
4. CHANGES IN ECOLOGICAL CHARACTER SINCE LISTING

The change in hydrology since listing has exacerbated the impacts of regulation and been obvious at the site with a significant reduction in the flooding frequency of all floods under 100 GL/d, but the most significant reduction in medium sized floods in the 10,000 ML/d - 30,000 ML/d range. This would have biggest impact on semi-permanent vegetation and billabongs and fringing aquatic vegetation when compared to pre-1987 period. Nonetheless, as there has been one large event (over 100GL/d) post-listing, compared to the 20 year prior to listing (when there was 3 events over 100GL/d), the floodplain condition has also declined in this period.

A decline in the health of the tree cover of the Site since listing represents a clear change in ecological character, though it still meets the nomination criteria. The vegetation and habitat values of the Site have changed significantly due to a decrease in flood events over the past two decades (DLWBC undated.). A River Redgum survey conducted in South Australia in February 2003 found that approximately 80% of the survey sites contained trees that were stressed to some degree, and 20-30% of them were severely stressed (MBDC 2003). In the area between Wentworth and Renmark (which includes the Riverland Site), more than half of all trees, including River Redgums, were stressed or dead (MDBC 2003). These findings are supported by Overton et al. (2006a), who estimated that 65% of the area of the Chowilla floodplain trees are affected by soil salinisation, compared with 40% in 1993. It is important to note that, at the time of listing, the floodplain vegetation of the Site was already experiencing significant stress, and that the continuing and increasing stress and deterioration of the site will require specific actions to maintain its ecological integrity.

Although River Redgums are justifiably recognised as iconic species and the dominant species of distinct community types, other species and vegetation communities are also being severely impacted by changes to the hydrologic regime. A survey of tree health across the Site undertaken in 2002 (DEH 2003) gave results that found approximately 43% of the area covered by River Redgum to be unhealthy or dead (Figure 4.1). The survey also found that nearly 82% of the area covered by Black Box was unhealthy or dead. Black Box communities cover a very large percentage of the site (Figure 4.2) and this very high percentage of stressed or dead vegetation indicates that the ecological character of the site is under threat across a broad range of habitats and community types (Figure 4.4). Six percent of the Black Box trees were dead in 2002 whereas only 1% of the River Redgums were dead at the same time (DEH 2003).

