles: Gould’s goanna *Varanus gouldii*, black-headed monitor *Varanus tristis* and carpet python *Morelia spilota*. The grey falcon *Falco hypoleucos* is also listed as near-threatened on the IUCN Red List.

Criteria 3 – Supports high level of biodiversity

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).

The wetlands of Nocoleche Nature Reserve and Peery contain a representative sample of the biodiversity of the Paroo catchment. Table 1 identifies species, genetic and ecosystem biodiversity known from the Ramsar wetlands. The information collection has not been consistent for both areas, nor across the entire range of taxa present, but it does provide an indication of the range of biodiversity supported by the wetland systems at Nocoleche and Peery, and within the Paroo river system. More complete species lists, or their references, can be found in the Management Plans for Nocoleche Nature Reserve and Paroo-Darling National Park.

Table 1. Biodiversity of the Paroo River Wetlands

Biodiversity Attribute	Nocoleche Source: NPWS 1999 (unless otherwise stated)	Peery Source: NPWS 2000 (unless otherwise stated)
------------------------	---	---

SPECIES DIVERSITY		
waterbirds	63 species (14 are of conservation concern) (Kingsford and Porter 1999)	<u>Lake Peery</u> : 42 species, 10 of which have been recorded breeding . <u>Lake Poloko</u> : 35 species, 4 of which have been recorded breeding (Kingsford and Porter 1999). 14 migratory birds listed in the CAMBA treaty, and 13 migratory birds listed in the JAMBA treaty (NPWS 2000).
other birds	177 species (14 are of conservation concern, 1 exotic)	237 species. 2 are vulnerable and 3 endangered in NSW.
vegetation	306 species (8 are of conservation concern, 25 exotics)	378 species in the Paroo-Darling National Park from a 2003 survey, following rain – extra 46 species from a dryer survey (Westbrooke <i>et al.</i> 2003).
reptiles	37 species (2 are of conservation concern, 0 exotics)	67 species (NPWS 2000). An additional survey in 1999 of Lake Peery identified 41 species (Annette Dean <i>pers comm.</i>).
frog	15 species (4 are of conservation concern, 0 exotics)	14 species (NPWS 2000) Lake Peery: 4 identified frog species (Annette Dean 2005 <i>pers.com</i>).
fish	8 species (Gehrke <i>et al.</i> 1999). 1 is of conservation concern, 2 exotics.	11 species in the lakes of the Paroo (Gehrke <i>et al.</i> 1999).
mammals	26 species (4 are of conservation concern, 9 exotics)	26 species, 2 are endangered and 7 considered vulnerable (NPWS 2000)
aquatic invertebrates	23 families of aquatic macroinvertebrates (Bruce Gray 2005 <i>pers com</i>). Crustacean spp. described below and/or in Category 20	17 families of aquatic macroinvertebrates (Bruce Gray 2005 <i>pers com</i>). See below and Category 20
GENETIC DIVERSITY		
fish	Golden perch in the Paroo River form a single breeding population (Keenan <i>et al.</i> 1996, 1998).	
ECOSYSTEM DIVERSITY		
ecosystem.	Floodplain wetlands: claypans, river channels and waterholes, <i>Eleocharis</i> swamps, lignum swamps and black box swamps	- Freshwater lakes that turn brackish from evaporation. Provide drought refuge. - Artesian mound spring at Lake Peery supports the Artesian springs ecological community (EPBC Act 1999). - The Peery Lake mound spring is one of the few places where permanent water occurs away from the Darling River in far-western NSW (NPWS

		2000).
--	--	--------

Significantly, the Paroo River Wetlands support a number of endemic species. They have been listed below.

The wetland supports one of the largest stands of Yapunyah, (Nocoleche Nature Reserve) Yapunyah *Eucalyptus ochrophloia* is a medium sized (~15 m.) floodplain tree restricted to the Paroo region in NSW (Brooker and Kleinig 1990). It has a rough, hard yellowish bark and has a high tolerance for drought and extremes of temperature.

In general, extremely wet periods favour the germination and establishment of these and other floodplain trees. The establishment of young plants is dependent on water remaining in the soil (Cassanova 1999). Personal accounts from honeybee keepers indicate that they flower after floods or large rain events.

There is currently no mapping of the extent of Yapunyah, but it is found along the river channels and waterholes of Nocoleche Nature Reserve. The seasonality, frequency, duration and magnitude of floods are all probably important for determining Yapunyah germination, establishment and condition.

Newly identified endemic crustacean species, (Nocoleche Nature Reserve): Wetlands in the Paroo catchment contain diverse macroinvertebrate communities, and several newly identified crustacean species that are endemic to this system have been identified (Timms 2001). Two new species in the genus *Branchinella* (Fairy shrimp) have been discovered, *Branchinella budjiti* and *B. campbelli*, along with a new genus in the family Branchipodidae and a new species of *Parastreptocephalus* (Streptocephalidae) (Timms 2001). The fairy shrimp are generally not found in Lake Peery or Poloko due to predation by the fish populations (Timms 2005 *pers. comm.*).

The wetland supports a genetically distinct and separate breeding population of Golden perch (Paroo River) – Golden perch *Macquaria ambigua* in the Paroo River form a single breeding population (Keenan *et al.* 1996, 1998). Periods of high flow play an important role in maintaining the links within this population of Golden Perch. If river flows are diverted so that wetlands are connected less frequently, the population of Golden Perch could be fragmented into smaller units which may not be viable.

Two new species of reptiles (Lake Peery): Two new species of reptiles have been recently identified from surveys of Peery Lake. *Ctenotus sp.* a striped skink and *Tympanocryptis sp.* a small earless dragon (Ross Sadler *pers. comm.*)

New Plant Species: Nocoleche Nature Reserve contains Starfruit (*Dentella minutissima*) and the only known NSW record for the aquatic plant *Aponogeton queenslandicus*, both of which are listed as threatened species in NSW. In 2000, *Nitella partita*, a charophyte algal species was rediscovered in temporary wetlands on Nocoleche, after having been absent for over 100 years. It was first described by the Swedish botanist Otto Nordstedt in 1889, when it was found near the Georgina River in Queensland. Nocoleche Nature Reserve is one of only four known locations in NSW for this species. Several new species of aquatic plants have also been found in temporary wetlands on Nocoleche Nature Reserve: another charophyte algae *Nitella* “parooensis” (Porter *pers comm.*) and a flowering plant, *Goodenia* “nocoleche”, a small yellow flowered aquatic herb (Pellow and Porter in press).

Peery Lake Mound Springs supports an undescribed species of *Utricularia* (Westbrooke *et al.* 2003).

Criterion 4: Supports plant and/or animal species at a critical stage in their life cycles, or provides refuge during adverse conditions

The Paroo River Wetlands and, in particular Peery and Poloko Lakes, constitute a key drought refuge in arid NSW (Morton *et al.* 1995) and play an important role in relation to waterbird breeding (Kingsford and Porter 1999). Eleven species of waterbirds have been recorded breeding at Peery Lake and 38 species at Nocoleche Nature Reserve (Kingsford and Porter 1999).

After filling, Lake Poloko can hold water for up to 22 months (in Kingsford *et al.* 1994) and Lake Peery may hold water for 36 months (Maher 1991). Lakes Peery and Poloko are freshwater lakes that become more brackish as the flood waters recede. Generally, salt lakes support higher numbers of waterbirds, and Lakes Peery and Poloko supported their greatest numbers when drying up and slightly saline (Kingsford *et al.* 1997). Lake Peery is able to maintain considerable populations of many waterbird species for up to 15 months after the end of a flood cycle when all other wetlands in the area have dried up or receded.

The artesian springs in Lake Peery are one of the few places where permanent water occurs away from the Darling River (NPWS 2000).

The Paroo River contains one of the healthiest native fish communities in the Murray-Darling river system, with high species diversity, strong recruitment of native species, and a relatively low incidence of exotic fish (eg. carp) (Gehrke *et al.* 1999). The maintenance of species diversity relies on the assortment of habitats provided along the Paroo, including pools, floodplains and permanent or semi-permanent lakes. Golden Perch and bony herring (*Nematolosa erebi*) are common in remnant waters in the Paroo catchment during the dry season (Boulton 1999). Although there is little specific research, it would appear that Lake Poloko, Lake Peery and the floodplain wetlands in Nocolche Nature Reserve provide important habitat for the fish populations of the Paroo.

Criterion 5: Regularly supports 20,000 or more waterbirds

The wetlands of the Paroo River have been identified as being of outstanding importance for waterbirds. Peery and Poloko Lake regularly support more than 20000 waterbirds. Aerial surveys in recent years have shown Peery Lake supported more than 20000 waterbirds in 1987, 1990 and 1993. The highest numbers were in 1993 when 35900 waterbirds were recorded. Poloko Lake also supported 28000 waterbirds in 1993 (Kingsford *et al.* 1997).

Criterion 7: Supports a significant proportion of indigenous fish subspecies, species or families, life-history stages, species interactions and/or populations that are representative of wetland benefits and/or values and thereby contribute to global biological diversity.

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 found (Silver Perch *Bidyanus bidyanus*, Spangled Perch *Leiopotherapon unicolor*, Bony Herring *Nematolosa erebi*, Hyrtl's Tandan *Neosilurus bryllii*, Gimson-spotted Rainbowfish *Melanotaenia thwaititii* and Australian Smelt *Retrobinna semoni*) in the Paroo River Wetlands. Although research has not been undertaken it is highly likely that these seven other 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).

15. Biogeography (required when Criteria 1 and/or 3 and /or certain applications of Criterion 2 are applied to the designation):

a) **biogeographic region:** The Mulga Lands bioregion

b) **biogeographic regionalisation scheme** (include reference citation): : Interim Bioregionalisation of Australia (IBRA) Version 5.1. Environment Australia 2000. Revision of the Interim Biogeographic Regionalisation of Australia (IBRA) and the development of Version 5.1. – Summary Report. Department of Environment and Heritage, Canberra.

16. Physical features of the site:

Geomorphology

The wetlands of Nocolche Nature Reserve comprise undulating sandplains and dunes, a reticulate system of broad, shallow, flat-bottomed tributary channels, floodplains and small lakes of the Paroo River and Cuttaburra/Kulkyne Creeks. Soils are dominated by sandy red earths and grey cracking clays.