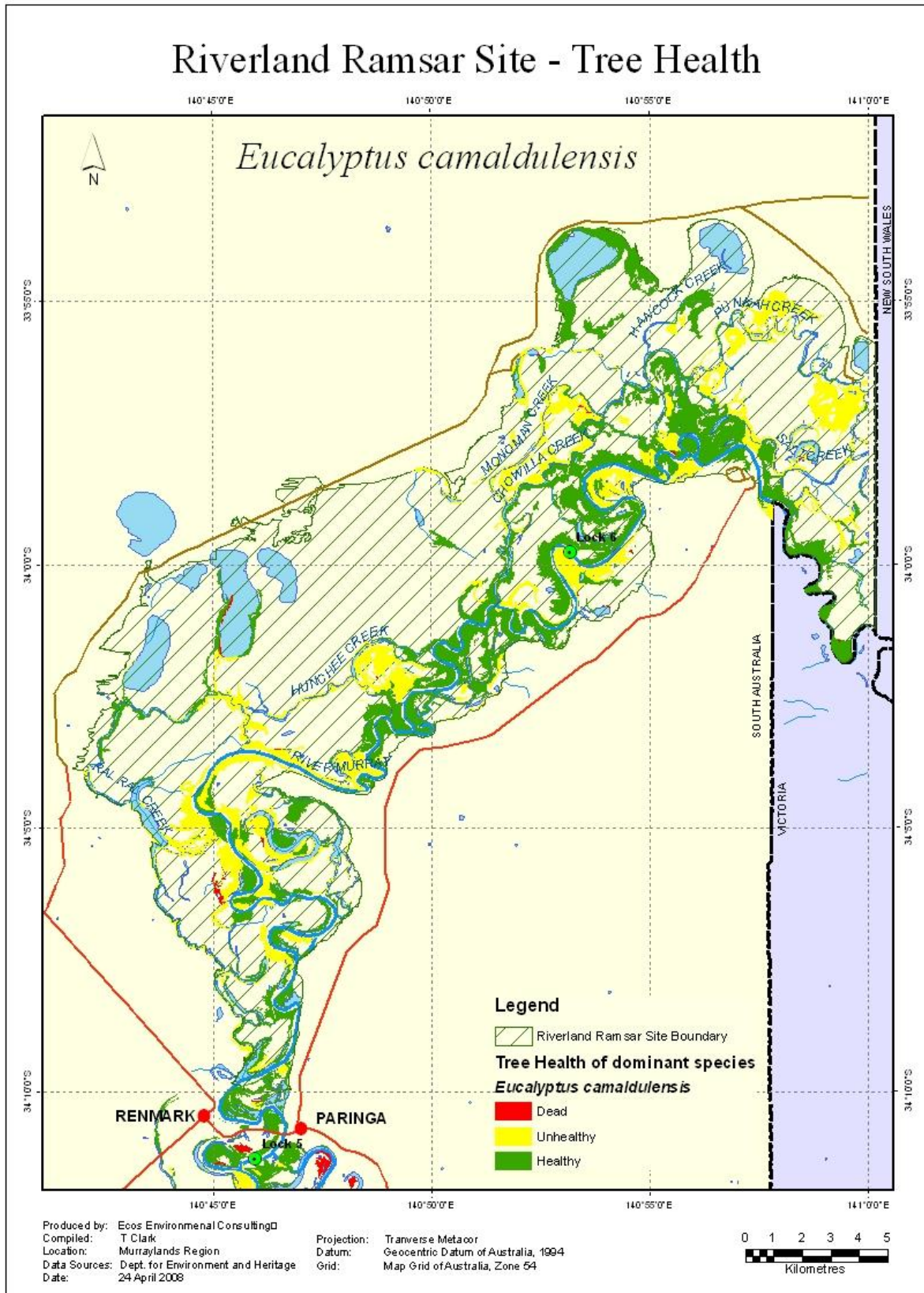


Figure 4.1 Tree health of River Redgum, Riverland Ramsar Site, 2002

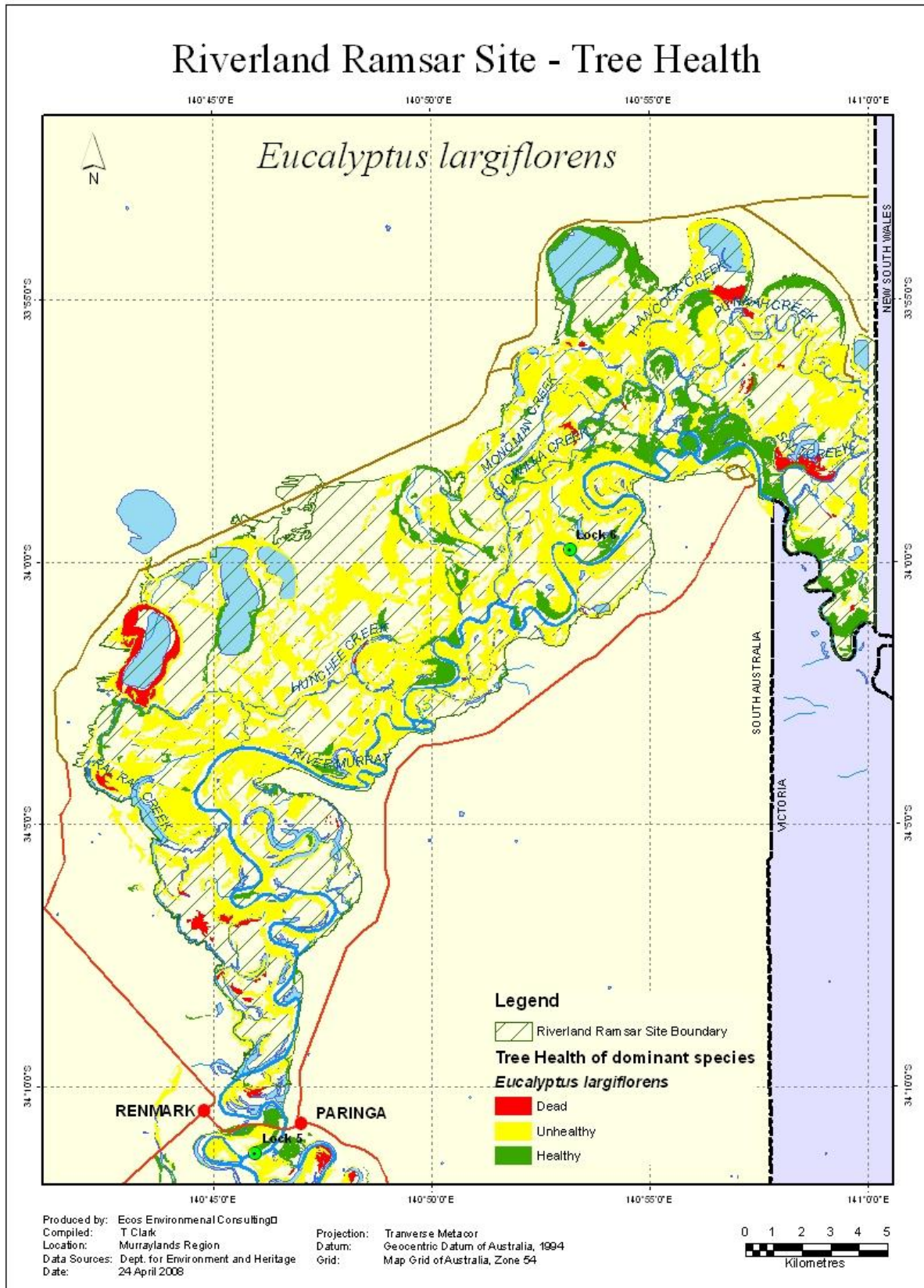


Figure 4.2 Tree health of Black Box, Riverland Ramsar Site, 2002

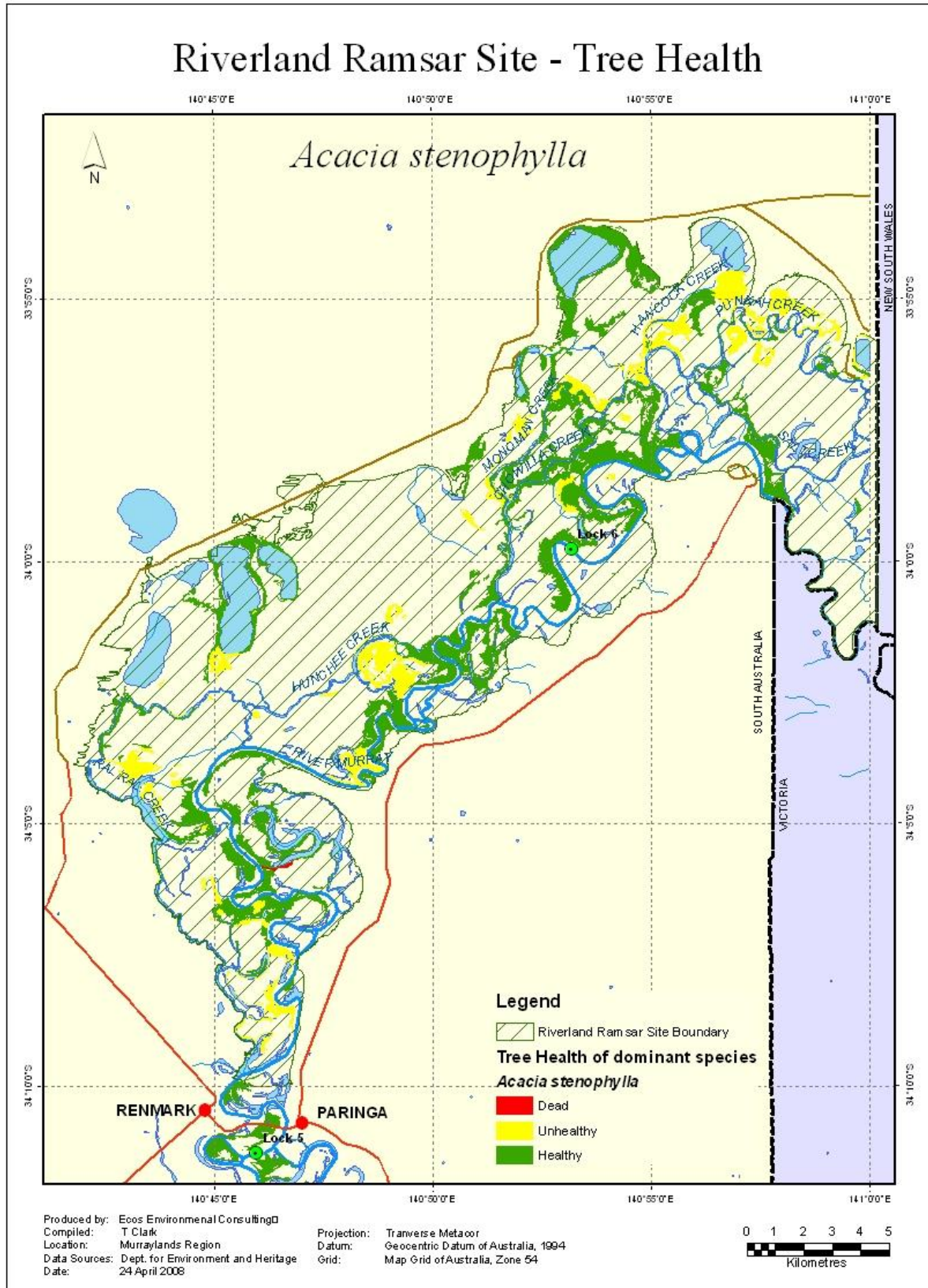


Figure 4.3 Tree health of River Cooba, Riverland Ramsar Site, 2002

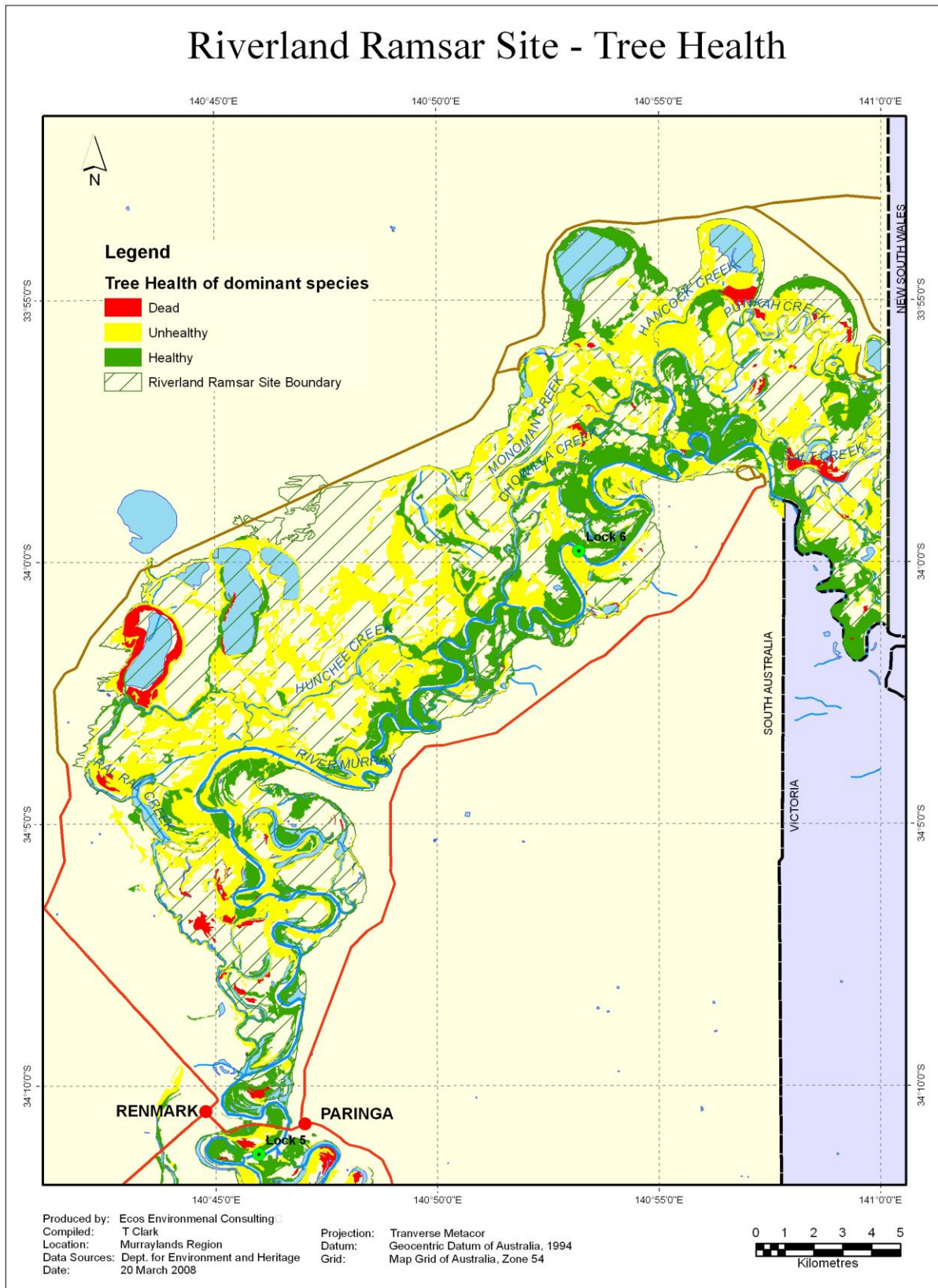


Figure 4.4 Tree health (River Redgum, Black Box and River Cooba)

combined) in the Riverland Ramsar Site, 2002

The changes at the Site reflect a regional decline in vegetation health on the floodplain of the lower River Murray. A vegetation survey at 100 sites along 1,450 km of the River Murray from Pericoota State Forest, Victoria to Mannum, SA was undertaken in 2002 and repeated in 2004. In 2002, 51.5% of all (River Redgum) trees surveyed were considered stressed, compared to 75.5% in 2004 (DWLBC 2005, in MDBC 2006). The results of this study are important to the Riverland Ramsar Site as they show a significant decline in tree health over a short period of time, in a large region that includes the Riverland. The DEH survey in 2002 indicates that only 43% of the River Redgum trees were stressed, indicating that the Riverland Ramsar Site might be faring better than trees along the whole reach.

A discussion of changes in vegetation and habitat values should consider, not only the current condition, but also the trajectory of that condition. Output from CSIRO (2005) described 54% of trees (River Redgum, Black Box and Coobah) in the Chowilla section of the site as being in good condition in 1993. By 2003 this number had fallen to 35% and to 24% in 2006 (Muller and Goode undated). In the absence of any management intervention, it is predicted to fall to 19% by 2035. Assuming no intervention, this deterioration trend extends to trees currently in moderate health, which are predicted to decline further into poor health, and trees currently in poor health, which are predicted to decline further and die (CSIRO 2005).

The CSIRO data is challenged by the DEH survey undertaken in 2002 (Figure 4.4) which indicates that, of all trees (River Redgum, Black Box, Coobah, Tea Tree), some 57% were considered to be healthy (which is higher than the 1993 level and much higher to the 2003 CSIRO estimate). Nonetheless, if the average annual rate of decline of 2% (since 1993) is applied to the DEH data there would still be significant loss of growing trees and decline in their role in aquatic ecosystem health (provisions of shading, allochthonous inputs from riparian vegetation [insects, leaves, etc] and large woody debris).

In 2005, it was estimated (by CSIRO 2005) that 31% of all trees are dead (as compared to 5% in the DEH Survey). By 2035, this figure is predicted to rise to 47%. The current situation (measured in 2003) of only 24% of trees considered to be healthy is likely to be a threshold beyond which permanent damage to the Site occurs. Further, River Redgum and Black Box are keystone species within the Site's ecosystem and therefore, once their populations drop to unsustainable levels, the entire system will be impacted (Muller and Goode undated).

The CSIRO (2005) predictions were modelled on the flow conditions experienced during the last 15 years (up to 2005) which were repeated to provide a 30-year outlook. This method of modelling raises the issue of another change in ecological character – changes to the climate component. Although climate change within the site cannot be confirmed in the sense of its trajectory, it is apparent that the climatic conditions in the 20 years since listing have been harsher than the period leading up to listing of the Site: "Particularly low flows have occurred in all years since 2000 as a result of an extended drought and demands for consumptive water

use, which were higher than in any previous drought. This drought is one of the most serious on record to affect the Murray-Darling Basin over the last 100 years" (MDBC 2006).

The CSIRO (2005) predictions are also supported by Overton et al. (2006a), who note that under a "do-nothing" scenario, the proportion of trees in good condition would drop to 32% by 2033 (assuming similar conditions to the last 15 years) and that "If a drought period occurs, such as in the last 5 years, the decline in vegetation will be dramatic."

The effects of management attempts to improve the vegetation, such as lowering of groundwater and increased enhancing the flow regime to increase salt flushing of the soil, will take many years to achieve results (Overton et al. 2006a).

Changes to climate magnify the impacts of altered flow regime, particularly to reduction in medium and high flow events. Although control of climate is beyond local management, a management plan for the Site should consider processes to mitigate these impacts.

Management of individual sites, via the construction of structures which allow wetlands to have natural wetting and drying cycles, and via wetland water trials in 2004-2006, have allowed individual sites to recover significantly (Aldridge et al. 2006; Nicol and Weedon 2006).

There was a dramatic increase in diversity and abundance of many plants and animals when wetting and drying trials were undertaken at Lake Merreti, noted particularly for the significant increase in waterbird numbers (Steggles and Tucker 2003). In the summer of 1994, Lake Merreti was completely dried for the first time since the 1950s. The inflow channels were also fitted with carp screens to prevent large carp entering the Lake. Since then management of lake has resulted in a change from a permanently inundated wetland to a semi-permanently, inundated wetland. Bird surveys have indicated that lake management has resulted in significantly higher diversity of birds, increased area of submerged vegetation and a far greater diversity in native fish (Steggles and Tucker 2003). Previous permanent inundation had led to loss of mature long-lived vegetation (including River Redgum and lignum stands), but now, post-management, the site supports a healthy growth of submerged plants and River Redgums and an expanded littoral zone. This vegetation however, is sensitive to disturbance from multiple fluctuations and salinisation (Steggles and Tucker 2003). Similar results were noted when Lake Woolpolool was allowed to flood in 2001 (Harper 2003).

The watering trials in 2004 – 2006 showed significant improvements in the condition of trees at many River Redgum sites and at least one Black Box site (Aldridge et al. 2006). The change in the understory of wetlands that were watered changed from terrestrial species to wetland plants was, while not uniform, significant (Nicol and Weedon 2006). The permanence of these changes was not studied but if these plants mature to set seed, then the seedbank will be renewed to await the next watering event (natural or induced). The aquatic fauna that also colonised these wetlands after watering included fish, frogs, turtles, crustaceans and water birds (Aldridge et al. 2006).

In summary, the obvious decline in the health of the tree cover of the Site since listing represents a clear change in ecological character, though it still meets the nomination criteria. At the time of listing some dead trees were present but surveys of tree health across the Site undertaken in 2002 (DEH 2003) gave results that found approximately 43% of the area covered by River Redgum to be unhealthy or dead. The survey also found that nearly 82% of the area covered by Black Box was unhealthy or dead. Individual areas within the site have responded positively to management actions such as active wetland watering

5. KNOWLEDGE GAPS

The key knowledge gaps for the Site include systematically collected data, for most of the major components, across the Site. The exception to this is the vegetation component, which has been surveyed for a number of studies (refer Section 3.6).

Natural variability is an important aspect of the components and processes that requires information. Several components (e.g. hydrology, understorey vegetation, water quality, fish, amphibians, reptiles, crustaceans, water birds) have been monitored as part of studies assessing benefits of management actions at the Site (e.g. Aldridge et al. 2006; CSIRO 2005, Nicol and Weedon 2006). However, these need to be evaluated in terms of whole-of-Site monitoring, natural variation, and their use for assessing Site condition in relation to Ramsar criteria.

Data should be gathered using standard methods that allow derivation of a 'point-in-time' baseline which can be compared to future monitoring programs. Therefore the initial sampling strategy must be designed in a way that is cognisant of repeatability (see section 6, below). The data should also be gathered using approaches and methods that allow comparison with other data sets within the site, the Murray-Darling Basin, and the rest of Australia.

Examples of the types of data required are presented in Table 5.1.

Table 5.1: Knowledge gaps for the Riverland Ramsar site

Component	Identified Knowledge Gaps	Recommended Data collection or other action to address the gap.	Priority
Vegetation	Changes across whole site since listing	5-yearly update of collated vegetation map of site	Very high
Climate	Estimate of climatic change for region, particularly in relation to delivery of rainfall and evaporation	5-yearly update of climatic extremes (95 th percentiles, 99 th percentiles), and also quartiles and averages (medians)	High
Hydrology	Inundation records for each wetland; this includes areal coverage and depths over time	Remote sensing or aerial photos of wetland extent over time, followed-up with ground truthing & depth measurements	High
	Rates of flows filling wetlands	Gauge installation/augmentation	Medium
	Contributions from groundwater are not yet quantified (although relationships often established)	Monitor groundwater levels	Low
Geomorphology	Map of landforms across site, with descriptions and ongoing geomorphic processes, especially	Geomorphic mapping of site, incorporating information from aerial photographs and including cross-sections. Strong focus on areas of	Medium - Low

Component	Identified Knowledge Gaps	Recommended Data collection or other action to address the gap.	Priority
	sedimentation rates in basins/depressions	active deposition and rates of infilling	
	Sediment deposition rates	Sediment volume measurement and calculations	Medium - Low
Water Quality	Baseline water quality data for the wetland systems	Monthly monitoring program for at least 2 years, including inputs from discharge drains and other identifiable sources	High
	Quantitative spatial and temporal changes in salinity across the Site, particularly in relation to flow regimes	Flow-event sampling for wetland systems	Medium
Fauna	Changes to faunal distributions across whole site since listing	5-yearly update of collated fauna database of site using systematic faunal surveys across site, including but not limited to: fish; mammals; birds; aquatic macroinvertebrates and amphibians.	High
	Extensive map of rare faunal species across site	Location map of vulnerable, rare or threatened species with information on habitat preferences and tolerances	High
Habitat	Map of habitats across site, with particular reference to vulnerable, rare or threatened species' requirements	Prepare habitat map based on vegetation and geomorphic maps, aerial photographs and using habitat preferences and requirements of identified species.	High
Soil salinity	Map of substrate across site with salinity categories	Survey of substrate, with representation of areas with high stock access. Measurement criteria to include colour, texture & structure, as well as measures of impacts	Medium

In addition to the components and processes identified above, the following issues and management actions were identified as knowledge gaps:

- *Environmental water allocations for the Site*: changes in response to climate change;
- *On-site management and ground works for water movement within the Site*: there appears to be more than one set of ground works being undertaken at the site, with different management agencies not necessarily aware of the goals or actions being undertaken by other agencies The Environmental

Manager of the SAMDB NRM Board controls the allocations of all water for environmental watering and wetland management; and,

- *A single, central management plan*: there are several management plans for individual components of, or areas within, the Site. These need to be collated into a cohesive Riverland Ramsar Site Management Plan with goals and actions known and accepted by all relevant resource managers.

6. KEY SITE MONITORING NEEDS

The monitoring needs of the site should focus on the limits of acceptable change for the maintenance of the Site's ecological character. The major threats have been discussed in Section 3.6 and the limits of acceptable change in Section 3.7. These are presented in Table 6.1, with associated monitoring needs and prioritisations.

Priorities for monitoring were established by considering the highest value components which face the highest threat.

Table 6.1: Key monitoring needs for the Riverland Ramsar site.

Baseline condition & interim limits of acceptable change	Key Indicator(s)	Monitoring needs (type & frequency)	Priority
<p><u>Wetland of international significance (& part of Riverland Biosphere Reserve)</u></p> <p>At a high level, the baseline condition of the site for this service can be described 'meeting the first eight listing criteria'. The short-term and long-term limits of acceptable change should both be 'no loss of any listing criteria'.</p> <p>These listing criteria comprise most of the other ecological services identified for the Site, and are presented in the rows below.</p>	<p>The key indicators are the listing criteria. These are discussed in the rows below</p>	<p>See below</p>	<p>N/A</p>
<p><u>Representative/rare/unique wetland type in appropriate biogeographic region</u></p> <p>The most readily assessable indicator of each wetland type is areal extent. The vegetation of the Site has been surveyed and documented and may provide a basis for defining extent of each wetland type. Similarly, tree health for several species has been recorded for parts of the site.</p> <p>The short term limits of acceptable change should be: no loss of more than 10% of any wetland type over the site as a whole, within any 2-year period.</p> <p>The long-term limits of acceptable change should be no loss of more than 20% of any wetland type over the site as a whole, within any 10-year period.</p> <p>The term "as a whole" acknowledges that spatial and temporal changes to vegetation occur in relation to natural variability of hydrological regime over multi-year cycles. However, the diversity and constituents of the wetland mosaic must be maintained.</p>	<p>Tree health Wetland diversity Extent of Wetland Type</p>	<p>2 yearly tree health assessment using infrared satellite data 5 yearly on-ground vegetation surveys including tree health and wetland type and extent</p>	<p>Very High</p>
<p><u>Supports populations of rare, endangered and threatened species (State & National)</u></p> <p>The condition at the time of listing for many threatened species, particularly faunal, is unknown (in terms of population numbers,</p>	<p>Populations of rare, endangered or threatened species</p>	<p>5 yearly on-ground vegetation and fauna surveys</p>	<p>High</p>

Baseline condition & interim limits of acceptable change	Key Indicator(s)	Monitoring needs (type & frequency)	Priority
<p>trends, ranges) and require further assessment. There are more data available for the listed species of flora, through vegetation surveys.</p> <p>The limits of acceptable change should be based on species surveyed in 2002 (vegetation) and 2003 (fauna). Quantitative surveys should be undertaken in in the near future and repeated 5-yearly. The changes between surveys should be used to define the level of variation. Short term and Long term limits of acceptable change should be no loss of any listed species of flora and fauna.</p>			
<p><u>Provision of remnant lower River Murray floodplain habitat to support regional biodiversity</u></p> <p><u>Fauna</u>: The pre-listing condition of the faunal groups is unknown, in terms of complete species lists, distributions and abundances. The short term limits of acceptable change should be derived from the qualitative 2003 baseline information. Quantitative surveys should be undertaken in in the near future and repeated 5-yearly. The changes between surveys should be used to define the level of variation.</p> <p><u>Flora</u> The baseline condition for flora is better established, with a several vegetation surveys of the Site having been undertaken. The short term limits of acceptable change should be: no loss of any rare species of flora over any time period and no loss of any vegetation community type, excluding seasonal variations and natural annual variations.</p> <p>Tree health data recorded in 2003 and work undertaken by CSIRO show tree health should not further decline than current levels, unless significant changes to the site's ecological character.</p> <p>Flora and Fauna The long-term limits of acceptable change should be:</p> <ul style="list-style-type: none"> ○ no loss of any rare or threatened species of flora or fauna ○ no net reduction in populations of bird, fish, mammal, mollusc, macrocrustacean or amphibian fauna over any 10 year period; and ○ no loss of more than 20% of any vegetation type over the site 	<p>Tree health Populations of rare, endangered or threatened species</p>	<p>2 yearly tree health assessment using infrared satellite data 5 yearly on-ground vegetation and fauna surveys (fauna surveys to include both aquatic and terrestrial species)</p>	<p>Very High</p>

Baseline condition & interim limits of acceptable change	Key Indicator(s)	Monitoring needs (type & frequency)	Priority
as a whole within any ten year period.			
<p><u>Diverse and abundant waterbirds</u></p> <p>Apart from presence data and some estimates of population sizes, much of the pre-listing condition for these species is not well known. Short term limits of acceptable change should be derived from the 2003 baseline information. Quantitative surveys should be undertaken in the near future and repeated 5-yearly. The changes between surveys should be used to define the level of variation.</p> <p>Long-term limits of acceptable change should be:</p> <ul style="list-style-type: none"> ○ no loss of any rare or threatened species; and ○ no net reduction in populations over any rolling 10 year period. 	<p>Population levels of waterbirds</p> <p>Species diversity of waterbirds</p>	<p>Annual bird observer counts of waterbirds</p> <p>5 yearly on-ground waterbird (as part of integrated sampling vegetation and fauna surveys (fauna surveys to include both aquatic and terrestrial species)</p>	<p>High</p>
<p><u>Diverse fish and invertebrate fauna</u></p> <p>Short term limits of acceptable change should be derived from the 2005/06 SARDI Survey. This survey should be repeated in 2008 and the changes would be used to define the level of variation, which should be exceeded in any 5 year period.</p> <p>Long-term limits of acceptable change should be:</p> <ul style="list-style-type: none"> ○ no loss of any rare or threatened species; and ○ no net reduction in populations over any rolling 10 year period. 	<p>Fish and macro-invertebrate abundance and diversity</p>	<p>Five yearly fish and macro-invertebrate survey</p> <p>Use AUSRIVAS and SIGNAL scores to benchmark diversity, abundance and community health of macro-invertebrate populations (this will need to be added to future surveys)</p>	<p>High for Fish</p> <p>Medium for macro-invertebrate</p>
<p><u>High diversity and mosaic of both terrestrial and aquatic habitats</u></p> <p>Baseline condition for habitat diversity can be defined using vegetation surveys undertaken at the Site. This should be supplemented by future surveys of the Site, as required.</p> <p>The short term limits of acceptable change should be no loss of any habitat type, excluding seasonal variations and natural annual variations. No further death of trees and no increase in the area of unhealthy trees should occur in any two year period.</p> <p>The long term limits of acceptable change should be no loss of more than 20% of any habitat type, over the site as a whole (i.e. vegetation</p>	<p>Tree health</p> <p>Wetland diversity</p>	<p>Met in above monitoring actions</p>	<p>Medium-High</p>

Baseline condition & interim limits of acceptable change	Key Indicator(s)	Monitoring needs (type & frequency)	Priority
communities may migrate, but diversity & mosaic must be maintained)			

7. COMMUNICATION, EDUCATION AND PUBLIC AWARENESS (CEPA) MESSAGES

The primary message that needs to be communicated to relevant stakeholders is:

"An ECD which reflects the ecological character of the Riverland Ramsar Site at the time of listing in 1987 is complete. The Site is listed against Criteria 1 – 8:

- *Criterion 1 (representative/rare/unique wetland type in appropriate biogeographic region);*
- *Criterion 2 (vulnerable/endangered/critically endangered species or ecological communities);*
- *Criterion 3 (supports populations of plant and/or animals important for regional biodiversity);*
- *Criterion 4 (supports species at critical stages or provides refuge in adverse conditions);*
- *Criterion 5 (providing habitat that regularly supports 20,000 or more waterbirds);*
- *Criterion 6 (providing habitat that regularly supports 1% of the global population of at least one species of waterbird);*
- *Criterion 7 (supporting a significant proportion of indigenous fish taxa, life-history stages, species interactions or populations that are representative of wetland benefits and/or values); and,*
- *Criterion 8 (supplying an important food source, spawning ground, nursery and/or migration path for fishes, on which fish stocks depend).*

This site is a complex, riverine wetland ecosystem which provides habitat for important and nationally threatened species. The ECD documents past and current conditions, determines approaches to assess changes in condition, and identifies potential threats to the wetland's character. The ECD also identifies appropriate management considerations for future management planning and critical information gaps for management. Without active management intervention the ecological character of the site is under threat.

The stakeholders of the Riverland Ramsar Site are numerous and the messages required for each may be different, especially as part of management planning. We have separated the stakeholders for the site into four groups, according to their role and interest in the site (Table 7.1). Initially, however, a combined set of messages relevant to the ECD can be used to communicate the importance of the site, why it was listed, the threats to the site and future actions required. The combined, key

communication and public education messages for the Riverland Ramsar Site are displayed in Table 7.2.

Table 7.1: Stakeholder groups for the Riverland Ramsar Site

Stakeholder Group	Stakeholders
Managers	Department of Environment and Heritage (SA) Department of Environment, Water, Heritage and the Arts (Commonwealth) Murray-Darling Basin Commission River Murray Water Landholders
Regulators	SA Murray Darling Basin NRM Board Dept of Land Water Biodiversity Conservation (SA) Environmental Protection Authority (SA) Department of Environment and Heritage Department of Environment, Water, Heritage and the Arts (for the EPBC Act)
Advisors and Funders	Australian Government – Dept of Agriculture, Fisheries and Forestry and Department of Environment, Water, Heritage and the Arts Murray-Darling Basin Commission Consultants and Contractors Universities and Researchers: <ul style="list-style-type: none"> • Biosphere Reserve • Commonwealth Scientific and Industrial Research Organisation. • Murray Darling Freshwater Research Centre
Broader Community	Landholders Tourism industry Birds Australia (South Australia) General Public

Table 7.2: Key communications and public education messages for the Riverland Ramsar Site

Message No.	Simple Message	Detailed Message
1	The Riverland Ramsar Site is an internationally important wetland	<p>The Riverland Ramsar Site is an internationally important wetland, and is now listed under criteria 1, to 8:</p> <ol style="list-style-type: none"> 1. As it contains excellent regional representative examples of a major floodplain system within the Murray Scroll Belt Subregion of the Riverina Bioregion of the Murray-Darling Basin. 2. The Site supports the following taxa, listed as Vulnerable (EPBC Act 1999), including: Regent Parrot (Eastern) (<i>Polytelis anthopeplus monarchoides</i>); Southern Bell Frog (<i>Litoria raniformis</i>); Murray Cod (<i>Maccullochella peelii peelii</i>); Murray Hardyhead (<i>Craterocephalus fluviatilis</i>). 3. The wetlands supports twenty-eight plant species listed at the State level (NPWS Act 1972) that are found at the Site on a permanent or seasonal basis (Appendix 1.1). Twenty species are listed as rare and eight as vulnerable. 4. The Riverland wetland provides critical summer or stopover habitat for eight species of migratory birds listed under the JAMBA, CAMBA and ROKAMBA agreements. 5. The Site regularly supports 20,000 or more waterbirds involving fifty-nine species. 6. Freckled Duck (<i>Stictonetta naevosa</i>), Red-necked Avocet (<i>Recurvirostra novaehollandiae</i>) and Red-kneed Dotterel (<i>Erythrogonys cinctus</i>) have been recorded at the Site in numbers representing greater than 1% of their estimated global population. 7. The Site supports 16 species of freshwater native fish species (nine families) within the Murray-Darling Basin. The Site's fish assemblage displaying a high biodisparity and five different reproductive styles. 8. The Site also provides habitat for breeding and a nursery for juvenile stages of Golden Perch (<i>Macquaria ambigua</i>), Silver Perch (<i>Bidyanus bidyanus</i>) and many other fish. Floods in spring and early summer ensure abundant plankton and other organisms as food for young fish.

Message No.	Simple Message	Detailed Message
2	The Site is a zone of high biodiversity	<p>The site is a zone of high biodiversity. The area contains a variety of aquatic and terrestrial habitats including the following vegetation communities: River Redgum forest/woodland, Black Box, Lignum, River Saltbush chenopod shrubland, low chenopod shrubland, samphire low shrubland, herbfield, grassland, fringing aquatic reed & sedge, and true aquatic habitats such as channels, billabongs, backwaters and depressions.</p> <p>The large area of intermittent shallow water allows the site to be a good feeding area for waterbirds. The area provides nesting habitat for many species of waterbirds (and also bushland species) within the River Redgum, Black Box woodlands and wetlands. These include: Strawneck Ibis, White Ibis, Yellow-billed Spoonbill, Royal Spoonbill, Darter, Pied Cormorant, Little Black Cormorant, Little Pied Cormorant, and Black Swan. A number of migratory birds have been recorded from the site, including species listed on the China - Australia Migratory Bird Agreement (CAMBA) and the Japan - Australia Migratory Bird Agreement (JAMBA). The floodplain wetlands also support a rich variety of invertebrate fauna.</p>
3	The site contains many national and State threatened species	<p>The site contains many national and State threatened species. These include the following taxa, listed as Vulnerable under section 179 of the <i>EPBC Act 1999</i>:</p> <ul style="list-style-type: none"> ○ Regent Parrot (Eastern) (<i>Polytelis anthopeplus monarchoides</i>); ○ Southern Bell Frog (<i>Litoria raniformis</i>); ○ Murray Cod (<i>Maccullochella peelii peelii</i>) ○ Murray hardyhead (<i>Craterocephalus fluviatilis</i>) <p>The following significant plant species are listed at the State level under the National Parks and Wildlife Act 1972 and inhabit the Site on a permanent or seasonal basis:</p> <ul style="list-style-type: none"> ○ Dainty Maiden-hair <i>Adiantum capillus-veneris</i> (Vulnerable) ○ Swamp Daisy <i>Brachycome basaltica</i> var. <i>gracilis</i> (Rare) ○ Black-fruit Daisy <i>Brachycome melanocarpa</i> (Vulnerable) ○ Coast Daisy <i>Brachycome parvula</i> var. <i>lissocarpa</i> (Rare) ○ Matted Water Starwort <i>Callitriche sonderi</i> (Rare)