The Peery component contains sandstone hills surrounded by stony plains, parallel dunes with swales, claypans and two overflow lakes, Peery and Poloko, which are terminal playa lakes. Peery Lake contains artesian mound springs in its northern basin. These overflow lakes are the result of channel systems being blocked by ranges of Palaeozoic bedrock. Soils are dominated by reddish clay sands.

Water and River Flows

The Paroo River Wetlands receive the bulk of their water from the Paroo and Warrego Rivers, which originate in south-western Queensland and drain catchments of 73 600 and 69 100 square kilometres respectively. However, there are also hundreds of small wetlands or claypans (from 1 to 50 hectares) which fill from local rainfall. Flooding is fairly frequent in comparison with most inland river systems with, on average, a major flood every 5 years, a moderate flood every 2-3 years and minor flooding at least yearly (Maher 1991). During 1990 a major flood on the Paroo inundated 686 000 hectares. The floodwaters filled the overflow lakes and continued downstream to reach the Darling River. A similar flood event in May 2000 caused this phenomenon to occur again. This freshwater flooding can inundate wetlands for a few weeks, or up to three years in the case of Peery Lake. Flooding in the Darling River can also back up and fill the Paroo overflow lakes.

Climate

The climate of the Paroo River Wetlands is semi arid to arid with an annual average rainfall of 250 mm. The wetlands lie on the edge of the summer rainfall zone resulting in highly variable rainfall patterns. The average maximum and minimum temperatures for summer are 36°C and 21°C and for winter 18°C and 4.5°C.

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 Paroo River stretches from a series of low ranges in central southern Queensland to the Darling River in New South Wales. The river is about 640 kilometres long and has a catchment area of 73,650 square kilometres. Flows in the Paroo are highly variable as the river receives water from local rainfall in the upper and lower catchment. Flows generally increase in volume until south of the Queensland border.

The Paroo River Wetlands lie within the Great Artesian Basin and are underlain by Cretaceous bedrock, which is exposed in places to form low hills. The majority of the wetlands are overlain by Quaternary sands and alluvial deposits.

The Paroo Overflow is at the southern end of the Paroo Catchment on a vast floodplain area. It is a complex network of channels, wetlands and lakes, covering an area of about 76,280 hectares. In rare events, floodwaters may enter the Overflow from the Warrego River in the north, via the Cuttaburra Creek and Channels, or from the Darling River in the south.

The Paroo Overflow is a complex branched system, with direction of water flow governed by volume. The bulk of the water travels down the western branch to fill shallow channels, floodplain depressions and lakes. Flows of 980 gigalitres or more are required to fill the lakes of the Paroo Overflow and reach the Darling River. Ranging from 3.5 to 5.5 metres deep, some of these lakes retain water for up to three years. Tongo Lake, Yantabangee, Poloko, Gilpoko, Peery, Nine Mile, Dick and Copago Lakes, and Mullawoolka Basin are a chain of Overflow lakes on the western branch that are filled sequentially by floodwaters. This filling order may be reversed if floodwaters from the Darling River back up along the Paroo Overflow. For example Lake Dick can fill from Paroo or Darling River floodwaters and may remain flooded for up to 18 months. On the eastern margin of this branch, Blue and Green Lakes are also filled by Paroo flows.

18. Hydrological values:

The Paroo River and its wetlands have two significant hydrological values. The Artesian springs at Lake Peery support a nationally significant habitat and community. In addition, the highly variable flow regime of the Paroo – Warrego Rivers are the last remaining un-modified river systems in the Murray Darling Basin. The free-flowing nature of the river is of great value to the traditional owners of this country, and to the graziers who depend on the river for their livelihood.

Artesian Springs: Artesian springs occur on the margins of the Great Artesian Basin as vents for the natural discharge of artesian water. The Great Artesian Basin (GAB) 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 km. and has an estimated total water storage of 64 900 million megalitres. Natural discharge occurs mainly from mound springs in the south-western area.

At Peery Lake there are two distinct sets of mound springs on the eastern and western sides of the Lake. The springs are highly variable ranging from mounds up to 2 meters high and 4 meters in diameter, to muddy depressions in the bed of Peery Lake. Mounds are formed from accumulated mud and evaporite. Springs on both sides of Peery Lake include both active and extinct forms. Mound springs are considered to be the rarest landform in Australia (Pickard 1992) and the Peery Lake mound springs form the largest active spring complex in NSW.

Variable flows: The Paroo River 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 and Warrego Rivers are highly turbid like most inland rivers. For much of the time the Paroo River exists as a string of highly turbid water holes, but in flood it is characterised by extensive floodplains and lakes (Bunn and Davies 1999). During floods large amounts of water, 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 (Mussared 1997). Any changes to the hydrology of the Paroo through diversions or extractions will have a negative impact on wetlands and their values (Kingsford 1999).

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 • Ip • Is • 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:

Ts N W P Tp Y

20. General ecological features:

The main wetland habitats and vegetation types (from Kingsford and Porter 1999) are:

Claypans and canegrass swamps which are shallow wind-formed pans that flood from local runoff and dry quickly. The dominant vegetation is Canegrass (*Eragrostis australasica*), Nardoo (*Marsilea drummondii*) and stoneworts (*Nitella spp* and *Chara spp*).

River channels and waterholes which are shallow to deep channels formed by moving water and sediment deposition of major streams. The dominant vegetation is River Red Gum (*Eucalyptus camaldulensis*), Black Box (*E. largiflorens*), Coolibah (*E. coolabah*) and Yapunyah (*E. ochrophloia*), Lignum (*Muehlenbeckia florulenta*), grasses and annual herbs.

Blackbox swamps which are small to large, shallow to moderately deep basins often formed on the edge of river floodplains and sometimes in sandplains. The dominant vegetation is Black Box (*Eucalyptus largiflorens*), Bimble Box (*E. populnea*) and a ground cover of grasses, sedges, herbs and submerged water plants.

Lignum swamps and overflow plains which are small to large basins and alluvial plains with shallow distributary channels. The dominant vegetation is Black Box (*Eucalyptus largiflorens*), Bimble Box (*E. populnea*), River Cooba (*Acacia stenophylla*), Lignum (*Muehlenbeckia florulenta*), grasses, sedges and herbs.

Eleocharis swamps which are shallow to moderate depth basins in sandplains with a flat or hummocky base and potholes. The margins are generally treeless with occasional shrubs including Lignum (*Muehlenbeckia florulenta*), Spiny Lignum (*Muehlenbeckia borrida*) and Nitre Goosefoot (*Chenopodium nitrariaceum*). There is an extensive covering of sedges including *Eleocharis acuta* and *E. pallens* as well as grasses and herbs.

Freshwater lakes which are terminal basins of old streams, carved or blocked channel systems that can be large and deep. The dominant vegetation around margins is River Red Gum (*Eucalyptus camaldulensis*), Black Box (*E. largiflorens*), Bimble Box (*E. populnea*), River Cooba (*Acacia stenophylla*), sedges, grasses and herbs.

Artesian mound springs are the vents for the natural discharge of artesian water. The springs are highly variable ranging from mounds up to 2 meters high and 4 meters in diameter, to muddy depressions in the bed of Peery Lake. The dominant vegetation of the mound springs is sedges (*Eleocharis* or *Cyperus* spp.), samphires and the endemic Salt Pipewort (*Eriocaulon carsonii*).

21. Noteworthy flora:

Appendix A lists the plant species known from the Paroo River Wetlands. Noteworthy flora include the Salt Pipewort *Eriocaulon carsonii*, the Desert Carpet Weed *Glinus orygioides*, *Dentella minutissima*, a prostrate herb, the aquatic plant *Aponogeton queenslandicus*, Spike Grass *Elytrophorus spicatus* and the Yapunyah tree *Eucalyptus ochrophloia*.

22. Noteworthy fauna:

The wetlands of Nocoleche Nature Reserve and Peery are known for their waterbird populations, and also for an incredible wet and dry cycle that supports a range of native plants and animals associated with episodic flooding. The following information has been sourced from the Plan of Management for Nocoleche (NPWS 1999), except where referenced otherwise.

Waterbirds

For Peery and Poloko Lakes 55 waterbird species and over 35 000 individuals have been recorded (Kingsford *et al.* 1994). At least eleven waterbird species have been recorded breeding on the lakes. In Nocoleche Nature Reserve 63 species of waterbirds have been recorded with breeding records for 38 of these species (Kingsford and Porter 1999).

Fifteen waterbird species found on the Paroo River Wetlands are covered by the Japan and China Migratory Bird Agreements (JAMBA and CAMBA respectively) with Australia, and listed as migratory species under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.

Five waterbird species from the Paroo River Wetlands are listed under the NSW Threatened Species Conservation Act and a further 16 are considered of conservation concern in western NSW. The 5 threatened species include Freckled Duck (*Stictonetta naevosa*), which has been recorded in large numbers (>1000) on Peery Lake and breeding in Nocoleche Nature Reserve; Blue-billed Duck (*Oxyura australis*), an almost wholly aquatic species which has been recorded breeding in Nocoleche Nature Reserve; Brolga (*Grus rubicunda*), once widespread in NSW but now largely confined to wetlands in north-western NSW; Painted Snipe (*Rostratula benghalensis*), a nomadic species not often seen; and Black-tailed Godwit (*Limosa limosa*), a migratory shorebird which may migrate regularly through western NSW.

The 16 waterbird species considered of conservation concern in western NSW include species such as Great Crested Grebe (*Podiceps cristatus*), Australian Pelican (*Pelecanus conspicillatus*), Straw-necked Ibis (*Threskiornis spinicollis*), Australian White Ibis (*T. molucca*) and Glossy Ibis (*Plegadis falcinellus*) and Caspian Tern (*Sterna caspia*) (Smith *et al.* 1995). All of these species, although considered relatively common, have restricted breeding distributions of which a substantial proportion occurs in western NSW.