Message No.	Simple Message	Detailed Message
		<ul style="list-style-type: none"> ○ Water Starwort <i>Callitriche umbonata</i> (Vulnerable) ○ Pale Beauty-heads <i>Calocephalus sonderi</i> (Rare) ○ Tufted Burr-daisy <i>Calotis scapigera</i> (Rare) ○ Purple Crassula <i>Crassula peduncularis</i> (Rare) ○ Pale Flax-lily <i>Dianella porracea</i> (Vulnerable) ○ Small-flower Beetle-grass <i>Diplachne parviflora</i> (Rare) ○ Waterwort <i>Elatine gratioloides</i> (Rare) ○ Barren Cane-grass <i>Eragrostis infecunda</i> (Rare) ○ Purple Love-grass <i>Eragrostis lacunaria</i> (Rare) ○ Pale-fruit Cherry <i>Exocarpos strictus</i> (Rare) ○ Sea-Heath <i>Frankenia cupularis</i> (Rare) ○ Hooked Needlewood <i>Hakea tephrosperma</i> (Rare) ○ Nutty Club-rush <i>Isolepis variegata</i> (Vulnerable) ○ Slender Fissure-plant <i>Maireana pentagona</i> (Rare) ○ Creeping Boobialla <i>Myoporum parvifolium</i> (Rare) ○ Upright Milfoil <i>Myriophyllum crispatum</i> (Vulnerable) ○ Robust Milfoil <i>Myriophyllum papillosum</i> (Rare) ○ Wavy Marshwort <i>Nymphoides crenata</i> (Rare) ○ Australian Broomrape <i>Orobanche cernua</i> var. <i>australiana</i> (Vulnerable) ○ Squat Picris <i>Picris squarrosa</i> (Rare) ○ Jagged Bitter-cress <i>Rorippa laciniata</i> (Rare) ○ Behr's Swainsona-pea <i>Swainsona behriana</i> (Vulnerable) ○ <i>Zannichellia palustris</i> (Rare) <p>The Site's fauna is similarly diverse and includes the following State listed threatened species that inhabit the Site on a permanent or seasonal basis:</p>

Message No.	Simple Message	Detailed Message
		<ul style="list-style-type: none"> ○ Feather-tailed Glider <i>Acrobates pygmaeus</i> (Endangered) ○ Broad-shell Turtle <i>Chelodina expansa</i> (Vulnerable) ○ Carpet Python <i>Morelia spilota variegata</i> (Rare) ○ Lace Monitor <i>Varanus varius</i> (Rare) ○ Great Crested Grebe <i>Podiceps cristatus</i> (Rare) ○ Australian Bittern <i>Botaurus poiciloptilus</i> (Vulnerable) ○ Musk Duck <i>Biziura lobata</i> (Rare) ○ Blue-billed Duck <i>Oxyura australis</i> (Rare) ○ Australasian Shoveler <i>Anas rhynchos</i> (Rare) ○ Freckled Duck <i>Stictonetta naevosa</i> (Vulnerable) ○ Intermediate Egret <i>Ardea intermedia</i> (Rare) ○ Glossy Ibis <i>Plegadis falcinellus</i> (Rare) ○ Bush Stone-curlew <i>Burhinus grallarius</i> (Vulnerable) ○ Square-tailed Kite <i>Lophoictinia isura</i> (Vulnerable) ○ Peregrine Falcon <i>Falco peregrinus</i> (Rare) ○ White-bellied Sea-Eagle <i>Haliaeetus leucogaster</i> (Vulnerable) ○ Major Mitchell's Cockatoo <i>Cacatua leadbeateri</i> (Vulnerable)
4	The site provides many important services and benefits to the region	<p>The site provides many important services and benefits to the region, which include:</p> <ul style="list-style-type: none"> ○ Wetlands of International Significance; ○ Unique occurrence of wetlands in the normally semi-dry lower River Murray floodplain environment; ○ Part of the Riverland Biosphere Reserve; ○ One of the only parts of the lower River Murray floodplain not receiving irrigation, retaining much of its natural character and hence, natural heritage; ○ High diversity and mosaic of both terrestrial and aquatic habitats; probably the highest

Message No.	Simple Message	Detailed Message
		<p>biodiversity of any site along the Lower River Murray</p> <ul style="list-style-type: none"> ○ Supports populations of rare, endangered and nationally threatened species; ○ Supports populations of rare, endangered and threatened species and communities in South Australia and New South Wales <p>Chowilla floodplain has:</p> <ul style="list-style-type: none"> ○ 28 plant species of state significance; ○ 4 animal species of national significance ○ 23 animal species of state significance; ○ Diverse and abundant waterbirds; ○ Diverse fish fauna (including nationally significant species); and, ○ Diverse invertebrate fauna <p>Benefits to humans derived from the Site include:</p> <ul style="list-style-type: none"> ○ Cultural heritage (indigenous and European) ○ Tourism/recreation ○ Drinking water for livestock ○ Water for irrigated agriculture ○ Livestock fodder ○ Flood retardation ○ Pollutant reduction, including nutrient inputs to the River Murray ○ Sediment trapping ○ Educational and scientific values, including studies on groundwaters ○ greenhouse gas offset
5	Understanding the ecology of the site will enhance future management of the	Understanding the ecology of the site will enhance future management of the site. The ECD provides a complete description of the wetland's character at the time of listing, the changes since listing, the threats likely to cause changes in the wetland's ecological character (including

Message No.	Simple Message	Detailed Message
	site	the ecological benefits the site provides), the key knowledge gaps of the site's ecology and functioning, monitoring requirements and triggers for management actions.
6	Past and present management practices provide some threats to the site's values such as human use, alterations to the hydrologic regime, grazing, vegetation clearance and introduction of pest plants and animals.	<p>Past and present management practices within and beyond the Sites provide some threats to the site's values. The major threats to the Site include:</p> <ul style="list-style-type: none"> ○ Climate change, particularly synergies between decreased rainfall and increased evaporation; ○ Altered flow regime; ○ Salinity; ○ Very high sedimentation rates for wetlands; ○ Elevated and altered groundwater regime; ○ Obstructions to fish passage; ○ Grazing pressure; ○ Pest flora and fauna; and ○ Human access and motorised recreation
7	The ECD project has summarised the available information on the site which describes its ecological character	<p>The ECD project has:</p> <ul style="list-style-type: none"> ○ collated all the available information on the site; ○ provided a description of the site, its biodiversity and its functions; ○ brought stakeholders together in the management of the site; ○ discovered that despite its regional significance and international listing, the site has gaps in the information required for its management and protection indicating more research and monitoring is required
8	Landholders, managers and users should promote the wise use of wetlands.	<p>Landholders, managers and users should promote the wise use of wetlands:</p> <ul style="list-style-type: none"> ○ The wise use of wetlands is a key concept of the Ramsar Convention on Wetlands and is defined as the 'sustainable utilisation for the benefit of humankind in a way compatible with the maintenance of the natural properties of the ecosystem'

8. GLOSSARY

Adverse conditions	ecological conditions unusually hostile to the survival of plant or animal species, such as occur during severe weather like prolonged drought, flooding, cold, etc (Ramsar Convention 2005b).
Assessment	the identification of the status of, and threats to, wetlands as a basis for the collection of more specific information through monitoring activities (as defined by Ramsar Convention 2002a, Resolution VIII.6).
Baseline	condition at a starting point. For Ramsar wetlands it will usually be the time of listing of a Ramsar site (Lambert and Elix 2006).
Benchmark	a standard or point of reference (ANZECC and ARMCANZ 2000b). a pre-determined state (based on the values which are sought to be protected) to be achieved or maintained (Lambert and Elix 2006).
Benefits	benefits/services are defined in accordance with the Millennium Ecosystem Assessment definition of ecosystem services as "the benefits that people receive from ecosystems (Ramsar Convention 2005a, Resolution IX.1 Annex A). See also "Ecosystem Services".
Biogeographic region (also 'bioregion')	a scientifically rigorous determination of regions as established using biological and physical parameters such as climate, soil type, vegetation cover, etc (Ramsar Convention 2005b).
Biological diversity	the variability among living organisms from all sources including, <i>inter alia</i> , terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species (genetic diversity), between species (species diversity), of ecosystems (ecosystem diversity), and of ecological processes. This definition is largely based on the one contained in Article 2 of the Convention on Biological Diversity (Ramsar Convention 2005b).
Catchment	the total area draining into a river, reservoir, or other body of water (ANZECC and ARMCANZ 2000a).
Change in ecological character	is defined as the human-induced adverse alteration of any ecosystem component, process, and/or ecosystem benefit/service (Ramsar Convention 2005a, Resolution IX.1 Annex A).
Community	an assemblage of organisms characterised by a distinctive combination of species occupying a common environment and interacting with one another (ANZECC and ARMCANZ 2000a).
Community Composition	all the types of taxa present in a community (ANZECC and ARMCANZ 2000a).
Conceptual model	wetland conceptual models express ideas about components and processes deemed important for wetland ecosystems (Manlet et al. 2000; Gross 2003)
Contracting Parties	are countries that are Member States to the Ramsar Convention on Wetlands; 154 as at March 2007. Membership in the Convention is open to all states that are members of the United Nations, one of the UN specialized agencies, or the International Atomic Energy Agency, or is a Party to the Statute of the International Court of Justice [http://www.ramsar.org/key_cp_e.htm].
Critical stage	meaning stage of the life cycle of wetland-dependent species. Critical stages being those activities (breeding, migration stopovers, moulting etc.) which if interrupted or prevented from occurring may threaten long-term conservation of the species. (Ramsar Convention 2005b).

Ecological character	<p>is the combination of the ecosystem components, processes and benefits/services that characterise the wetland at a given point in time. Within this context, ecosystem benefits are defined in accordance with the variety of benefits to people (Ecosystem Services). (Millennium definition of ecosystem services as "the benefits that people receive from ecosystems" (Ramsar Convention 2005a, Resolution IX.1 Annex A).</p> <p>The phrase "at a given point in time" refers to Resolution VI.1 paragraph 2.1, which states that "It is essential that the ecological character of a site be described by the Contracting Party concerned at the time of designation for the Ramsar List, by completion of the Information Sheet on Ramsar Wetlands (as adopted by Recommendation IV. 7).</p>
Ecological communities	any naturally occurring group of species inhabiting a common environment, interacting with each other especially through food relationships and relatively independent of other groups. Ecological communities may be of varying sizes, and larger ones may contain smaller ones (Ramsar Convention 2005b).
Ecosystems	the complex of living communities (including human communities) and non-living environment (Ecosystem Components) interacting (through Ecological Processes) as a functional unit which provides inter alia a variety of benefits to people (Ecosystem Services). (Millennium Ecosystem Assessment 2005).
Ecosystem components	include the physical, chemical and biological parts of a wetland (from large scale to very small scale, e.g. habitat, species and genes) (Millennium Ecosystem Assessment 2005).
Ecosystem processes	are the dynamic forces within an ecosystem. They include all those processes that occur between organisms and within and between populations and communities, including interactions with the non-living environment that result in existing ecosystems and bring about changes in ecosystems over time (Australian Heritage Commission 2002). They may be physical, chemical or biological.
Ecosystem services	are the benefits that people receive or obtain from an ecosystem. The components of ecosystem services are provisioning (e.g. food & water), regulating (e.g. flood control), cultural (e.g. spiritual, recreational), and supporting (e.g. nutrient cycling, ecological value). (Millennium Ecosystem Assessment 2005). See also "Benefits".
Fluvial geomorphology	the study of water-shaped landforms (Gordon <i>et al.</i> 1999)
Indicator species	species whose status provides information on the overall condition of the ecosystem and of other species in that ecosystem; taxa that are sensitive to environmental conditions and which can therefore be used to assess environmental quality (Ramsar Convention 2005b).
Indigenous species	a species that originates and occurs naturally in a particular country (Ramsar Convention 2005b).
Introduced (non-native) species	a species that does not originate or occur naturally in a particular country (Ramsar Convention 2005b).
Limits of Acceptable Change	the variation that is considered acceptable in a particular component or process of the ecological character of the wetland without indicating change in ecological character which may lead to a reduction or loss of the criteria for which the site was Ramsar listed' (modified from definition adopted by Phillips 2006).
List of Wetlands of International Importance ("the Ramsar List")	the list of wetlands which have been designated by the Ramsar Contracting Party in which they reside as internationally important, according to one or more of the criteria that have been adopted by the Conference of the Parties [http://www.ramsar.org/about/about_glossary.htm].
Monitoring	the collection of specific information for management purposes in response to hypotheses derived from assessment activities, and the use of these monitoring results for implementing management (Ramsar Convention 2002a, Resolution VIII.6).

Ramsar	city in Iran, on the shores of the Caspian Sea, where the Convention on Wetlands was signed on 2 February 1971; thus the Convention's short title, "Ramsar Convention on Wetlands" [http://www.ramsar.org/about/about_glossary.htm].
Ramsar Criteria	Criteria for Identifying Wetlands of International Importance, used by Contracting Parties and advisory bodies to identify wetlands as qualifying for the Ramsar List on the basis of representativeness or uniqueness or of biodiversity values. http://www.ramsar.org/about/about_glossary.htm
Ramsar Convention	<i>Convention on Wetlands of International Importance especially as Waterfowl Habitat</i> . Ramsar (Iran), 2 February 1971. UN Treaty Series No. 14583. As amended by the Paris Protocol, 3 December 1982, and Regina Amendments, 28 May 1987. The abbreviated names "Convention on Wetlands (Ramsar, Iran, 1971)" or "Ramsar Convention" are more commonly used [http://www.ramsar.org/index_very_key_docs.htm].
Ramsar Information Sheet (RIS)	the form upon which Contracting Parties record relevant data on proposed Wetlands of International Importance for inclusion in the Ramsar Database; covers identifying details like geographical coordinates and surface area, criteria for inclusion in the Ramsar List and wetland types present, hydrological, ecological, and socioeconomic issues among others, ownership and jurisdictions, and conservation measures taken and needed (http://www.ramsar.org/about/about_glossary.htm).
Ramsar List	the List of Wetlands of International Importance [http://www.ramsar.org/about/about_glossary.htm].
Ramsar Sites	wetlands designated by the Contracting Parties for inclusion in the List of Wetlands of International Importance because they meet one or more of the Ramsar Criteria [http://www.ramsar.org/about/about_glossary.htm].
Ramsar Sites Database	repository of ecological, biological, socio-economic, and political data and maps with boundaries on all Ramsar sites, maintained by Wetlands International in Wageningen, the Netherlands, under contract to the Convention [http://www.ramsar.org/about/about_glossary.htm].
Taxa, Taxon	A general name for a taxonomic group whatever level e.g. species or genus of any biota.
Wetlands	are areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six metres (Ramsar Convention 1987).
Wetland Assessment	the identification of the status of, and threats to, wetlands as a basis for the collection of more specific information through monitoring activities (Finlayson <i>et al.</i> 2001; Ramsar Convention 2002a).
Wetland Ecological Risk Assessment	a quantitative or qualitative evaluation of the actual or potential adverse effects of stressors on a wetland ecosystem (US EPA 1989)
Wetland types	as defined by the Ramsar Convention's wetland classification system [http://www.ramsar.org/ris/key_ris.htm#type].
Wise use of wetlands	is the maintenance of their ecological character, achieved through the implementation of ecosystem approaches[1], within the context of sustainable development[2]" (Ramsar Convention 2005a Resolution IX.1 Annex A). 1. Including <i>inter alia</i> the Convention on Biological Diversity's "Ecosystem Approach" (CBD COP5 Decision V/6) and that applied by HELCOM and OSPAR (Declaration of the First Joint Ministerial Meeting of the Helsinki and OSPAR Commissions, Bremen, 25-26 June 2003). 2. The phrase "in the context of sustainable development" is intended to recognize that whilst some wetland development is inevitable and that many developments have important benefits to society, developments can be facilitated in sustainable ways by approaches elaborated under the Convention, and it is not appropriate to imply that 'development' is an objective for every wetland.