Terrestrial Birds

Seven terrestrial bird species found in the Paroo River Wetlands are listed as threatened in NSW. Three are birds of prey; the Black-breasted Buzzard (*Hamirostra melanosternon*), Square-tailed Kite (*Lophoictinia isura*) and Grey Falcon (*Falco hypoleucos*). All three species have undergone severe decline in their distribution in NSW, particularly in the last 40 years and all have been recorded breeding along the Paroo River. The Australian Bustard (*Ardeotis australis*), once common in grasslands and open woodlands in NSW, is now only a visitor to areas of north-western NSW. The Pink Cockatoo (*Cacatua leadbeateri*), although common, has a restricted distribution with north-western NSW a stronghold. Hall's Babbler (*Pomatostomus halli*), a bird of the Mulga (*Acacia aneura*) woodlands was only discovered in the 1960s and again its distribution is restricted to north-western NSW. Pied Honeyeater (*Certhiomyx variegatus*) is usually regarded as nomadic and occurs irregularly in western NSW as it follows the flowering of shrubs.

Another 4 terrestrial bird species found in the Paroo River Wetlands are considered of conservation concern. They are the Brown Quail (*Coturnix ypsilophora*), Chestnut-breasted Quail-thrush (*Cinclosoma castaneothorax*) and Black-chinned Honeyeater (*Meliphreptus gularis*), which all suffer from habitat loss, and the Buff-rumped Thornbill (*Acanthiza reguloides*), which has a restricted breeding distribution in western NSW (Smith *et al.* 1995).

Mammals

There are 3 threatened mammal species known from the Paroo River Wetlands and all are insectivorous bats. The Yellow-bellied Sheathtail Bat (*Saccolaimus flaviventris*), Little Pied Bat (*Chalinolobus picatus*), and Inland Forest Bat (*Vespadelus baverstocki*) have all been found in a variety of habitats, but little is known of their ecology as they have rarely been recorded. The Water Rat (*Hydromys chrysogaster*) is of conservation concern in western NSW and is found throughout the Paroo River (Dickman *et al.* 1993). In addition, the Short-beaked Echidna *Tachyglossus aculeatus*, the Fat-tailed Dunnart *Sminthopsis crassicaudata*, four species of kangaroo and six other microchiropterans have been recorded in the site.

Reptiles and Frogs

Two new species of reptiles have been recently found in surveys of Peery Lake, in Paroo-Darling National Park. *Ctenotus* sp. a striped skink and *Tympanocryptis* sp. a small earless dragon (Ross Sadler *pers. comm.*) have been identified. The vulnerable Wedgesnout Ctenotus (*Ctenotus brooksi*) was also identified during a 2001 herpetofauna survey of Peery Lake (Annette Dean *pers. comm.*). In addition, a total of six reptiles were identified as possible vulnerable or endangered species that were predicted to occur in the general vicinity of Paroo-Darling National Park.

Significant reptile and amphibian species for NSW recorded at Nocoleche Nature Reserve include fat-tailed diplodactylus (*Diplodactylus conspicillatus*), narrow-banded snake (*Simoselaps fasciolatus*), the Murray turtle *Emydura macquarii*, the carpet python *Morelia spilota variegata*, the sand goanna *Varanus gouldii*, striped burrowing frog (*Litoria alboguttata*) and the frogs *Cyclorana verrucosa*, *Crinia parinsignifera*, and *Litoria latopalmata*.

Macroinvertebrates

Wetlands in the Paroo catchment contain diverse macroinvertebrate communities (Boulton 1999). Several newly identified crustacean species that are endemic to this system have also been identified. In total, 29 different taxa have been collected and identified (predominantly to family level) from monitoring sites at Nocoleche Nature Reserve and Perry Creek near Mandalay. Samples were collected and processed in accordance with the NSW AusRivAS aquatic macroinvertebrate bioassessment protocol (Turak and Waddell 2002; Turak, Waddell, and Johnstone 2004) [www.deh.gov.au/water/rivers/nrhp/manual-nsw/index.html] and [http://ausriv.as Canberra.edu.au/Bioassessment/Macroinvertebrates/Man/Sampling/NSW/NSW_Ausrivas_protocol_Version2_2004.pdf]. The resultant data was stored in the National River Health data base (Gray and Hosking 2003 onwards). A fauna species list can be found in Appendix B. Two new species in the genus Branchinella (Fairy shrimp) have also been discovered, *Branchinella budjiti* and *B. campbelli*, along with a new genus in the family Branchipodidae and a new species of *Parastreptocephalus* (Streptocephalidae) (Timms 2001). The fairy shrimp are generally not found in Lake Peery or Poloko due predation by fish populations (Timms 2005 *pers. comm.*).

Fish

The Paroo River supports one of the healthiest native fish communities in the Murray-Darling Basin with high species diversity, strong recruitment of native species and a relatively low incidence of introduced species such as carp. Healthy populations of Golden Perch (*Macquaria ambigua*), Spangled Perch (*Leiopotherapon unicolor*) and Bony

Herring (*Nematalosa erebi*) are found throughout the wetlands (Gerhke *et al.* 1999). Significantly, Golden Perch found in the Paroo River are genetically distinct from Golden Perch found elsewhere in the Murray-Darling Basin.

A fauna species list can be found in Appendix B.

23. Social and cultural values:

a) The traditional Aboriginal owners of the Paroo country in NSW are the Baakandji and Budjiti people. The Paroo River Wetlands are highly significant to local Aboriginal people in terms of archaeological, traditional and contemporary social values. They retain a strong oral history of the region and continuing attachment to this landscape.

The Paroo Overflow and Peery Lake area is an important focus in the regional system of 'Dreaming Tracks'. Ancestral beings such as Kuluwirru (a big fellow) and the two Ngyati (water serpents) travelled through the area creating many of the landscape features still seen in the area including boulders, rivers and lakes and the springs. Some of the areas created by Kuluwirru are particularly important as law places where unacceptable social behaviour was punished (Wharton 2000).

The archaeology of the Paroo region is only beginning to be investigated, but work in Queensland has shown evidence of occupation for at least 14 000 years (Robins 1999). The Baakandji and Budjiti were fisher people, gatherers, hunters and seed harvesters (evidence suggests regular burning to maintain grass seed production). Around 2000 years ago there was a distinct change in social and cultural practices including increases in ceremonial gatherings and exchanges of both performance and goods which in turn led to the development of more complex technology for harvesting of resources.

The Baakandji and Budjiti lived traditionally until around the 1840s when European graziers pushed their stock along the Paroo River. They were met with violent resistance which did not ease until the 1860s when Aboriginal people began to be employed as pastoral workers (Goodall 1999). It is known that traditional ceremonies were held on the Paroo until at least the mid 1910s and that government interference in the lives of these people in NSW did not occur until the 1930s. Many present-day Baakandji and Budjiti people have colourful memories of living and working on the Paroo and collecting the many bush foods it offers, and so retain a strong affiliation with their country.

Nocoleche was one of the first official pastoral holdings on the Paroo River and was established in 1887. The history of European ownership has been well documented with ownership changing eight times in the period up to dedication as a nature reserve in 1978 (NPWS 1999). The infrastructure which remains from this pastoral period includes homesteads, shearers' quarters complex, an outstation, stock yards, fences and a suspension bridge across the river. Peery also previously supported a large productive pastoral industry. Evidence of this past industry is still abundant with fence lines, woolshed, shearers' quarters, water tanks and homestead still in place (NPWS 2000).

The Paroo River and wetlands have provided the Baakandji and Budjiti people with food and resources for thousands of years. This is still the case. Native plants provide significant bush foods and medicines. Wild fruit such as quandongs, "Gruie" and wild bananas and other plant foods such as gum from gidgee, leopard wood and white wood trees, wild onions and yams were eaten and still are when they can be collected. All Aboriginal people have his or her own totem or *Dreaming*. A totem could be a bird, animal or rock and it represents as the groups sacred emblem. These sacred emblems never change and are said to have been designated by their ancestor spirits. The totem of the Budjiti people is the pademelon (Bunbra) and the totems of the Baakandji people include the wedge-tailed eagle (Bilyar) and mallee-fowl. Aboriginal people believe they must look after their totem.

Native animals have also provided an enormous resource of food to the Baakandji and Budjiti people on the Paroo. For example, witchetty grubs, honey bees, wild turkeys, mussels, yabbies, fish, swan eggs, duck eggs, kangaroo and Grungrun (turps) were all hunted or collected and eaten by Baakandji and Budjiti people living on the river.

Doris Turner recalls, from her childhood growing up on the river:

“We looked along the river bank for our food, and go along with this little bookey wire and get a witchetty grub out of the hole on the river, cook it in the ashes. We don’t worry about going home to our parents for dinner, we eat, have a feed down there, or go in the river and diving for mussels and chuck it in the ashes and that, yes and the yabbies.... And the wild fruit, yeab.... We never starved like children today, when we used to find our own food, ‘cause there’s a lot of food there...” Doris Turner, 2005.

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:

ii). Both Paroo-Darling National Park and Nocolceche Nature Reserve have Aboriginal artefacts present in extremely large numbers including ground stone artefacts, flaked stone tools, microblade workshops, campsites and stone arrangements. In Paroo-Darling National Park important quarry sites exist which would have supplied the raw materials for sandstone milling slabs, high-grade quartzite flakes, and silcrete and porcelanite for flaked stone tools. These resources were traded with other groups. Lake Peery has been a key place to the Baakandji people for thousands of years. Many stone artifacts and important art sites are associated with the lake.

iii). Aboriginal Dreaming stories, or creation stories are of great spiritual importance to the Aboriginal people and are closely tied to Aboriginal custom and law. There are a number of stories that talk about the creation of the Paroo River country. One particular story of the Baakandji people links the northern area of this nomination, Nocolceche with the southern portion, Peery Lake. The story is of the Ngatyi (Rainbow Serpent) Dreaming, as told to Jeremy Beckett by Alf Barlow (nd) and begins at Ularara (near Nocolceche). The two Ngatyi traveled over the land creating the sand hills, waterholes, lakes, swamps and springs. There are also stories about the formation of Peery Springs, the Kulluwirru Stories. The Kulluwirru Stories (Howitt version), are of a giant blackfellow who traveled over the Barrier ranges to Pirrie Lake, where some other blacks and his uncles lived. These others made fun of him and called him big head and he determined upon revenge. When they went away next day after wallaby he emptied Pirrie lake into his skin bag. The others on returning home tired and thirsty found all the water gone. He refused to give them any water from his skin bag and they perished and became the stones that lie about lake Pirrie. The big fellow then knocked a hole in the rock and the Pirrie Spring came out. This he left for his two uncles and he also gave them certain rules for their guidance, among them for initiations (Wharton 2000). In another story, the creator hero Coolooberroo collects water from the springs in a kangaroo skin bag later emptying the bag to create the Darling River.