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10. APPENDICES

10.1 Appendix 1: Flora of the Riverland Ramsar Site

10.1.1 List of dominant plant species for major vegetation communities found at the Site

Plant Species	Indigenous (Y = yes; N = no)
<i>Acacia nyssophylla</i>	Y
<i>Acacia stenophylla</i>	Y
<i>Actinobole uliginosum</i>	Y
<i>Agrostis avenacea</i> var. <i>avenacea</i>	Y
<i>Alectryon oleifolius</i> ssp. <i>canescens</i>	Y
<i>Alternanthera denticulata</i>	Y
<i>Amphibromus nervosus</i>	Y
<i>Amyema miquelii</i>	Y
<i>Anagallis arvensis</i>	N
<i>Angianthus tomentosus</i>	Y
<i>Arctotheca calendula</i>	N
<i>Aristida contorta</i>	Y
<i>Asperula gemella</i>	Y
<i>Aster subulatus</i>	N
<i>Atriplex eardleyae</i>	Y
<i>Atriplex holocarpa</i>	Y
<i>Atriplex leptocarpa</i>	Y
<i>Atriplex limbata</i>	Y
<i>Atriplex lindleyi</i>	Y
<i>Atriplex lindleyi</i> ssp. <i>lindleyi</i>	Y
<i>Atriplex pseudocampanulata</i>	Y
<i>Atriplex rhagodioides</i>	Y
<i>Atriplex semibaccata</i>	Y
<i>Atriplex stipitata</i>	Y
<i>Atriplex suberecta</i>	Y
<i>Atriplex velutinella</i>	Y

Plant Species	Indigenous (Y = yes; N = no)
<i>Austrodanthonia caespitosa</i>	Y
<i>Austrodanthonia setacea</i>	Y
<i>Austrostipa nitida</i>	Y
<i>Austrostipa scabra</i> ssp. <i>falcata</i>	Y
<i>Azolla filiculoides</i>	Y
<i>Bolboschoenus caldwellii</i>	Y
<i>Bolboschoenus medianus</i>	Y
<i>Brachyscome basaltica</i> var. <i>gracilis</i>	Y
<i>Brachyscome ciliaris</i> var. <i>ciliaris</i>	Y
<i>Brachyscome ciliaris</i> var. <i>lanuginosa</i>	Y
<i>Brachyscome dentate</i>	Y
<i>Brachyscome lineariloba</i>	Y
<i>Brassica tournefortii</i>	N
<i>Bromus arenarius</i>	Y
<i>Bromus rubens</i>	N
<i>Bulbine semibarbata</i>	Y
<i>Calandrinia eremaea</i>	Y
<i>Callitris gracilis</i>	Y
<i>Calocephalus sonderi</i>	Y
<i>Calotis cuneifolia</i>	Y
<i>Calotis hispidula</i>	Y
<i>Calotis scapigera</i>	Y
<i>Carduus tenuiflorus</i>	N
<i>Carthamus lanatus</i>	N
<i>Centaurea melitensis</i>	N
<i>Centipeda crateriformis</i> ssp. <i>crateriformis</i>	Y
<i>Centipeda cunninghamii</i>	Y
<i>Centipeda minima</i> ssp. <i>minima</i>	Y
<i>Centipeda thespidioides</i>	Y
<i>Chamaesyce drummondii</i>	Y
<i>Chenopodium curvispicatum</i>	Y
<i>Chenopodium desertorum</i> ssp. <i>desertorum</i>	Y
<i>Chenopodium nitrariaceum</i>	Y
<i>Chrysocephalum apiculatum</i>	Y

Plant Species	Indigenous (Y = yes; N = no)
<i>Cirsium vulgare</i>	N
<i>Convolvulus remotus</i>	Y
<i>Conyza albida</i>	N
<i>Conyza bonariensis</i>	N
<i>Cotula australis</i>	Y
<i>Cotula bipinnata</i>	N
<i>Cotula coronopifolia</i>	N
<i>Craspedia glauca</i>	Y
<i>Crassula colorata</i> var. <i>acuminata</i>	Y
<i>Crassula helmsii</i>	Y
<i>Crassula peduncularis</i>	Y
<i>Crassula sieberiana</i> ssp. <i>tetramera</i>	Y
<i>Cressa australis</i>	Y
<i>Crinum flaccidum</i>	Y
<i>Cuscuta campestris</i>	N
<i>Cynodon dactylon</i>	N
<i>Cyperus gymnocaulos</i>	Y
<i>Damasonium minus</i>	Y
<i>Daucus glochidiatus</i>	Y
<i>Dianella porracea</i>	Y
<i>Disphyma crassifolium</i> ssp. <i>clavellatum</i>	Y
<i>Dissocarpus paradoxus</i>	Y
<i>Dittrichia graveolens</i>	N
<i>Dodonaea viscosa</i> ssp. <i>angustissima</i>	Y
<i>Echium plantagineum</i>	N
<i>Eclipta platyglossa</i>	Y
<i>Einadia nutans</i> ssp. <i>nutans</i>	Y
<i>Eleocharis acuta</i>	Y
<i>Emex australis</i>	N
<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	Y
<i>Enteropogon acicularis</i>	Y
<i>Epaltes australis</i>	Y
<i>Eragrostis australasica</i>	Y
<i>Eragrostis dielsii</i> var. <i>dielsii</i>	Y

Plant Species	Indigenous (Y = yes; N = no)
<i>Eragrostis elongate</i>	Y
<i>Eragrostis lacunaria</i>	Y
<i>Eremophila bignoniiflora</i>	Y
<i>Eremophila divaricata</i> ssp. <i>divaricata</i>	Y
<i>Eriochiton sclerolaenoides</i>	Y
<i>Erodium cicutarium</i>	N
<i>Erodium crinitum</i>	Y
<i>Eucalyptus camaldulensis</i> var. <i>camaldulensis</i>	Y
<i>Eucalyptus gracilis</i>	Y
<i>Eucalyptus largiflorens</i>	Y
<i>Eucalyptus porosa</i>	Y
<i>Euchiton sphaericus</i>	Y
<i>Exocarpos aphyllus</i>	Y
<i>Exocarpos strictus</i>	Y
<i>Fimbristylis velata</i>	Y
<i>Frankenia cupularis</i>	Y
<i>Frankenia pauciflora</i> var. <i>gunnii</i>	Y
<i>Frankenia serpyllifolia</i>	Y
<i>Galenia secunda</i>	N
<i>Gamochaeta spicata</i>	N
<i>Glycyrrhiza acanthocarpa</i>	Y
<i>Gnephosis tenuissima</i>	Y
<i>Goodenia fascicularis</i>	Y
<i>Gypsophila tubulosa</i>	N
<i>Hakea leucoptera</i> ssp. <i>leucoptera</i>	Y
<i>Haloragis aspera</i>	Y
<i>Halosarcia</i> sp.	Y
<i>Hedypnois rhagadioloides</i>	N
<i>Helichrysum</i> sp.	Y
<i>Heliotropium curassavicum</i>	N
<i>Heliotropium supinum</i>	N
<i>Helminthotheca echioides</i>	N
<i>Herniaria cinerea</i>	N

Plant Species	Indigenous (Y = yes; N = no)
<i>Hordeum glaucum</i>	N
<i>Hordeum leporinum</i>	N
<i>Hordeum marinum</i>	N
<i>Hornungia procumbens</i>	N
<i>Hypochoeris glabra</i>	N
<i>Isoetopsis graminifolia</i>	Y
<i>Isolepis platycarpa</i>	Y
<i>Juncus aridicola</i>	Y
<i>Juncus aridicola</i>	Y
<i>Juncus pauciflorus</i>	Y
<i>Juncus usitatus</i>	Y
<i>Lachnagrostis billardierei</i> ssp. <i>billardierei</i>	Y
<i>Lactuca serriola</i>	N
<i>Lamarckia aurea</i>	N
<i>Lavatera</i> sp.	Y
<i>Lepidium africanum</i>	N
<i>Lepidium fasciculatum</i>	Y
<i>Lepidium papillosum</i>	Y
<i>Lepidium pseudohyssopifolium</i>	Y
<i>Limonium lobatum</i>	N
<i>Loranthaceae</i> sp.	Y
<i>Ludwigia peploides</i> ssp. <i>montevidensis</i>	N
<i>Lycium ferocissimum</i>	N
<i>Lysiana exocarpi</i> ssp. <i>exocarpi</i>	Y
<i>Maireana appressa</i>	Y
<i>Maireana brevifolia</i>	Y
<i>Maireana ciliate</i>	Y
<i>Maireana georgei</i>	Y
<i>Maireana pentagona</i>	Y
<i>Maireana pentatropis</i>	Y
<i>Maireana pyramidata</i>	Y
<i>Maireana radiate</i>	Y
<i>Maireana</i> sp.	Y
<i>Maireana turbinata</i>	Y

Plant Species	Indigenous (Y = yes; N = no)
<i>Malacocera tricornis</i>	Y
<i>Marrubium vulgare</i>	N
<i>Marsilea drummondii</i>	Y
<i>Medicago minima</i> var. <i>minima</i>	N
<i>Medicago polymorpha</i> var. <i>polymorpha</i>	N
<i>Medicago truncatula</i>	N
<i>Melaleuca lanceolata</i> ssp. <i>lanceolata</i>	Y
<i>Melilotus indicus</i>	N
<i>Mentha australis</i>	Y
<i>Mesembryanthemum crystallinum</i>	N
<i>Mesembryanthemum nodiflorum</i>	N
<i>Mimulus repens</i>	Y
<i>Muehlenbeckia florulenta</i>	Y
<i>Muehlenbeckia horrida</i> ssp. <i>horrida</i>	Y
<i>Myoporum montanum</i>	Y
<i>Myoporum parvifolium</i>	Y
<i>Myosurus minimus</i> var. <i>australis</i>	Y
<i>Myriophyllum crispatum</i>	Y
<i>Myriophyllum papillosum</i>	Y
<i>Myriophyllum verrucosum</i>	Y
<i>Neatostema apulum</i>	N
<i>Nicotiana goodspeedii</i>	Y
<i>Nicotiana velutina</i>	Y
<i>Nitraria billardierei</i>	Y
<i>Olearia pimeleoides</i> ssp. <i>pimeleoides</i>	Y
<i>Omphalolappula concava</i>	Y
<i>Onopordum acaulon</i>	N
<i>Osteocarpum acropterum</i> var. <i>acropterum</i>	Y
<i>Oxalis perennans</i>	Y
<i>Paspalum vaginatum</i>	N
<i>Pentaschistis airoides</i>	N
<i>Persicaria decipiens</i>	Y
<i>Persicaria lapathifolia</i>	Y
<i>Phragmites australis</i>	Y

Plant Species	Indigenous (Y = yes; N = no)
<i>Phyla canescens</i>	N
<i>Phyllanthus lacunarius</i>	Y
<i>Picris squarrosa</i>	Y
<i>Pimelea microcephala</i> ssp. <i>microcephala</i>	Y
<i>Pimelea trichostachya</i>	Y
<i>Pittosporum angustifolium</i>	Y
<i>Plagiobothrys plurisepaleus</i>	Y
<i>Plantago cunninghamii</i>	Y
<i>Poa fordeana</i>	Y
<i>Pogonolepis muelleriana</i>	Y
<i>Polycalymma stuartii</i>	Y
<i>Polygonum plebeium</i>	Y
<i>Polypogon monspeliensis</i>	N
<i>Pratia concolor</i>	Y
<i>Pseudognaphalium luteoalbum</i>	Y
<i>Psilocaulon granulicaule</i>	N
<i>Pycnosorus pleiocephalus</i>	Y
<i>Ranunculus pentandrus</i> var. <i>platycarpus</i>	Y
<i>Reichardia tingitana</i>	N
<i>Rhagodia spinescens</i>	Y
<i>Rhagodia ulicina</i>	Y
<i>Rhodanthe corymbiflora</i>	Y
<i>Rhodanthe floribunda</i>	Y
<i>Rhodanthe moschate</i>	Y
<i>Rhodanthe polygalifolia</i>	Y
<i>Rhodanthe pygmaea</i>	Y
<i>Rorippa eustylis</i>	Y
<i>Rostraria cristata</i>	N
<i>Rostraria pumila</i>	N
<i>Rumex bidens</i>	Y
<i>Rumex tenax</i>	Y
<i>Salix babylonica</i>	N
<i>Salsola tragus</i>	Y
<i>Sarcocornia quinqueflora</i>	Y