The Baakandji and Budjiti people are the traditional owners of the Paroo, their country’s boundaries intersecting around Wanaaring. The Budjiti people extend to the north and the Baakandji to the south. Nocolceche has significance for both groups for trade, as a living place, work place and for food, water and stories. For the Baakandji and Budjiti the Paroo country has natural, cultural and spiritual significance. The river is “the lifeblood of the community” (Lorna McNiven, Budjiti Elder). Paroo-darling National park has significance to the Baakandji people.

Paroo-Darling National Park is reserved for natural and cultural heritage conservation and appropriate recreation. Nocolceche Nature Reserve is primarily for the conservation, study and appreciation of natural and cultural heritage.

24. Land tenure/ownership:

(a) within the Ramsar site: Both Nocolceche Nature Reserve and Peery (Paroo-Darling National Park) are gazetted under the NSW *National Parks and Wildlife Act 1974*; Nocolceche in 1978 and the Peery and Mandalay portions of Paroo-Darling National Park in April 2000.

(b) in the surrounding area: The lands surrounding both reserves are Western Lands Leases leased to pastoralists for grazing purposes. The TSR bisecting Nocolceche Nature Reserve, and those adjoining Peery, are Crown lands administered by the NSW Rural Lands Protection Board. The road that bisects Peery is a Shire Main Road. This roads maintenance is the responsibility of the Wilcannia Central Darling Shire .

25. Current land (including water) use:

a) within the Ramsar site:

b) in the surroundings/catchment: The surrounding lands, including most of the Paroo catchment, are leased for grazing.

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:

(b) in the surroundings/catchment: Grazing.

27. Conservation measures taken:

a Department of Environment and Conservation: Paroo-Darling National Park was gazetted in April 2000 and covers an area of 42,480 hectares together with a more recent addition of 50,467 hectares. Lakes Peery and Poloko are within the park boundaries. It has National Park status under the NSW *National Parks and Wildlife Act 1974*, which ensures that future management will aim to minimise disturbance to natural and cultural heritage and provide opportunities for appropriate recreation. A draft management plan for Paroo-Darling National Park is currently (August 2005) being prepared.

Nocoleche Nature Reserve, an area of 74 000 hectares, was dedicated in 1978. It has nature reserve status under the National Parks and Wildlife Act which ensures that future management will aim to conserve, study and promote the appreciation of wildlife, natural environments and natural phenomenon. A management plan was adopted for Nocoleche Nature Reserve in January 2000. Control of introduced plants and animals is a high priority, as is the restoration of water flow to wetlands affected by road works.

A Memorandum of Understanding (MoU) has been signed by the Baakandji and Budjiti people and by the National Parks managers of the Ramsar site to recognise the input of the traditional owners in the nomination of this site and to establish a mechanism for their ongoing management in the Ramsar site.

Nocoleche Nature Reserve, Peery Springs and Peery National Park (now part of the larger Paroo-Darling National Park) are all listed on the Register of the National Estate, recognising their natural and cultural values nationally (Department of the Environment and Heritage 2005a).

Peery Lake, Poloko Lake and the Paroo River tributary channels (which includes the Nocoleche wetlands) are all recognised as nationally important wetlands and are included in *A Directory of Important Wetlands Australia* (DIWA) (Environment Australia 2001; Department of the Environment and Heritage 2005b).

Water Management Planning: On 18 July 2003, the Intergovernmental Agreement for the Paroo River between NSW and Queensland was signed under the Border Catchments Memorandum of Understanding that covers all of the rivers that flow between Queensland and New South Wales. Through the Agreement, the NSW and Queensland governments are working together to protect this unique river system and the people who rely on it. Part IV of the Agreement defines the roles and responsibilities of the States for the implementation of natural resource management within the Paroo River Agreement area (ie the Paroo catchment). The Agreement advocates the development of a whole of catchment management plan (still to be developed).

Under their state *Water Act 2000* the Queensland Government has developed the **Water Resource (Warrego, Paroo, Bulloo and Nebine) Plan 2003**. The Water Resource Plan provides a framework for the allocation and sustainable management of surface and overland flow water. Under *Clause 11* of the plan, "the volume of water that crosses the Queensland-New South Wales border must not be less than 99% of the end of system flow for the pre-development flow pattern from Paroo and associated streams". For the Warrego, which flows into the Paroo through the Cuttaburra Channels in high flows, "the volume of water that crosses the Queensland-New South Wales border must not be less than 89% of end of system flow for the pre-development flow pattern from Paroo and associated streams".

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) There is a current Plan of Management for Nocoleche Nature Reserve which is being implemented under the NSW National Parks and Wildlife Act 1974.

d) Describe any other current management practices:

28. Conservation measures proposed but not yet implemented:

The Paroo-Darling National Park Draft Management Plan is currently being prepared. Resource assessment and community consultation is still to be undertaken before the draft plan is completed. When completed the final plan will be adopted under section 81 of the *National Parks and Wildlife Act 1974*.

There is a current Plan of Management for Nocoleche Nature Reserve, which is due for revision in 2006. This will endeavour to include a greater emphasis on the Aboriginal values of the Reserve and a description of the ecological character of the site.

The plans will be consistent with the Australian Ramsar Management Principles (Schedule 6 of the Commonwealth *Environment Protection And Biodiversity Conservation Regulations 2000*) and will together form the management plan for the Paroo River Wetlands Ramsar site, as provided for under the EPBC Act.

29. Current scientific research and facilities:

A number of research projects are proposed under the management plan for Nocoleche Nature Reserve, including a comprehensive survey of Aboriginal cultural heritage, continued research on waterbirds and wetlands, ecology of wetland vegetation, ecology of frog species and a study of the impact of fishing on aquatic fauna.

The Reserve has shearers' quarters, which are well maintained and have been used for many years as a base for scientific research.

30. Current communications, education and public awareness (CEPA) activities related to or benefiting the site:

Paroo-Darling National Park is a relatively new park and in a remote location, consequently visitor numbers are very low. It is expected that a number of conservation education proposals will be listed in the draft plan of management. A Visitors Centre was opened in 2005 in White Cliffs.

Nocoleche Nature Reserve is also remote and not dedicated for recreation purposes. The management plan allows use of the Reserve by the scientific community, local schools and community groups. There is also an area set aside for traditional Aboriginal uses.

31. Current recreation and tourism:

Visitor use is low at Nocoleche Nature Reserve and expected to remain so; recreation and tourism will be low impact with the provision of low-key facilities (day use area only). The Reserve will have restricted access and there are no proposals to provide additional recreational facilities.

It is expected that recreation and tourism needs will be higher in Paroo-Darling National Park and this will be addressed in the plan of management.

32. Jurisdiction:

Territorial: Government of New South Wales
Functional: Department of Environment and Conservation

33. Management authority:

Nocoleche Nature Reserve	Paroo-Darling National Park
NSW National Parks & Wildlife Service	NSW National Parks & Wildlife Service
Upper Darling Region	Far West Region
16-18 Barton Street	183 Argent St

(PO Box 453)
Cobar 2835
Phone (02) 6836 2692
Fax (02) 6836 3330

(PO Box 788)
Broken Hill 2880
Phone (08) 8080 3200
Fax (08) 8080 3201

34. Bibliographical references:

Australian Nature Conservation Agency, 1996. A Directory of Important Wetlands in Australia. Second Edition. ANCA, Canberra.

Ayers, D. 1996. Threatened Species of Western New South Wales. NSW National Parks and Wildlife Service, Sydney.

Barker, J., Grigg, G.C., and Tyler, M.J. 1995. A field guide to Australian Frogs. Surrey Beatty & Sons, Sydney.

Boulton, A. 1999. "Why Variable Flows Are Needed for Invertebrates of Semi-Arid Rivers" in Kingsford R. T. (ed) A Free-flowing River: The Ecology of the Paroo River, National Parks and Wildlife Service, Sydney, pp 113-28.

Bowen, P.F. and Pressey, R.L. 1993. Localities and Habitats of Plants with Restricted Distributions in the Western Division of NSW. *Occasional Paper No. 17*. NSW National Parks and Wildlife Service, Sydney.

Briggs, J.D. & Leigh, J.H., 1996. Rare or Threatened Australian Plants 1995 rev. edn

Brooker, M.I.H. and Kleinig, D.A. 1990. Field guide to the Eucalypts Vol. 2. Inkata Press, Melbourne.

Bunn S.E. and Davies P. M. 1999. "Aquatic Food Webs in Turbid, Arid-zone rivers: Preliminary Data from Cooper Creek, Western Queensland" in Kingsford R. T. (ed) A Free-flowing River: The Ecology of the Paroo River, National Parks and Wildlife Service, Sydney, pp. 67-76.

Cassanova, M.T. 1999. "Plant establishment in Paroo wetlands: The importance of water regime" in Kingsford R. T. (ed) A Free-flowing River: The Ecology of the Paroo River, National Parks and Wildlife Service, Sydney, pp. 113-28.

Christidis, L. and Boles, W.E. 1994. The taxonomy and species of birds of Australia and its territories. Royal Australian Ornithologists Union Monograph 2. RAOU, Melbourne.

Cogger, H.G. 1994. Reptiles and Amphibians of Australia. Reed Books, Sydney.

Cottingham, P. 1999. Scientific Forum on River Condition and Flow Management of the Moonie, Warrego, Paroo, Bulloo and Nebine River Basins. Queensland Department of Natural Resources, Australia.

Department of the Environment and Heritage. 2005a. The Register of the National Estate. Searchable database online at <http://www.ahc.gov.au/register/index.html>. Accessed August 2005.

Department of the Environment and Heritage. 2005b. Australian Wetlands Database. Searchable database online at <http://www.deh.gov.au/water/wetlands/database/index.html>. Accessed August 2005.

Dickman, C. R., Pressey, R. L., Lim, L. and Parnaby H. E. 1993. Mammals of Particular Conservation Concern in the Western Division of NSW. *Biological Conservation* 65, 219-248.

Environment Australia, 2001. A Directory of Important Wetlands in Australia. Third edition. Environment Australia, Canberra.

Gerhrke, P.C., Schiller, C.B. and Brown P. 1999. "Native fish and River Flows: The Paroo Perspective" in Kingsford, R.T. (ed.) A Free-Flowing River: the ecology of the Paroo River. NSW National Parks and Wildlife Service, Sydney, pp. 210-222.

- Goodall, H. 1999. Contesting changes on the Paroo and its sister rivers, in Kingsford, R.T. (ed.) A Free-Flowing River: the ecology of the Paroo River, NSW National Parks and Wildlife Service, Sydney, pp.179-200.
- Goodrick, G. N. 1984. Wetlands of North-Western New South Wales. Occasional Paper No. 6. NSW National Parks and Wildlife Service, Sydney.
- Gray, B. J. and Hosking, J. 2003 (onwards). *National River Health Data Base*. Commonwealth of Australia, Canberra.
- Hawking, J. H. and Smith, F. J. 1997. *Colour Guide to Invertebrates of Australian Inland Waters*. Cooperative Research Centre for Freshwater Ecology Identification Guide No. 8. Murray-Darling Freshwater Research Centre, Thurgoona.
- Hawking, J.H. 2000. *Key to Keys: A Guide to Keys and Zoological Information to Identify Invertebrates from Australian Inland Waters*. Second Edition. Cooperative Research Centre for Freshwater Ecology Identification Guide No. 2. Murray-Darling Freshwater Research Centre, Thurgoona.
- Hawking, J. H., Smith, and Le Busque. 2004 (onwards). *Colour Web Key Guide* [www.clw.csiro.au/ColourWebGuide]. CSIRO / Murray-Darling Freshwater Research Centre, Thurgoona.
- Keenan, C. Watts, R and Serafini, L. 1996. "Population genetics of golden perch, silver perch and catfish within the Murray-Darling Basin" in R.J Banens and R. Lehane (eds) Proceedings fo the 1995 Riverine Environment Forum October 1995, Murray-Darling Basin Commission, Attwood, pp 17-26.
- Keenan, C. Watts, R. and Serafini, L. 1998. Population Genetics of golden perch (*Macquaria ambigua*), silver perch (*Bidyanus bidyanus*) and eel-tailed catfish (*Tandanus tandanus*) within the Murray-Darling Basin, Final report on NRMS Project M262 to the Murray Darling Basin Commission, Southern Fisheries Centre, Department of Primary Industries, Brisbane.
- Kingsford, R.T. (ed.) 1999. A Free-Flowing River: the ecology of the Paroo River. NSW National Parks and Wildlife Service, Sydney.
- Kingsford, R.T. and Porter, J.L. 1999. "Wetlands and waterbirds of the Paroo and Warrego Rivers" in Kingsford, R.T. (ed.) A Free-Flowing River: the ecology of the Paroo River, NSW National Parks and Wildlife Service, Sydney, pp. 23-50.
- Kingsford, R.T., Bedward, M. and Porter, J.L. 1994. Waterbirds and Wetlands in Northwestern New South Wales. Occasional Paper No. 19. NSW National Parks and Wildlife Service, Sydney.
- Kingsford, R.T., Thomas, R.F. and Wong, P.S. 1997. Significant wetlands for waterbirds in the Murray-Darling Basin, Murray-Darling Basin Commission, Canberra.
- Lunney, D. Hand, S. Reed, P. and Butcher, D. 1994. The Future of the Fauna of Western New South Wales. Royal Zoological Society of NSW: Sydney.
- Maher, M.T. 1991. An Inland Perspective on the Conservation of Australian Waterbirds. PhD thesis, UNE.
- Morgan, G. and Terrey, J. 1992. Nature Conservation in Western NSW. National Parks Association of NSW Inc. Sydney.
- Morton, S.R., Short, J. and Barker, R.D. 1995. Refugia for Biological Diversity in arid and Semi-arid Australia, *Biodiversity Series* No.4.
- Mussared, D. 1997. Living on Floodplains. The Cooperative Research Centre for Freshwater Ecology. The Murray-Darling Basin Commission.

- NSW National Parks and Wildlife Service. 2000. Nocolche Nature Reserve Plan of Management, NSW National Parks and Wildlife Service, Sydney.
- NSW National Parks and Wildlife Service. 2000. Peery National Park Draft Plan of Management, NSW National Parks and Wildlife Service, Sydney.
- NSW National Park and Wildlife Service 2001. Artesian Springs Ecological Community – Endangered Ecological Community Listing, NSW National Parks and Wildlife Service, Sydney
- Pellow, B.J. and Porter, J.L. (in press) A new species of *Goodenia* (Goodeniaceae) from Nocolche Nature Reserve, Far Western Plains, New South Wales, *Telopea*.
- Pickard, J. 1992. Artesian Springs in the Western Division of New South Wales. Graduate School of the Environment Working Paper Series No. 9202, pp. 1-120.
- Pickard, J. 1996. Conservation recovery plan: *Eriocaulon carsonii*. NSW National Parks and Wildlife.
- Ponder, W.F. 1986. Mound Springs of the Great Artesian Basin. pp 403-420 In de Deckker, P. and Williams W.D. (Eds), *Limnology in Australia*. CSIRO, Melbourne and W. Junk, The Hague.
- Ponder, W.F. (1999) Box 4.5, Mound Springs. p 50 In Boulton, A.J. and Brock, M.A. *Australian Freshwater Ecology: Processes and management*. Glen Eagles Publishing, Adelaide.
- Queensland Government, Department of Natural Resources 2000. Draft Water Management Plan Warrego, Paroo, Bulloo and Nebine Catchments (Draft WMP).
- Queensland Government, Department of Natural Resources and Mines. 2005. The Great Artesian Basin.
- Robins, R. 1999. Clocks for rocks: an archeological perspective on the Currawinya lakes, in Kingsford, R.T. (ed.) *A Free-Flowing River: the ecology of the Paroo River*, NSW National Parks and Wildlife Service, Sydney, pp. 150-178.
- Robinson, M. 1993. *A Field Guide to Frogs*. Australian Museum/Reed, Sydney.
- Sadler, R.A., Pressey, R.L. and Whish, G.L. 1996. Reptiles and Amphibians of Particular Conservation Concern in the Western Division of New South Wales: Distributions, Habitats, and Conservation Status. *Biological Conservation* 69:41-54.
- Simpson, K. and N. Day. 1993. *Field Guide to the Birds of Australia*. Viking O'Neil, Melbourne.
- Smith, J., Ellis, M., Ayers, D., Mazzer, T., Wallace, G., Langdon, A. and Cooper, M. 1998 *The Fauna of Western NSW: The Northern Floodplains Region*, NSW National Parks and Wildlife Service, Sydney.
- Smith, P.J., Smith, J.E., Pressey, R.L. and Whish, G.L. 1995. Birds of Particular Conservation Concern in the Western Division of New South Wales: Distributions, Habitats and Threats. *Biological Conservation* 69, 315-338.
- Strahan, R. 1995. *The Mammals of Australia*. Reed Books, Sydney.
- SunWater, 2005. SunWaterOnline: 07 Jul 2005 10:10.
- Swan, G. 1990. *Snakes and Lizards of New South Wales*. Three Sisters Publications, Winmalee.
- Timms, B.V., 2001. Two new species of fairy shrimp (Crustacea: Anostraca: Thamnocephalidae :*Branchinella*) from the Paroo, inland Australia. *Records of the Australian Museum* 53 (2):247-254.

Turak, E., Hose, G., and Waddell, N. 2002. *Australia-Wide Assessment of River Health: New South Wales Bioassessment Report (NSW Final Report)*. Monitoring River Health Initiative Technical Report Number 2a, Department of the Environment and Heritage and NSW Environment Protection Authority, Canberra and Sydney [http://www.deh.gov.au/water/rivers/nrhp/nsw/index.html].

Turak, E. and Waddell, N. 2002. *Australia-Wide Assessment of River Health: New South Wales AusRivAS Sampling and Processing Manual*. Monitoring River Health Initiative Technical Report Number 13, Department of the Environment and Heritage and NSW Environment Protection Authority, Canberra and Sydney [http://www.deh.gov.au/water/rivers/nrhp/manual-nsw/index.html].

Turak, E., Waddell, N., and Johnstone. 2004. *New South Wales Australian River Assessment System (AusRivAS) Sampling and Processing Manual*. NSW Department of Environment and Conservation, Sydney [http://ausriv.as.canberra.edu.au/Bioassessment/Macroinvertebrates/Man/Sampling/NSW/NSW_Ausrivas_protocol_Version2_2004.pdf].

Watts, R.J. 1999. "Biodiversity in the Paroo River and its Wetlands" in Kingsford, R.T. (ed.) *A Free-Flowing River: the ecology of the Paroo River*, NSW National Parks and Wildlife Service, Sydney, pp.13-22.

Westbrooke, M., Leversha, J., Gibson, M., O'Keefe, M., Milne, R., Gowans, S., Harding, C., and Callister, K. 2003. Vegetation of Peery Lake area, Paroo-Darling National Park, western New South Wales. *Cunninghamia* 8 (1):111-128.

Wharton, W. 2000. Changing fortunes of the Paroo, Australian Heritage Commission.

Williams, W. D. 1980. *Australian Freshwater Life: The Invertebrates of Australian Inland waters*. Second Edition, MacMillan Education Australia Pty Ltd, Melbourne.

Williams, W. D. 1980. *Australian Freshwater Life: The Invertebrates of Australian Inland waters*. Second Edition, MacMillan Education Australia Pty Ltd, Melbourne.