Plant Species	Indigenous (Y = yes; N = no)
<i>Sarcozona praecox</i>	Y
<i>Schismus barbatus</i>	N
<i>Schoenoplectus pungens</i>	Y
<i>Schoenoplectus validus</i>	Y
<i>Scleroblitum atriplicinum</i>	Y
<i>Sclerolaena brachyptera</i>	Y
<i>Sclerolaena decurrens</i>	Y
<i>Sclerolaena diacantha</i>	Y
<i>Sclerolaena divaricata</i>	Y
<i>Sclerolaena muricata</i> var. <i>muricata</i>	Y
<i>Sclerolaena muricata</i> var. <i>semiglabra</i>	Y
<i>Sclerolaena obliquicuspis</i>	Y
<i>Sclerolaena stelligera</i>	Y
<i>Sclerolaena tricuspis</i>	Y
<i>Senecio cunninghamii</i> var. <i>cunninghamii</i>	Y
<i>Senecio glossanthus</i>	Y
<i>Senecio pinnatifolius</i>	Y
<i>Senecio quadridentatus</i>	Y
<i>Senecio runcinifolius</i>	Y
<i>Senna artemisioides</i> ssp. <i>petiolaris</i>	Y
<i>Setaria jubiflora</i>	Y
<i>Sida ammophila</i>	Y
<i>Silene apetala</i>	N
<i>Sisymbrium erysimoides</i>	N
<i>Sisymbrium irio</i>	N
<i>Solanum esuriale</i>	Y
<i>Solanum lacunarium</i>	Y
<i>Solanum nigrum</i>	N
<i>Sonchus asper</i> ssp. <i>glaucescens</i>	N
<i>Sonchus oleraceus</i>	N
<i>Sonchus tenerrimus</i>	N
<i>Spergularia diandra</i>	N
<i>Spergularia marina</i>	N
<i>Spergularia rubra</i>	N

Plant Species	Indigenous (Y = yes; N = no)
<i>Spirodela punctata</i>	Y
<i>Sporobolus mitchellii</i>	Y
<i>Sporobolus virginicus</i>	Y
<i>Stemodia florulenta</i>	Y
<i>Suaeda australis</i>	Y
<i>Swainsona microphylla</i>	Y
<i>Swainsona microphylla</i> ssp. <i>minima</i>	Y
<i>Swainsona phacoides</i>	Y
<i>Tecticornia indica</i> ssp. <i>leiostachya</i>	Y
<i>Tecticornia pergranulata</i>	Y
<i>Tecticornia pergranulata</i> ssp. <i>divaricata</i>	Y
<i>Tecticornia pergranulata</i> ssp. <i>pergranulata</i>	Y
<i>Tecticornia triandra</i>	Y
<i>Tetragonia eremaea</i>	Y
<i>Tetragonia tetragonioides</i>	Y
<i>Teucrium racemosum</i>	Y
<i>Teucrium sessiliflorum</i>	Y
<i>Threlkeldia diffusa</i>	Y
<i>Thysanotus</i> sp.	Y
<i>Trichanthodium skirrophorum</i>	Y
<i>Triglochin calcitrapum</i>	Y
<i>Triptilodiscus pygmaeus</i>	Y
<i>Typha domingensis</i>	Y
<i>Urospermum picroides</i>	N
<i>Vallisneria americana</i> var. <i>americana</i>	Y
<i>Verbena officinalis</i>	N
<i>Veronica peregrina</i> ssp. <i>xalapensis</i>	N
<i>Vittadinia australasica</i> var. <i>australasica</i>	Y
<i>Vittadinia cervicularis</i> var. <i>cervicularis</i>	Y
<i>Vittadinia cuneata</i>	Y
<i>Vittadinia cuneata</i> var. <i>cuneata</i> forma <i>cuneata</i>	Y
<i>Vittadinia dissecta</i> var. <i>hirta</i>	Y
<i>Vulpia muralis</i>	N

Plant Species	Indigenous (Y = yes; N = no)
<i>Vulpia myuros forma myuros</i>	N
<i>Wahlenbergia fluminalis</i>	Y
<i>Wahlenbergia tumidifructa</i>	Y
<i>Waitzia acuminata var. acuminata</i>	Y
<i>Wilsonia rotundifolia</i>	Y
<i>Xanthium occidentale</i>	N
<i>Xanthium spinosum</i>	N
<i>Zaluzianskya divaricata</i>	N
<i>Zygophyllum ammophilum</i>	Y
<i>Zygophyllum eremaeum</i>	Y
<i>Zygophyllum glaucum</i>	Y
<i>Zygophyllum iodocarpum</i>	Y

10.1.2 Appendix 1.1: Plant species listed at the State level under the National Parks and Wildlife Act 1972 known to be present at the Site on a permanent or seasonal basis:

- *Adiantum capillus-veneris*, Dainty Maiden-hair (Vulnerable)
- *Brachycome basaltica var. gracilis*, Swamp Daisy (Rare)
- *Brachycome melanocarpa*, Black-fruit Daisy (Vulnerable)
- *Brachycome parvula var. lissocarpa*, Coast Daisy (Rare)
- *Callitriche sonderi*, Matted Water Starwort (Rare)
- *Callitriche umbonata*, Water Starwort (Vulnerable)
- *Calocephalus sonderi*, Pale Beauty-heads (Rare)
- *Calotis scapigera*, Tufted Burr-daisy (Rare)
- *Crassula peduncularis*, Purple Crassula (Rare)
- *Dianella porracea*, Pale Flax-lily (Vulnerable)
- *Diplachne parviflora*, Small-flower Beetle-grass (Rare)
- *Elatine gratioloides*, Waterwort (Rare)
- *Eragrostis infecunda*, Barren Cane-grass (Rare)
- *Eragrostis lacunaria*, Purple Love-grass (Rare)

- *Exocarpos strictus*, Pale-fruit Cherry (Rare)
- *Frankenia cupularis*, Sea-Heath (Rare)
- *Hakea tephrosperma*, Hooked Needlewood (Rare)
- *Isolepis producta*, Nutty Club-rush (Vulnerable)
- *Maireana pentagona*, Slender Fissure-plant (Rare)
- *Myoporum parvifolium*, Creeping Boobialla (Rare)
- *Myriophyllum crispatum*, Upright Milfoil (Vulnerable)
- *Myriophyllum papillosum*, Robust Milfoil (Rare)
- *Nymphoides crenata*, Wavy Marshwort (Rare)
- *Orobanche cernua* var. *australiana*, Australian Broomrape (Vulnerable)
- *Picris squarrosa*, Squat Picris (Rare)
- *Rorippa laciniata*, Jagged Bitter-cress (Rare)
- *Swainsona behriana*, Behr's Swainsona-pea (Vulnerable)
- *Zannichellia palustris* (Rare)

10.2 Appendix 2: Fauna of the Riverland Ramsar Site

10.2.1 Appendix 2.1: List of waterbird/wader species recorded utilising the Riverland Ramsar Wetland (RIS in prep.).

Hoary-headed Grebe (<i>Poliiocephalus poliocephalus</i>)	Hardhead (<i>Aythya australis</i>)
Australian Grebe (<i>Tachybaptus novaehollandiae</i>)	Australian Wood Duck (<i>Chenonetta jubata</i>)
Great Crested Grebe (<i>Podiceps cristatus</i>)	Blue-billed Duck (<i>Oxyura australis</i>)
Australian Pelican (<i>Pelecanus conspicillatus</i>)	Musk Duck (<i>Biziura lobata</i>)
Great Cormorant (<i>Phalacrocorax carbo</i>)	White-bellied Sea-Eagle (<i>Haliaeetus leucogaster</i>)
Little Black Cormorant (<i>P. sulcirostris</i>)	Swamp Harrier (<i>Circus approximans</i>)
Pied Cormorant (<i>P. varius</i>)	Buff-banded Rail (<i>Rallus philippensis</i>)
Little Pied Cormorant (<i>P. melanoleucos</i>)	Australian Spotted Crake (<i>P. fluminea</i>)
Australian Darter (<i>Anhinga novaehollandiae</i>)	Dusky Moorhen (<i>Gallinula tenebrosa</i>)
White-necked Heron (<i>Ardea pacifica</i>)	Black-tailed Native-hen (<i>G. ventralis</i>)
Great (Large) Egret (<i>A. Alba</i>)	Purple Swamphen (<i>Porphyrio porphyrio</i>)
Intermediate Egret (<i>A. intermedia</i>)	Eurasian Coot (<i>Fulica atra</i>)
White-faced Heron (<i>A. novaehollandiae</i>)	Black-winged Stilt (<i>Himantopus himantopus</i>)
Little Egret (<i>A. garzetta</i>)	Banded Stilt (<i>Cladorhynchus leucocephalus</i>)
Cattle Egret (<i>A. ibis</i>)	Red-necked Avocet (<i>Recurvirostra novaehollandiae</i>)
Australian Bittern (<i>Botaurus poiciloptilus</i>)	Masked Lapwing (<i>Vanellus miles</i>)
Rufous Night-Heron (<i>Nycticorax caledonicus</i>)	
Australian Ibis (<i>Threskiornis molucca</i>)	

Straw-necked Ibis (<i>Threskiornis spinicollis</i>)	Red-capped Plover (<i>Charadrius ruficapillus</i>)
Glossy Ibis (<i>Plegadis falcinellus</i>)	Black-fronted Plover (<i>C. melanops</i>)
Royal Spoonbill (<i>Platalea regia</i>)	Red-kneed Dotterel (<i>C. cinctus</i>)
Yellow-billed Spoonbill (<i>P. Flavipes</i>)	Common Greenshank (<i>Tringa nebularia</i>)
Black Swan (<i>Cygnus atratus</i>)	Sharp-tailed Sandpiper (<i>Calidris acuminata</i>)
Freckled Duck (<i>Stictonetta naevosa</i>)	Red-necked Stint (<i>C. ruficollis</i>)
Australian Shelduck (<i>Tadorna tadornoides</i>)	Curlew Sandpiper (<i>C. ferruginea</i>)
Pink-eared Duck (<i>Malacorhynchus membranaceus</i>)	Silver Gull (<i>Larus novaehollandiae</i>)
Grey Teal (<i>Anas gracilis</i>)	Whiskered Tern (<i>Chlidonias hybridus</i>)
Chestnut Teal (<i>A. castanea</i>)	Gull-billed Tern (<i>Gelochelidon nilotica</i>)
Pacific Black Duck (<i>A. superciliosa</i>)	Caspian Tern (<i>Hydroprogne caspia</i>)
Australasian Shoveler (<i>A. rhynchotis</i>)	Clamorous Reed Warbler (<i>Acrocephalus stentoreus</i>)
	Golden-headed (<i>Cisticola Cisticola exilis</i>)

10.2.2 Appendix 2.2: List of all bird species found at the Site during a 2003 survey by DEH (2002) (* = introduced species)

- **Passer domesticus* House Sparrow
- **Sturnus vulgaris* Common Starling
- *Acanthagenys rufogularis* Spiny-cheeked Honeyeater
- *Acanthiza chrysorrhoa* Yellow-rumped Thornbill
- *Acanthiza nana* Yellow Thornbill
- *Acanthiza uropygialis* Chestnut-rumped Thornbill
- *Accipiter cirrhocephalus* Collared Sparrowhawk
- *Accipiter fasciatus* Brown Goshawk
- *Accipiter novaehollandiae* Grey Goshawk
- *Acrocephalus australis* Australian Reed Warbler, (Clamorous Reed-Warbler)
- *Aegotheles cristatus* Australian Owlet-nightjar
- *Anas gracilis* Grey Teal
- *Anas rhynchotis* Australasian Shoveler
- *Anas superciliosa* Pacific Black Duck
- *Anhinga melanogaster* Darter
- *Anthochaera carunculata* Red Wattlebird
- *Anthus novaeseelandiae* Richard's Pipit
- *Aphelocephala leucopsis* Southern Whiteface
- *Aquila audax* Wedge-tailed Eagle
- *Ardea modesta* Eastern (Great) Egret
- *Artamus cinereus* Black-faced Woodswallow
- *Artamus personatus* Masked Woodswallow
- *Artamus superciliosus* White-browed Woodswallow
- *Barnardius zonarius* Australian Ringneck, (Ring-necked Parrot)
- *Burhinus grallarius* Bush Stone-curlew
- *Cacatua galerita* Sulphur-crested Cockatoo
- *Cacatua leadbeateri* Major Mitchell's Cockatoo
- *Cacatua roseicapilla* Galah

- *Cacatua sanguine* Little Corella
- *Calidris acuminata* Sharp-tailed Sandpiper
- *Charadrius ruficapillus* Red-capped Plover
- *Chenonetta jubata* Australian Wood Duck, (Maned Duck)
- *Chrysococcyx basalis* Horsfield's Bronze-cuckoo
- *Chrysococcyx osculans* Black-eared Cuckoo
- *Cincloramphus mathewsi* Rufous Songlark
- *Circus approximans* Swamp Harrier
- *Climacteris picumnus* Brown Treecreeper
- *Colluricincla harmonica* Grey Shrike-thrush
- *Coracina novaehollandiae* Black-faced Cuckoo-shrike
- *Corcorax melanorhamphos* White-winged Chough
- *Corvus bennetti* Little Crow
- *Corvus coronoides* Australian Raven
- *Corvus mellori* Little Raven
- *Cracticus nigrogularis* Pied Butcherbird
- *Cracticus torquatus* Grey Butcherbird
- *Cygnus atratus* Black Swan
- *Dacelo novaeguineae* Laughing Kookaburra
- *Daphoenositta chrysoptera* Varied Sittella
- *Dicaeum hirundinaceum* Mistletoebird
- *Dromaius novaehollandiae* Emu
- *Egretta novaehollandiae* White-faced Heron
- *Elsemyornis melanops* Black-fronted Dotterel
- *Entomyzon cyanotis* Blue-faced Honeyeater
- *Epthianura albifrons* White-fronted Chat
- *Erythrogonys cinctus* Red-kneed Dotterel
- *Eurostopodus argus* Spotted Nightjar
- *Falco berigora* Brown Falcon
- *Falco cenchroides* Nankeen Kestrel
- *Falco longipennis* Australian Hobby
- *Falco peregrinus* Peregrine Falcon