Appendix A
Plant Species of the Paroo River Wetlands
(from Kingsford and Porter 1999 and updated by Porter 2000)

- ◆ indicates species listed under the NSW Threatened Species Conservation Act
- ♣ indicates species listed nationally under ROTAP (Rare Or Threatened Australian Plants)
- ♥ indicates species of conservation concern in western NSW
- indicates introduced species

Family	Species	Common name
Characeae	<i>Chara australis</i> <i>Chara braunii</i> <i>Chara fibrosa</i> ◆ <i>Nitella partita</i> <i>Nitella cristata</i> <i>Nitella sonderi</i> <i>Nitella pseudoflabellata</i> <i>Nitella subtilissima</i> <i>Nitella 'parooensis'</i>	
Marsiliaceae	<i>Marsilea drummondii</i> <i>Marsilea angustifolia</i>	Nardoo Narrow-leaf nardoo
Ophioglossaceae	<i>Ophioglossum polyphyllum</i>	Adders tongue
Sinopteridaceae	<i>Cheilanthes sieberi</i>	Rock fern
Alismataceae	<i>Damasonium minus</i>	Starfruit
Aponogetonaceae	♣ ◆ <i>Aponogeton queenslandicus</i>	
ANGIOSPERMS : MONOCOTS		
Amaryllidaceae	<i>Crinum flaccidum</i>	Darling Lily
Cyperaceae	<i>Cyperus bifax</i> <i>Cyperus difformis</i> <i>Cyperus gilesii</i> <i>Cyperus iria</i> <i>Cyperus squarrosus</i> <i>Eleocharis pallens</i> <i>Eleocharis pusilla</i> <i>Eleocharis acuta</i> <i>Fimbristylis dichotoma</i> <i>Lipocarpus microcephala</i> <i>Schoenoplectus dissacanthus</i>	Downs nutgrass Dirty Dora Bearded-flat sedge Pale spike rush Small spike-rush Common spike rush Common fringe rush Club rush
Hydrocharitaceae	<i>Ottelia ovalifolia</i>	Swamp Lily
Juncaceae	<i>Juncus aridicola</i>	Tussock rush
Najadaceae	<i>Najas tenuifolia</i>	Water nymph
Poaceae	<i>Agrostis avenacea</i> var. <i>avenacea</i> <i>Aristida anthoxanthoides</i> <i>Astrelba pectinata</i> <i>Bothriochloa erianthoides</i>	Blown grass Pale wiregrass Barley Mitchell grass Satintop grass

Family	Species	Common name
	<i>Chloris divaricata</i> <i>Chloris pectinata</i> <i>Chloris truncata</i> <i>Chrysopogon fallax</i> <i>Cymbopogon obtectus</i> <i>Dicanthium sericeum</i> <i>Digitaria coenivola</i> <i>Digitaria brownii</i> <i>Diplachne fusca</i> ♥ <i>Elytrophorus spicatus</i> <i>Enneapogon avenaceus</i> <i>Enteropogon acicularis</i> <i>Eragrostis australasicus</i>	Windmill grass Comb-windmill grass Windmill grass Golden beard grass Silky heads Queensland bluegrass Finger panic Cotton panic grass Brown beetle grass Spikegrass Bottle washers Curly windmill grass Canegrass
	• <i>Eragrostis cilianensis</i> <i>Eragrostis dielsii</i> <i>Eragrostis eriopoda</i> <i>Eragrostis kennedyae</i> <i>Eragrostis lacunaria</i> <i>Eragrostis laniflora</i> <i>Eragrostis parviflora</i> <i>Eragrostis setifolia</i> <i>Eriochloa australiensis</i> <i>Leptochloa digitata</i> <i>Panicum decompositum</i> • <i>Panicum gibbum</i> <i>Paspalidium jubiflorum</i> <i>Sporobolus caroli</i> <i>Stipa scabra</i> ssp. <i>scabra</i> <i>Stipa variabilis</i> <i>Themeda australis</i> <i>Thyridolepis mitchelliana</i> <i>Trinaphis mollis</i>	Stinkgrass Mulka Woollybutt Small flowered lovegrass Purple lovegrass Woollybutt Weeping lovegrass Neverfail Australian cupgrass Umbrella canegrass Native millet Warrego grass Fairy grass Kangaroo grass Mulga Mitchell grass Purple needlegrass
ANGIOSPERMS : DICOTS		
Aizoaceae	<i>Glinus lotoides</i> ♣ ♦ <i>Glinus orygiodes</i>	Carpet-weed Desert Carpet-weed
Amaranthaceae	<i>Alternanthera angustifolia</i> <i>Alternanthera denticulata</i> <i>Alternanthera nodiflora</i>	Narrow-leaf joyweed Lesser joyweed Common joyweed
Apiaceae	<i>Eryngium plantagineum</i>	Long eryngium
Asteraceae	• <i>Xanthium occidentale</i> • <i>Xanthium spinosum</i> <i>Brachycome goniocarpa</i> <i>Calotis hispidula</i> <i>Calotis inermis</i> <i>Centipeda cunninghamii</i> <i>Epaltes australis</i> <i>Minuria denticulata</i> <i>Minuria integerrima</i> <i>Senecio glossanthus</i>	Noogoora burr Bathurst burr Dwarf daisy Bogan flea Fluffy burr-daisy Common sneeze weed Spreading nut-heads Woolly minuria Smooth minuria Slender groundsel
Boraginaceae	• <i>Heliotropium curassavicum</i> • <i>Heliotropium supinum</i>	Smooth heliotrope Prostrate heliotrope
Caryophyllaceae	• <i>Spergularia rubra</i>	Sandspurry
Chenopodiaceae	<i>Atriplex holocarpa</i> <i>Atriplex nummularia</i> <i>Atriplex vesicaria</i> <i>Chenopodium auricomum</i> <i>Disphyma crassifolium</i> ssp. <i>clavellatum</i>	Old man saltbush Bladder saltbush Golden goosefoot

Family	Species	Common name
	<i>Enchylaena tomentosa</i> <i>Maireana aphylla</i> <i>Maireana pyramidata</i> <i>Sclerolaena convexula</i> <i>Sclerolaena decurrens</i> <i>Sclerolaena diacantha</i> <i>Sclerolaena tricuspis</i> <i>Salsola kali</i> var. <i>strobilifera</i> <i>Sclerostegia tenuis</i>	Ruby saltbush Black bluebush Green copperburr Grey copperburr Streaked poverty-bush, Giant redburr Knobby buckbush
Elatinaceae	<i>Bergia trimera</i> <i>Elatine gratioloides</i>	Small water fire Waterwort
Eriocaulaceae	♣♦ <i>Eriocaulon carsonii</i>	Salt Pipewort
Fabaceae Subfamily Faboideae	• <i>Medicago laciniata</i> <i>Glycine canescens</i> <i>Glycyrrhiza acanthocarpa</i> <i>Lotus cruentus</i>	Cut leaf medic Silky glycine Native liquorice Red flowered lotus
Subfamily Mimosoideae	<i>Acacia oswaldii</i> <i>Acacia salicina</i> <i>Acacia stenophylla</i>	Miljee Cooba River cooba
Frankeniaceae	<i>Frankenia gracilis</i> <i>Frankenia serpyllifolia</i>	Dainty sea-heath Bristly sea-heath
Haloragaceae	<i>Haloragis aspera</i> <i>Myriophyllum verrucosum</i>	Rough raspwort Red water-milfoil
Lamiaceae	<i>Mentha australis</i> <i>Teucrium racemosum</i>	River mint Grey germander
Lobeliaceae	<i>Pratia concolor</i> <i>Pratia darlingensis</i>	Poison pratia Matted pratia
Myoporaceae	<i>Eremophila bigoniiflora</i> <i>Eremophila divaricata</i> ssp. <i>divaricata</i> <i>Eremophila longifolia</i> <i>Eremophila polyclada</i> <i>Myoporum montanum</i>	Eurah Spreading emubush Berrigan, Emubush Flowering lignum Western boobialla
Myrtaceae	<i>Eucalyptus camaldulensis</i> <i>Eucalyptus coolabah</i> <i>Eucalyptus largiflorens</i> <i>Eucalyptus ocbrophiola</i> <i>Eucalyptus populnea</i> ssp. <i>bimbil</i> <i>Melaleuca densispicata</i>	Red gum Coolibah Black box Yapunyah Poplar box, Bimblebox Swamp paperbark
Onagraceae	<i>Ludwigia peploides</i> ssp. <i>montevidensis</i>	Water primrose
Oxalidaceae	<i>Oxalis corniculata</i>	Yellow wood sorrel
Plantaginaceae	<i>Plantago turrijera</i>	Small sago weed
Polygonaceae	<i>Muehlenbeckia florulenta</i> <i>Muehlenbeckia horrida</i> <i>Persicaria attenuata</i> <i>Persicaria lapathifolia</i> <i>Persicaria plebium</i>	Lignum Spiny lignum Knotweed Pale knotweed Small knotweed
Portulacaceae	<i>Portulaca intraterranea</i>	Large pigweed
Ranunculaceae	<i>Mysurus minimus</i> <i>Ranunculus pentandrus</i>	Mouse-tail

Family	Species	Common name
Rubiaceae	<i>Ranunculus sessiflorus</i>	
Scrophulariaceae	◆ <i>Dentella minutissima</i> <i>Glossostigma diandrum</i> <i>Gratiola pumilio</i> <i>Mimulus repens</i>	Mudmat
Solanaceae	<i>Stemodia florulenta</i>	Bluerod
Tamaricaceae	<i>Nicotiana simulans</i>	Native tobacco
Thymeliaceae	● <i>Tamarix aphylla</i>	Tamarisk , Athel Pine
Verbenaceae	<i>Pimelea microcephala ssp microcephala</i> <i>Pimelea trichostachya</i>	Shrubby rice flower Spiked rice flower
	<i>Verbena officinalis</i> <i>Verbena supina</i>	Common verbena Trailing verbena

Appendix B
Fauna of the Paroo River Wetlands
(from Kingsford and Porter 1999 and NSW Wildlife Atlas 2000)

- ◆ species listed as threatened under the NSW Threatened Species Conservation Act
- ▲ species listed under JAMBA and/or CAMBA
- ♥ species of conservation concern in Western NSW (Dickman *et al.* 1993, Smith *et al.* 1995, Saddler *et al.* 1996)
- ♣ waterbird species recorded breeding
- introduced species

CLASS AMPHIBIA

Order Salientia

Family Hylidae

Frog (*Cyclorana cultripes*)
 Water-holding Frog (*Cyclorana platycephala*)
 ♥ Warty Water-holding Frog (*Cyclorana verrucosa*)
 ♥ Striped Burrowing Frog (*Litoria alboguttata*)
 Green Tree Frog (*Litoria caerulea*)
 Broad-palmed Frog (*Litoria latopalmata*)
 Peron's Tree Frog (*Litoria peronii*)
 Desert Tree Frog (*Litoria rubella*)

Family Myobatrachidae

Barking Marsh Frog (*Limnodynastes fletcheri*)
 Spotted Grass Frog (*Limnodynastes tasmaniensis*)
 Common Spadefoot Toad (*Neobatrachus sudelli*)
 Crucifix Toad (*Notaden bennettii*)
 ♥ Brown Toadlet (*Crinia deserticola*)
 ♥ Plains Froglet (*Crinia parinsignifera*)

CLASS REPTILIA

Order Testudines

Family Chelidae

♥ Murray Turtle (*Emydura macquarii*)

Order Squamata

Family Gekkonidae

Gecko (*Diplodactylus byrnei*)
 Spiny-tailed Gecko (*Diplodactylus ciliaris*)
 ♥ Fat-tailed Gecko (*Diplodactylus conspicillatus*)
 Steindachner's Gecko (*Diplodactylus steindachneri*)
 ♥ Northern Dtella (*Gehyra dubia*)
 Tree Dtella (*Gehyra variegata*)
 Bynoe's Gecko (*Heteronotia binoei*)
 Beaded Gecko (*Lucasium damaeum*)
 Smooth Knob-tailed Gecko (*Nephrurus levis*)
 Beaked Gecko (*Rhynchoedura ornata*)

Family Pygopodidae

Legless Lizard (*Delma tineta*)
 Burton's Legless-lizard (*Lialis burtonis*)

Family Agamidae

Central Notted Dragon (*Ctenophorus nuchalis*)
 Painted Dragon (*Ctenophorus pictus*)
 Gilbert's Dragon (*Lophognathus gilberti*)
 Central Bearded Dragon (*Pogona vitticeps*)

Family Varanidae

Gould's Goanna or Sand Goanna (*Varanus gouldii*)
 Black-headed Monitor (*Varanus tristis*)

Family Scincidae

Carnaby's Wall Skink (*Cryptoblepharus carnabyi*)
 striped skink (*Ctenotus leonhardtii*)
 Regal Striped Skink (*Ctenotus regius*)
 striped skink (*Ctenotus schomburgkii*)
 ♥ striped skink (*Ctenotus strachbii*)
 Desert Skink (*Egernia inornata*)
 Broad-banded Sand Swimmer (*Eremiascincus richardsonii*)
 Boulenger's Skink (*Morethia boulengeri*)
 Eastern Blue-tongued Lizard (*Tiliqua scincoides*)
 Shingle-back Lizard (*Trachydosaurus rugosus*)

Family Typhlopidae

blind snake (*Ramphotyphlops bituberculatus*)

Family Boidae

♥ Carpet Python (*Morelia spilota variegata*)

Family Elapidae

Mulga or King Brown Snake (*Pseudochis australis*)
 Western Brown Snake (*Pseudonaja nuchalis*)
 Eastern Brown Snake (*Pseudonaja textilis*)
 Coral Snake (*Simoselaps australis*)
 ◆ Narrow-banded Snake (*Simoselaps fasciolatus*)

CLASS MAMMALIA

Order Monotremata

Family Tachyglossidae

Short-beaked Echidna (*Tachyglossus aculeatus*)

Order Polyprotodonta

Family Dasyuridae

Fat-tailed Dunnart (*Sminthopsis crassicaudata*)

Order Diprotodonta

Family Macropodidae

Western Grey Kangaroo (*Macropus fuliginosus*)
 Eastern Grey Kangaroo (*Macropus giganteus*)
 Common Wallaroo (*Macropus robustus*)
 Red Kangaroo (*Macropus rufus*)

Order Chiroptera

Family Emballonuridae

◆ Yellow-bellied Sheath-tail-bat (*Saccolaimus flaviventris*)

Family Molossidae

White-striped Mastiff-bat (*Tadarida australis*)

Family Vespertilionidae

- Gould's Wattle Bat (*Chalinolobus gouldii*)
- ◆ Little Pied Bat (*Chalinolobus picatus*)
- ◆ Inland Forest Bat (*Vespadelus baverstockii*)
- Little Forest Bat (*Vespadelus vulturnus*)
- Lesser Long-eared Bat (*Nyctophilus geoffroyi*)
- Western Broad-nosed Bat (*Scotorepens balstoni*)
- Little Broad-nosed Bat (*Scotorepens greyii*)

Order Rodentia

Family Muridae

- ♥ Water Rat (*Hydromys chrysogaster*)
- House Mouse (*Mus musculus*)

Order Carnivora

Family Canidae

- Fox (*Vulpes vulpes*)

Family Felidae

- Cat (feral) (*Felis catus*)

Order Lagomorpha

Family Leporidae

- Rabbit (*Oryctolagus cuniculus*)

Order Artiodactyla

Family Suidae

- Pig (feral) (*Sus scrofa*)

Family Bovidae

- Cattle (feral) (*Bos taurus*)
- Horse (feral) (*Equus caballus*)
- Goat (feral) (*Capra hircus*)
- Sheep (feral) (*Ovis aries*)

CLASS AVES

(CHRISTIDIS AND BOLES 1994 AS TAXONOMIC REFERENCE)

Order Struthioniformes

Family Casuariidae

Emu (*Dromaius novaehollandiae*)

Order Galliformes

Family Phasianidae

- ♥ Brown Quail (*Coturnix ypsilophora*)

Order Anseriformes

Family Anatidae

- Chestnut Teal (*Anas castanea*)
- ♣ Grey Teal (*Anas gracilis*)
- ♣ Australasian Shoveler (*Anas rhynchos*)
- ♣ Pacific Black Duck (*Anas superciliosa*)
- ♣ Hardhead (*Aythya australis*)
- ♣ Musk Duck (*Biziura lobata*)
- ♣ Maned Duck (*Chenonetta jubata*)
- ♣ Black Swan (*Cygnus atratus*)
- ♣ Plumed Whistling-Duck (*Dendrocygna eytoni*)
- ♣ Pink-eared Duck (*Malacorhynchus membranaceus*)
- ◆ ♣ Blue-billed Duck (*Oxyura australis*)
- ◆ ♣ Freckled Duck (*Stictonetta naevosa*)

Order Podicipediformes

Family Podicipedidae

- Hoary-headed Grebe (*Polyocephalus polyocephalus*)
- ♣ Australasian Grebe (*Tachybaptus novaehollandiae*)
- ♥ Great Crested Grebe (*Podiceps cristatus*)

Order Pelecaniformes

Family Anhingidae

- ♥ ♣ Darter (*Anhinga melanogaster*)

Family Phalacrocoracidae

- ♥ ♣ Great Cormorant (*Phalacrocorax carbo*)

- ♣ Little Pied Cormorant (*Phalacrocorax melanoleucos*)
- ♣ Little Black Cormorant (*Phalacrocorax sulcirostris*)
- ♥ ♣ Pied Cormorant (*Phalacrocorax varius*)

Family Pelecanidae

- ♥ ♣ Australian Pelican (*Pelecanus conspicillatus*)

Order Ciconiiformes

Family Ardeidae

- ♣ White-faced Heron (*Ardea novaehollandiae*)
- ♣ White-necked Heron (*Ardea pacifica*)
- ◆ ♥ ♣ Great Egret (*Ardea alba*)
- Little Egret (*Egretta garzetta*)
- ♥ ♣ Intermediate Egret (*Ardea intermedia*)
- Rufous Night Heron (*Nycticorax caledonicus*)

Family Plataleidae

- ♣ Yellow-billed Spoonbill (*Platalea flavipes*)
- ♥ ♣ Royal Spoonbill (*Platalea regia*)
- ◆ ♥ ♣ Glossy Ibis (*Plegadis falcinellus*)
- ♥ ♣ Australian White Ibis (*Threskiornis molucca*)
- ♥ ♣ Straw-necked Ibis (*Threskiornis spinicollis*)

Order Falconiformes

Family Accipitridae

- Collared Sparrowhawk (*Accipiter cirrocephalus*)
- Brown Goshawk (*Accipiter fasciatus*)
- Wedge-tailed Eagle (*Aquila audax*)
- Whistling Kite (*Haliastur sphenurus*)
- ◆ Black-breasted Buzzard (*Hamirostra melanosternon*)
- Little Eagle (*Hieraaetus morphnoides*)
- ◆ Square-tailed Kite (*Lophoictinia isura*)
- Black Kite (*Milvus migrans*)

Family Falconidae

- Brown Falcon (*Falco berigora*)
- Australian Kestrel (*Falco cenchroides*)
- ◆ Grey Falcon (*Falco hypoleucos*)

Australian Hobby (*Falco longipennis*)
Peregrine Falcon (*Falco peregrinus*)
Black Falcon (*Falco subniger*)

Order Gruiformes

Family Gruidae

◆♣ Brolga (*Grus rubicunda*)

Family Rallidae

♣ Eurasian Coot (*Fulica atra*)
♣ Black-tailed Native-hen (*Gallinula ventralis*)
Australian Spotted Crane (*Porzana fluminea*)
Baillon's Crane (*Porzana pusilla*)
Spotless Crane (*Porzana tabuensis*)

Family Otididae

◆ Australian Bustard (*Ardeotis australis*)

Order Turniciformes

Family Turnicidae

Little Button-quail (*Turnix velox*)

Order Charadriiformes

Family Scolopacidae

♣ Bar-tailed Godwit (*Limosa lapponica*)
◆♣ Black-tailed Godwit (*Limosa limosa*)
♣ Common Sandpiper (*Actitis hypoleucos*)
♣ Sharp-tailed Sandpiper (*Calidris acuminata*)
♣ Curlew Sandpiper (*Calidris ferruginea*)
♣ Red-necked Stint (*Calidris ruficollis*)
♣ Long-toed Stint (*Calidris subminuta*)
♣ Wood Sandpiper (*Tringa glareola*)
♣ Common Greenshank (*Tringa nebularia*)
♣ Marsh Sandpiper (*Tringa stagnatilis*)

Family Rostratulidae

◆♣ Painted Snipe (*Rostratula benghalensis*)

Family Recurvirostridae

♣ Black-winged Stilt (*Himantopus himantopus*)
♣ Red-necked Avocet (*Recurvirostra novaehollandiae*)

Family Charadriidae

♣ Black-fronted Dotterel (*Elseyornis melanops*)
♣ Red-capped Plover (*Charadrius ruficapillus*)
Red-kneed Dotterel (*Erythrogonys cinctus*)
Inland Dotterel (*Charadrius australis*)
♣ Masked Lapwing (*Vanellus miles*)
♣ Banded Lapwing (*Vanellus tricolor*)

Family Glareolidae

Australian Pratincole (*Stilia isabella*)