- *Fulica atra* Eurasian Coot
- *Geopelia cuneata* Diamond Dove
- *Geopelia placida* Peaceful Dove
- *Grallina cyanoleuca* Magpie-lark
- *Gymnorhina tibicen* Australian Magpie
- *Haliastur sphenurus* Whistling Kite
- *Hieraaetus morphnoides* Little Eagle
- *Himantopus himantopus* Black-winged Stilt
- *Hirundo neoxena* Welcome Swallow
- *Lalage tricolor* White-winged Triller
- *Lichenostomus penicillatus* White-plumed Honeyeater
- *Lichenostomus virescens* Singing Honeyeater
- *Malurus cyaneus* Superb Fairy-wren
- *Malurus lamberti* Variegated Fairy-wren
- *Malurus leucopterus* White-winged Fairy-wren
- *Malurus splendens* Splendid Fairy-wren
- *Manorina flavigula* Yellow-throated Miner
- *Manorina melanocephala* Noisy Miner
- *Megalurus gramineus* Little Grassbird
- *Melanodryas cucullata* Hooded Robin
- *Melithreptus brevirostris* Brown-headed Honeyeater
- *Melopsittacus undulatus* Budgerigar
- *Merops ornatus* Rainbow Bee-eater
- *Milvus migrans* Black Kite
- *Myiagra inquieta* Restless Flycatcher
- *Ninox novaeseelandiae* Southern Boobook
- *Northiella haematogaster* Blue Bonnet
- *Nycticorax caledonicus* Nankeen Night Heron
- *Ocyphaps lophotes* Crested Pigeon
- *Pachycephala inornata* Gilbert's Whistler
- *Pachycephala rufiventris* Rufous Whistler
- *Pardalotus striatus* Striated Pardalote

-
- *Pelecanus conspicillatus* Australian Pelican
 - *Petrochelidon ariel* Fairy Martin
 - *Petrochelidon nigricans* Tree Martin
 - *Petroica goodenovii* Red-capped Robin
 - *Phalacrocorax carbo* Great Cormorant
 - *Phalacrocorax melanoleucos* Little Pied Cormorant
 - *Phalacrocorax sulcirostris* Little Black Cormorant
 - *Phalacrocorax varius* Pied Cormorant
 - *Phaps chalcoptera* Common Bronzewing
 - *Philemon citreogularis* Little Friarbird
 - *Phylidonyris albifrons* White-fronted Honeyeater
 - *Platalea flavipes* Yellow-billed Spoonbill
 - *Platycercus elegans* Crimson Rosella
 - *Plectorhyncha lanceolata* Striped Honeyeater
 - *Podargus strigoides* Tawny Frogmouth
 - *Poliiocephalus poliocephalus* Hoary-headed Grebe
 - *Polytelis anthopeplus* Regent Parrot
 - *Pomatostomus ruficeps* Chestnut-crowned Babbler
 - *Pomatostomus superciliosus* White-browed Babbler
 - *Porphyrio porphyrio* Purple Swamphen
 - *Psephotus haematonotus* Red-rumped Parrot
 - *Psephotus varius* Mulga Parrot
 - *Psophodes cristatus* Chirruping Wedgebill
 - *Pyrrholaemus brunneus* Redthroat
 - *Recurvirostra novaehollandiae* Red-necked Avocet
 - *Rhipidura albiscapa* Grey Fantail
 - *Rhipidura leucophrys* Willie Wagtail
 - *Smicrornis brevirostris* Weebill
 - *Sterna caspia* Caspian Tern
 - *Struthidea cinerea* Apostlebird
 - *Tachybaptus novaehollandiae* Australasian Grebe, (Little Grebe)
 - *Tadorna tadornoides* Australian Shelduck

- *Threskiornis molucca* Australian White Ibis
- *Threskiornis spinicollis* Straw-necked Ibis
- *Todiramphus pyrrhopygia* Red-backed Kingfisher
- *Todiramphus sanctus* Sacred Kingfisher
- *Tribonix mortierii* Black-tailed Native-hen
- *Vanellus miles* Masked Lapwing
- *Vanellus tricolor* Banded Lapwing
- *Zosterops lateralis* Silvereye

10.2.3 Appendix 2.3: Fauna species listed at the State level under the National Parks and Wildlife Act 1972 known to be present at the Site on a permanent or seasonal basis:

Mammals

- *Acrobates pygmaeus*, Feather-tailed Glider (Endangered)

Reptiles

- *Chelodina expansa*, Broad-shell Turtle (Vulnerable)
- *Morelia spilota variegata*, Carpet Python (Rare)
- *Varanus varius*, Lace Monitor (Rare)

Birds

- *Anas rhynchos*, Australasian Shoveler (Rare)
- *Ardea intermedia*, Intermediate Egret (Rare)
- *Biziura lobata*, Musk Duck (Rare)
- *Botaurus poiciloptilus*, Australian Bittern (Vulnerable)
- *Burhinus grallarius*, Bush Stone-curlew (Vulnerable)
- *Cacatua leadbeateri*, Major Mitchell's Cockatoo (Vulnerable)
- *Cisticola exilis*, Golden-headed Cisticola (Rare)
- *Entomyzon cyanotis*, Blue-faced Honeyeater (Rare)
- *Falco peregrines*, Peregrine Falcon (Rare)
- *Haliaeetus leucogaster*, White-bellied Sea-Eagle (Vulnerable)
- *Lophoictinia isura*, Square-tailed Kite (Vulnerable)
- *Oxyura australis*, Blue Billed Duck (Rare)
- *Philemon citreogularis*, Little Friarbird (Rare)
- *Plectorhyncha lanceolata*, Striped Honeyeater (Rare)
- *Plegadis falcinellus*, Glossy Ibis (Rare)
- *Podiceps cristatus*, Great Crested Grebe (Rare)
- *Pyrrholaemus brunneus*, Redthroat (Rare)
- *Stictonetta naevosa*, Freckled Duck (Vulnerable)

10.2.4 Appendix 2.4: Species recorded at the Site and listed under international migratory agreements include:

- *Ardea modesta*, Great (Eastern) Egret (JAMBA, CAMBA)
- *Calidris acuminata*, Sharp-tailed Sandpiper (JAMBA, CAMBA, ROKAMBA)
- *Calidris ferruginea*, Curlew Sandpiper (JAMBA, CAMBA, ROKAMBA)
- *Calidris ruficollis*, Red-necked Stint (JAMBA, CAMBA, ROKAMBA)
- *Haliaeetus leucogaster*, White-bellied Sea-Eagle (CAMBA)
- *Hydroprogne caspia*, Caspian Tern (CAMBA)
- *Plegadis falcinellus*, Glossy Ibis (CAMBA)
- *Tringa nebularia*, Greenshank (JAMBA, CAMBA, ROKAMBA)

10.2.5 Appendix 2.5: Nomadic waterbird species known to use the Site in times of drought

- *Anas gracilis*, Grey Teal
- *Anas rhynchos*, Australasian Shoveler
- *Aythya australis*, Hardhead,
- *Charadrius ruficapillus*, Red-caped Plover
- *Chlidonias hybridus*, Whiskered Tern,
- *Cladorhynchus leucocephalus*, Banded Stilt
- *Fulica atra*, Eurasian Coot
- *Himantopus himantopus*, Black-winged Stilt
- *Hydroprogne caspia*, Caspian Tern
- *Malacorhynchus membranaceus*, Pink-eared Duck
- *Platalea flavipes*, Yellow-billed Spoonbill
- *Poliiocephalus poliocephalus*, Hoary-headed Grebe
- *Recurvirostra novaehollandiae*, Red-necked Avocet
- *Stictonetta naevosa*, Freckled Duck
- *Tribonix mortierii*, Black-tailed Native-hen

10.2.6 Appendix 2.6: Nomadic bush-bird species that use the Site during the dry southern Australian summer period

- *Artamus cinereus*, Black-faced Wood Swallow
- *Artamus leucorhynchus*, White-breasted Wood Swallow
- *Chrysococcyx basalis*, Horsfield's Bronze Cuckoo
- *Chrysococcyx osculans*, Black-eared Cuckoo
- *Cuculus pallidus*, Pallid Cuckoo
- *Cuculus pyrrhophanus*, Fan-tailed Cuckoo
- *Halcyon pyrrhopygia*, Red-backed Kingfisher
- *Lalage sueurii*, White-winged Triller
- *Melopsittacus undulates*, Budgerigar
- *Nymphicus hollandicus*, Cockatiel

10.2.7 Appendix 2.7: List of Reptiles found at the Site during a 2003 survey by DEH (2002)

- *Chelodina longicollis* Common Long-necked Tortoise
- *Christinus marmoratus* Marbled Gecko
- *Cryptoblepharus cf carnabyi* Desert Wall skink
- *Ctenophorus pictus* Painted Dragon
- *Ctenotus olympicus* Saltbush Ctenotus
- *Ctenotus regius* Eastern Desert Ctenotus
- *Ctenotus schomburgkii* Sandplain Ctenotus
- *Diplodactylus tessellatus* Tessellated Gecko
- *Diplodactylus vittatus* Eastern Stone Gecko
- *Egernia striolata* Eastern Tree Skink
- *Emydura macquarii* Macquarie Tortoise
- *Eremiascincus richardsonii* Broad-banded Sandswimmer
- *Eulamprus quoyii* Eastern Water Skink
- *Gehyra variegata* Tree Dtella
- *Heteronotia binoei* Bynoe's Gecko
- *Lerista punctatovittata* Spotted Slider
- *Lucasium damaeum* Beaded Gecko
- *Menetia greyii* Dwarf Skink
- *Morethia adelaidensis* Adelaide Snake-eye
- *Notechis scutatus* Eastern Tiger Snake
- *Pogona vitticeps* Central Bearded Dragon
- *Pseudonaja textilis* Eastern Brown Snake
- *Ramphotyphlops bituberculatus* Rough-nosed Blind Snake
- *Rhynchoedura ornate* Beaked Gecko
- *Tiliqua rugosa* Sleepy Lizard
- *Varanus gouldii* Sand Goanna
- *Varanus varius* Tree Goanna

10.2.8 Appendix 2.8: List of Mammals found at the Site during a 2003 survey by DEH (2002) (* = introduced species)

- **Felis catus* Cat
- **Lepus capensis* Brown Hare
- **Mus musculus* House Mouse
- **Oryctolagus cuniculus* Rabbit
- **Ovis aries* Sheep
- **Sus scrofa* Pig
- **Vulpes vulpes* Fox
- *Cercartetus concinnus* Western Pygmy-possum
- *Hydromys chrysogaster* Water-rat
- *Macropus fuliginosus* Western Grey Kangaroo
- *Macropus rufus* Red Kangaroo
- *Mormopterus spp. (species complex) (NC)* Southern Freetail-bats
- *Planigale gilesi* Giles' Planigale
- *Pseudomys bolami* Bolam's Mouse
- *Sminthopsis crassicaudata* Fat-tailed Dunnart
- *Sminthopsis murina* Common Dunnart
- *Tachyglossus aculeatus* Short-beaked Echidna
- *Trichosurus vulpecular* Common Brushtail Possum

10.2.9 Appendix 2.9: Bird species and numbers recorded on the site (M. Harper, unpublished data)**Bird species and numbers recorded at Lake Merreti in 2000 and 2001**

Species	Date	30/10 /2000	15/12/ 2000	16/1/ 2001	6/2/ 2001	6/3/ 2001	3/4/ 2001	2/5/ 2001	1/6/ 2001	13/7/ 2001	5/9/ 2001	5/10/ 2001	2/11/ 2001	4/12/ 2001
Hoary-headed Grebe <i>Poliiocephalus poliocephalus</i>		50	300	2000	770	320		100		135	100	24	6	310
Great Crested Grebe <i>Podiceps cristatus</i>			6											
Australian Pelican <i>Pelecanus conspicillatus</i>			50	200	200	550	132	140	1200	22	145	31	19	40
Great Cormorant <i>Phalacrocorax carbo</i>			150		40	25	2	36		2	25	9		
Little Black Cormorant <i>Phalacrocorax sulcirostris</i>		30	40	40	30	46			14			92	26	
Pied Cormorant <i>Phalacrocorax varius</i>														
Little Pied Cormorant <i>Phalacrocorax melanoleucos</i>		8	30	40	230	112	215	364	232	40	53	294	118	18
Australian Darter <i>Anhinga novaehollandiae</i>			20				4	3					1	
White-necked Heron <i>Ardea pacifica</i>							12	18	1	2	15			
Great (Large) Egret <i>Egretta alba</i>		6	5		2	31	82	116	204	10	19	5		1
Intermediate Egret <i>Egretta intermedia</i>											1			

Species	Date	30/10/2000	15/12/2000	16/1/2001	6/2/2001	6/3/2001	3/4/2001	2/5/2001	1/6/2001	13/7/2001	5/9/2001	5/10/2001	2/11/2001	4/12/2001
White-faced Heron <i>Egretta novaehollandiae</i>						28	49	48	4	2	36	8	12	12
Little Egret <i>Egretta garzetta</i>												1		1
Rufous Night-Heron <i>Nycticorax calendonicus</i>														
Australian Ibis <i>Threskiornis molucca</i>		40	30	30	50	28	119	63	15	2	41	6	1	
Straw-necked Ibis <i>Carpibis spinicollis</i>		20			230			7			24			
Glossy Ibis <i>Plegadis falcinellus</i>				10	16	15								
Royal Spoonbill <i>Platalea regia</i>								3	3					
Yellow-billed Spoonbill <i>Platalea flavipes</i>		5	10	25	2	15		77	118	30	145	76	15	38
Black Swan <i>Cygnus atratus</i>		100	20	10	50	580	590	810	674	730	115	164	145	78
Freckled Duck <i>Stictonetta naevosa</i>		12		24				256	40		23	69	2	90
Australian Shelduck <i>Tadorna tadornoides</i>			30		15	74	120	144	80	70	160	235	547	295
Pink-eared Duck <i>Malacorhynchus membranaceus</i>		300	40		40	400	1050	500	600	1250	1800	450	890	720
Grey Teal <i>Anas gracilis</i>		400	350	400	2000	4000	7140	9400	5500	3660	3640	5110	6875	4600
Chestnut Teal <i>Anas castanea</i>								2	2			4		
Pacific Black Duck <i>Anas superciliosa</i>		40	50	50	100	180	155	200	320	420	184	60	160	110