Family Laridae

♥♣ Silver Gull (*Larus novaehollandiae*)
♣ White-winged Black Tern (*Chlidonias leucoptera*)
Whiskered Tern (*Chlidonias hybridus*)
♣♥♣ Caspian Tern (*Sterna caspia*)
Gull-billed Tern (*Sterna nilotica*)

Order Columbiformes

Family Columbidae

Diamond Dove (*Geopelia cuneata*)
Peaceful Dove (*Geopelia striata*)
Crested Pigeon (*Ocyphaps lophotes*)
Common Bronzewing (*Phaps chalcoptera*)

Order Psittaciformes

Family Cacatuidae

Sulphur-crested Cockatoo (*Cacatua galerita*)
◆ Major Mitchell's Cockatoo (*Cacatua leadbeateri*)
Galah (*Cacatua roseicapilla*)
Little Corella (*Cacatua sanguinea*)
Cockatiel (*Nymphicus hollandicus*)

Family Psittacidae

Red-winged Parrot (*Aprosmictus erythropterus*)
Australian Ringneck (*Barnardius zonarius*)
Budgerigar (*Melopsittacus undulatus*)
Blue Bonnet (*Northiella haematogaster*)
Red-rumped Parrot (*Psephotus haematotus*)
Mulga Parrot (*Psephotus varius*)
Blue-winged Parrot (*Neophema chrysostoma*)
Bourke's Parrot (*Neopsephotus bourkii*)

Order Cuculiformes

Family Cuculidae

Horsfield's Bronze-Cuckoo (*Chrysococcyx basalus*)
Black-eared Cuckoo (*Chrysococcyx osculans*)
Pallid Cuckoo (*Cuculus pallidus*)

Order Strigiformes

Family Strigidae

Southern Boobook (*Ninox novaeseelandiae*)

Order Caprimulgiformes

Family Podargidae

Tawny Frogmouth (*Podargus strigoides*)

Family Caprimulgidae

Spotted Nightjar (*Caprimulgus guttatus*)

Family Aegothelidae

Australian Owllet-nightjar (*Aegothales cristatus*)

Order Coraciiformes

Family Halcyonidae

Laughing Kookaburra (*Dacelo novaeguineae*)
Red-backed Kingfisher (*Todiramphus pyrrhopygia*)
Sacred Kingfisher (*Todiramphus sancta*)

Family Meropidae

Rainbow Bee-eater (*Merops ornatus*)

Order Passeriformes

Family Climacteridae

Brown Treecreeper (*Climacteris picumnus*)

Family Maluridae

Variegated Fairy-wren (*Malurus lamberti*)
White-winged Fairy-wren (*Malurus leucopterus*)

Family Pardalotidae

Striated Pardalote (*Pardalotus striatus*)
Red-browed Pardalote (*Pardalotus rubricatus*)
Western Gerygone (*Gerygone fusca*)
Weebill (*Smicromis brevirostris*)
Inland Thornbill (*Acanthiza apicalis*)
Yellow-rumped Thornbill (*Acanthiza chrysorrhoa*)
Yellow Thornbill (*Acanthiza nana*)
♥ Buff-rumped Thornbill (*Acanthiza reguloides*)
Chestnut-rumped Thornbill (*Acanthiza uropygialis*)
Southern Whiteface (*Apheloccephala leucopsis*)

Family Meliphagidae

Spiny-checked Honeyeater (*Acanthagenys rufogularis*)
Black Honeyeater (*Certhionyx niger*)
♦ Pied Honeyeater (*Certhionyx variegatus*)
Blue-faced Honeyeater (*Entomyzon cyanotis*)
White-plumed Honeyeater (*Lichenostomus penicillatus*)
Singing Honeyeater (*Lichenostomus virescens*)
Brown Honeyeater (*Lichmera indistincta*)
Yellow-throated Miner (*Manorina flavigula*)
Brown-headed Honeyeater (*Melithreptus brevirostris*)
♥ Black-chinned Honeyeater (*Melithreptus gularis*)
Little Friarbird (*Philemon citreogularis*)
White-fronted Honeyeater (*Phylidonyris albigrons*)
Striped Honeyeater (*Plectorhyncha lanceolata*)
White-fronted Chat (*Epthianura albigrons*)
Orange Chat (*Epthianura aurifrons*)
Crimson Chat (*Epthianura tricolor*)

Family Petroicidae

Jacky Winter (*Microeca fascians*)
Red-capped Robin (*Petroica goodenovii*)

Family Pomatostomidae

♦ Hall's Babbler (*Pomatostomus halli*)
Chestnut-crowned Babbler (*Pomatostomus ruficeps*)
White-browed Babbler (*Pomatostomus superciliosus*)

Family Cinclosomatidae

Chirruping Wedgebill (*Psophodes cristatus*)
♥ Chestnut-breasted Quail Thrush (*Cinkosua castaneiventris*)

Family Neositidae

Varied Sittella (*Daphoenositta chrysoptera*)

Family Pachycephalidae

Grey Shrike-thrush (*Colluricincla harmonica*)
Crested Bellbird (*Oreoica gutturalis*)
Rufous Whistler (*Pachycephala rufiventris*)

Family Dicruridae

Restless Flycatcher (*Myiagra inquieta*)
Grey Fantail (*Rhipidura fuliginosa*)
Willie Wagtail (*Rhipidura leucobryis*)
Magpie-lark (*Grallina cyanoleuca*)

Family Campephagidae

Ground Cuckoo-shrike (*Coracina maxima*)
Black-faced Cuckoo-shrike (*Coracina novaehollandiae*)
White-winged Triller (*Lalage sueurii*)

Family Artamidae

Black-faced Woodswallow (*Artamus cinereus*)
Dusky Woodswallow (*Artamus cyanopterus*)
White-breasted Woodswallow (*Artamus leucorhynchus*)
Masked Woodswallow (*Artamus personatus*)
White-browed Woodswallow (*Artamus superciliosus*)

Pied Butcherbird (*Cracticus nigrogularis*)
Grey Butcherbird (*Cracticus torquatus*)
Australian Magpie (*Gymnorhina tibicen*)

Family Corvidae

Little Crow (*Corvus bennetti*)
Australian Raven (*Corvus coronoides*)

Family Corcoracidae

White-winged Chough (*Corcorax melanorhampbos*)
Apostlebird (*Struthidea cinerea*)

Family Ptilonorhynchidae

Spotted Bowerbird (*Chlamydera maculata*)

Family Motacillidae

Richard's Pipit (*Anthus novaezeelandiae*)

Family Passeridae

Zebra Finch (*Taeniopygia guttata*)

Family Dicaeidae

Mistletoebird (*Dicaeum hirundinaceum*)

Family Hirundinidae

Fairy Martin (*Hirundo ariel*)
Tree Martin (*Hirundo nigricans*)
Welcome Swallow (*Hirundo neoxena*)

Family Sylviidae

Clamorous Reed-Warbler (*Acrocephalus stentoreus*)
Brown Songlark (*Cincloramphus cruralis*)
Rufous Songlark (*Cincloramphus mathewsi*)
Little Grassbird (*Megalurus gramineus*)

Family Sturnidae

• Common Starling (*Sturnus vulgaris*)

Fish of the Paroo River Wetlands
(from Gehrke, Schiller and Brown 1999)

NATIVE SPECIES

Golden Perch (*Macquaria ambigua*)
Silver Perch (*Bidyanus bidyanus*)
Spangled Perch (*Leiopotherapon unicolor*)
Bony Herring (*Nematalosa erebi*)
Hyrtl's Tandan (*Neosilurus hyrtlii*)
Crimson-spotted Rainbowfish (*Melanotaenia fluviatilis*)
Australian Smelt (*Retropinna semoni*)

INTRODUCED SPECIES

Carp (*Cyprinus carpio*)
Goldfish (*Carassius auratus*)
Gambusia (*Gambusia holbrooki*)
Redfin Perch (*Percia fluviatilis*)
Tilapia (*Oreochromis mossambicus*)

Aquatic Invertebrate Fauna of the Paroo River Wetlands
(from the National River Health Data Base 2004 and Turak, Hose and Waddell 2001)

The classifications follow Hawking, Smith, and Le Busque (2004 onwards) [www.clw.csiro.au/ColourWebGuide]; Hawking, J.H. (2000), Hawking and Smith (1997); and Williams 1980. Aquatic macroinvertebrate families were found at the Nocolche and / or Mandalay sites, between spring 1994 and autumn 1999 and spring 1999 and autumn 1999 (respectively):

PHYLUM ANNELIDA

Class Oligochaeta (segmented aquatic worms)

Phylum Mollusca

Class Gastropoda
Order Basommatophora
Family Ancyliidae (freshwater limpets)

Class Bivalvia
Family Corbiculidae (freshwater mussels)

Phylum Arthropoda

Class Arachnida
Order Acariformes (mites)

Class Crustacea
Order Isopoda
Family Cirolanidae (-)

Order Decapoda

Family Palaemonidae (freshwater prawns)
Family Parastacidae (freshwater crayfish and yabbies)

Class Insecta
Order Ephemeroptera
Family Caenidae (mayflies)

Order Odonata

Sub-order Anisoptera
Family Gomphidae (dragonflies)
Family Libellulidae (dragonflies)

Order Hemiptera

Sub-order Heteroptera

Family Notonectidae (backswimmers)

Family Corixidae (waterboatmen)
Family Hydrometridae (water measurers)
Family Mesoveliidae (dwarf pond skaters)
Family Veliidae (small water striders)

Order Coleoptera

Family Dytiscidae (predacious diving water beetles)

Sub Order Byrrhoidea

Family Heteroceridae (water beetles)

Sub Order Staphyloidea

Family Hydraenidae (minute rove beetles)
Family Staphylinidae (rove beetles)

Sub Order Hydrophiloidea

Family Hydrophilidae (scavenger water beetles)

Order Diptera

Family Culicidae (mosquitoes)
Family Tipulidae (crane flies)
Family Tabanidae (march / horse flies)
Family Ceratopogonidae (biting midges)
Family Chironomidae (blood worms)
Sub-family Chironominae (non-biting midges)
Sub-family Orthoclaadiinae (non-biting midges)
Sub-family Tanypodinae (non-biting midges)

Order Trichoptera

Family Ecnomidae (caddisflies)
Family Leptoceridae (longhorned caddisflies)

Deleted: <sp><sp>