Species	Date	30/10/2000	15/12/2000	16/1/2001	6/2/2001	6/3/2001	3/4/2001	2/5/2001	1/6/2001	13/7/2001	5/9/2001	5/10/2001	2/11/2001	4/12/2001
Australasian Shoveler <i>Anas rhynchotis</i>				30	20	80	80	105	300	40	20	46	2	65
Hardhead <i>Aythya australis</i>		500	3000	2000	400		20	30			46	140	4	150
Australian Wood Duck <i>Chenonetta jubata</i>				5	50	410	380	400	300	80	26	20	46	8
Musk Duck <i>Biziura lobata</i>				1										
White-bellied Sea-Eagle <i>Haliaeetus leucogaster</i>							1	2	1	2	1		2	
Swamp Harrier <i>Circus approximans</i>			2		2				1		1			
Australian Spotted Crake <i>Porzana fluminea</i>														
Black-tailed Native-hen <i>Tribonix mortierii</i>					25		3		15		430	540	720	610
Purple Swamphen <i>Porphyrio porphyrio</i>		30	30											
Eurasian Coot <i>Fulica atra</i>		100	400	400	600	1800	3650	5200	4800	4800	3230	3925	4700	3120
Black-winged Stilt <i>Himantopus himantopus</i>					40	95	284	142	60	65	80	5	116	60
Banded Stilt <i>Cladorhynchus leucocephalus</i>														2
Red-necked Avocet <i>Recurvirostra novaehollandiae</i>						2	11	19	120	290	620	9	8	14
Masked Lapwing <i>Vanellus miles</i>				30	15	65	56	67	35	52	27	43	48	25

Species	Date	30/10 /2000	15/12/ 2000	16/1/ 2001	6/2/ 2001	6/3/ 2001	3/4/ 2001	2/5/ 2001	1/6/ 2001	13/7/ 2001	5/9/ 2001	5/10/ 2001	2/11/ 2001	4/12/ 2001
Common Greenshank <i>Tringa nebularia</i>														
Red-capped Plover <i>Charadrius ruficapillus</i>							40	25	80	80		6		
Black-fronted Plover <i>Charadrius melanops</i>									40					6
Red-kneed Dotterel <i>Erythrogonys cinctus</i>				20		17	10	2	40	26	22	55	38	114
Red-necked Stint <i>Calidris ruficollis</i>								12						
Sharp-tailed Sandpiper <i>Calidris acuminata</i>				10		7	6				120			10
Silver Gull L. novaehollandiae			50	50	40	15	90	233	115	5	135	86	14	7
Whiskered Tern <i>Chidonias hybridus</i>											17	142	40	52
Gull-billed Tern <i>Gelochelidon nilotica</i>													1	
Caspian Tern <i>Hydroprogne caspia</i>			5	5		32	20	30	76	4	24	22	5	3
Cattle Egret <i>Ardeola ibis</i>											1			
Bar-tailed Godwit <i>Limosa lapponica</i>														
Sum: Total Birds Counted		1641	4618	5380	4967	8927	14321	18554	14990	11819	11326	11677	14561	10559

Species and numbers recorded at Lake Merreti in 2002

Species	Date	3/1/2002	1/2/2002	4/3/2002	2/4/2002	6/5/2002	3/6/2002	1/7/2002	1/8/2002	1/9/2002	6/10/2002	6/11/2002
Hoary-headed Grebe <i>Poliiocephalus poliocephalus</i>		317	214	288	15	56	110	165	70	148	185	60
Great Crested Grebe <i>Podiceps cristatus</i>												
Australian Pelican <i>Pelecanus conspicillatus</i>		144	430	190	32	18	4	9	3	3	7	15
Great Cormorant <i>Phalacrocorax carbo</i>		6	11					1	4	11		
Little Black Cormorant <i>Phalacrocorax sulcirostris</i>		5	28						1			
Pied Cormorant <i>Phalacrocorax varius</i>				6						20		
Little Pied Cormorant <i>Phalacrocorax melanoleucos</i>		55	92	8	18	10	5		20	20		2
Australian Darter <i>Anhinga novaehollandiae</i>			3									
White-necked Heron <i>Ardea pacifica</i>			1	2	2							
Great (Large) Egret <i>Egretta alba</i>		2	8	4	2							1
Intermediate Egret <i>Egretta intermedia</i>												
White-faced Heron <i>Egretta novaehollandiae</i>		5	7	2	3		2					
Little Egret <i>Egretta garzetta</i>		1										

Date	3/1/2002	1/2/2002	4/3/2002	2/4/2002	6/5/2002	3/6/2002	1/7/2002	1/8/2002	1/9/2002	6/10/2002	6/11/2002
Species											
Rufous Night-Heron <i>Nycticorax calendonicus</i>	2		1		1		1				
Australian Ibis <i>Threskiornis molucca</i>	11	48	28	160	4			4	7	1	4
Straw-necked Ibis <i>Carphibis spinicollis</i>				2					2		
Glossy Ibis <i>Plegadis falcinellus</i>											
Royal Spoonbill <i>Platalea regia</i>				1							
Yellow-billed Spoonbill <i>Platalea flavipes</i>	85	237	261	267	42	12	16	18	17	10	13
Black Swan <i>Cygnus atratus</i>	426	708	446	580	350	80	70	28	42	23	8
Freckled Duck <i>Stictonetta naevosa</i>	79	620	120	160	58	20	26	22	102	136	202
Australian Shelduck <i>Tadorna tadornoides</i>	356	846	260	90	32	24	40	32	14 (4)		24
Pink-eared Duck <i>Malacorhynchus membranaceus</i>	2700	1376	1970	4500	2850	4600	3500	2700	2800	1000	450
Grey Teal <i>A. gracilis</i>	7500	8900	7500	6000	3140	2700	2510	2200	3600	1470	750
Chestnut Teal <i>A. castanea</i>											
Pacific Black Duck <i>A. superciliosa</i>	200	96	92	140	90	100	224	100	110	112	280
Australasian Shoveler <i>A. rhynchotis</i>	120	730	282	180	210	70	343	240	348	286	62
Hardhead <i>Aythya australis</i>	45				2		12	35	128	225	182

Date	3/1/2002	1/2/2002	4/3/2002	2/4/2002	6/5/2002	3/6/2002	1/7/2002	1/8/2002	1/9/2002	6/10/2002	6/11/2002
Species											
Australian Wood Duck <i>Chenonetta jubata</i>		7				10	8	6			
Musk Duck <i>Biziura lobata</i>								1	2		
White-bellied Sea-Eagle <i>Haliaeetus leucogaster</i>			1			1		1		1	
Swamp Harrier <i>Circus approximans</i>	1	1	1	1		1	2	2	2		1
Australian Spotted Crake <i>P. fluminea</i>			2								
Black-tailed Native-hen <i>G. ventralis</i>	480	600	320	260	280	150	440	100	48	104	110
Purple Swamphen <i>Porphyrio porphyrio</i>											
Eurasian Coot <i>Fulica atra</i>	4500	5400	3400	1500	180	280		240	750	236	40
Black-winged Stilt <i>Himantopus himantopus</i>	46	295	268	156	80	90	120	70	65		96
Banded Stilt <i>Cladorhynchus leucocephalus</i>							2				
Red-necked Avocet <i>Recurvirostra novaehollandiae</i>	660	2326	3600	2500	1570	620	518	420	180	2870	560
Masked Lapwing <i>Vanellus miles</i>	25	30	70	64	18	24	6	15	12	28	22
Common Greenshank <i>Tringa nebularia</i>			2							2	
Red-capped Plover <i>C. ruficapillus</i>			53		3		70				
Black-fronted Plover <i>C. melanops</i>		8	6		34	6	8	14	4	2	

Date	3/1/2002	1/2/2002	4/3/2002	2/4/2002	6/5/2002	3/6/2002	1/7/2002	1/8/2002	1/9/2002	6/10/2002	6/11/2002
Species											
Red-kneed Dotterel <i>E. cinctus</i>	115	165	277	85	50	14	22	6	2	16	14
Red-necked Stint <i>Calidris ruficollis</i>			2		16						
Sharp-tailed Sandpiper <i>C.</i> <i>acuminata</i>	40		20	45						2	26
Silver Gull <i>L.</i> <i>novaeollandiae</i>	2	56	11	54	8	3	2	4	3		
Whiskered Tern <i>Chidonias hybridus</i>	36	17							12	30	156
Gull-billed Tern <i>Gelochelidon</i> <i>nilotica</i>											
Caspian Tern <i>Hydroprogne</i> <i>caspia</i>		6	4	8	3	3	12	9	32		
Cattle Egret <i>Ardeola ibis</i>											
Bar-tailed Godwit <i>Limosa lapponica</i>										1	
Sum: Total Birds Counted	17964	23266	19497	16825	9105	8929	8127	6365	8470	6747	3078

Species and numbers recorded at Lake Woolpolool in 2000 and 2001

Species	Date	3/11/ 2000	15/12/ 2000	10/1/ 2001	6/2/ 2001	6/3/ 2001	3/4/ 2001	2/5/ 2001	1/6/ 2001	13/7/ 01	5/9/ 2001	5/10/ 2001	2/11/ 2001	4/12/ 2001
Australian Grebe <i>Tachybaptus novaehollandiae</i>													1	
Hoary-headed Grebe <i>Poliiocephalus poliocephalus</i>		17	10	50	240							16		20
Australian Pelican <i>Pelecanus conspicillatus</i>		1	63	35	4		540	34					1	
Great Cormorant <i>P. carbo</i>			35	35	18	38	42				2	1		
Little Black Cormorant <i>P. sulcirostris</i>							25		2					
Little Pied Cormorant <i>P. melanoleucos</i>				5		88								16
White-necked Heron <i>Ardea pacifica</i>						1	15	1	7					
Great (Large) Egret <i>Egretta alba</i>			32	20			103			1	1			
White-faced Heron <i>E. novaehollandiae</i>			7	2	7	27	45	24	7		2			4
Little Egret <i>E. garzetta</i>													1	
Australian Bittern <i>Botaurus poiciloptilus</i>									1					
Australian Ibis <i>T. molucca</i>		1	65	18	4	5	17	20					11	28
Straw-necked Ibis <i>Carphibis spinicollis</i>							7							

Species	Date	3/11/ 2000	15/12/ 2000	10/1/ 2001	6/2/ 2001	6/3/ 2001	3/4/ 2001	2/5/ 2001	1/6/ 2001	13/7/ 01	5/9/ 2001	5/10/ 2001	2/11/ 2001	4/12/ 2001
Glossy Ibis <i>Plegadis falcinellus</i>					3									6
Royal Spoonbill <i>Platalea regia</i>										1				
Yellow-billed Spoonbill <i>P. flavipes</i>			44	6			22	32		11		2	4	60
Black Swan <i>Cygnus atratus</i>		160	280	460	650	600	806	750	677	48	57	238	250	160
Freckled Duck <i>Stictonetta naevosa</i>					20									
Australian Shelduck <i>Tadorna tadornoides</i>		26	75	85	95	40	90	46	2		8	38	8	
Pink-eared Duck <i>Malacorhynchos membranaceus</i>		10	500	140	110			10						30
Grey Teal <i>A. gracilis</i>		385	230	370	1800	1020	4000	6500	3800	5000	2150	2530	3730	4500
Chestnut Teal <i>A. castanea</i>		4			2	4	10	4						
Pacific Black Duck <i>A. superciliosa</i>		16		10	32	26	68	300	60			11	3	2
Australasian Shoveler <i>A. rhynchotis</i>			6	4	100	110	100	200	54	20		210	6	25
Hardhead <i>Aythya australis</i>		600	32	150	550	46		86				10		20
Australian Wood Duck <i>Chenonetta jubata</i>				15	30	50	30	5	15				10	
Blue-billed Duck <i>Oxyura australis</i>					6									
Swamp Harrier <i>Circus approximans</i>				2	2	2	1		1	1	2	1	2	2

Species	Date	3/11/ 2000	15/12/ 2000	10/1/ 2001	6/2/ 2001	6/3/ 2001	3/4/ 2001	2/5/ 2001	1/6/ 2001	13/7/ 01	5/9/ 2001	5/10/ 2001	2/11/ 2001	4/12/ 2001
Buff-banded Rail <i>Rallus philippensis</i>						1					1		3	
Australian Spotted Crake <i>P. fluminea</i>								8						32
Black-tailed Native-hen <i>G. ventralis</i>														60
Purple Swamphen <i>Porphyrio porphyrio</i>				6	5	10	10	4	5	4	4	2	6	5
Eurasian Coot <i>Fulica atra</i>			240	820	800	940	15	2	1250	500		300	1600	2550
Black-winged Stilt <i>Himantopus himantopus</i>			90	130	120	74	62	164	42	10	3	7	20	120
Banded Stilt <i>Cladorhynchus leucocephalus</i>			60	20		23							80	60
Red-necked Avocet <i>Recurvirostra novaehollandiae</i>			15	10								141	420	390
Masked Lapwing <i>Vanellus miles</i>		2		10		4	4	10			6	10		4
Common Greenshank <i>Tringa nebularia</i>							2	2						1
Red-capped Plover <i>C. ruficapillus</i>									15					10
Black-fronted Plover <i>C. melanops</i>														2
Red-kneed Dotterel <i>E. cinctus</i>												5	40	8
Red-necked Stint <i>Calidris ruficollis</i>									25					

Species	Date	3/11/ 2000	15/12/ 2000	10/1/ 2001	6/2/ 2001	6/3/ 2001	3/4/ 2001	2/5/ 2001	1/6/ 2001	13/7/ 01	5/9/ 2001	5/10/ 2001	2/11/ 2001	4/12/ 2001
Sharp-tailed Sandpiper <i>C. acuminata</i>					2			3				1	17	11
Curlew Sandpiper <i>C. ferruginea</i>														
Silver Gull <i>L. novaehollandiae</i>		10	95	265	150	145	324	19				44	42	25
Whiskered Tern <i>Chidonias hybridus</i>		2										38		68
Caspian Tern <i>Hydroprogne caspia</i>				8	12	6	12					8	35	
Sum: Total Birds Counted		1234	1879	2676	4762	3260	6350	8224	5963	5596	2236	3613	6290	8219

Species and numbers recorded at Lake Woolpolool in 2002

Species	Date	3/1/2002	1/2/2002	4/3/2002 Dry	2/4/2002 Dry	6/5/2002 Dry	3/6/2002 Dry	1/7/2002 Dry	1/8/2002	1/9/2002	6/10/200 2	6/11/200 2
Australian Grebe <i>Tachybaptus novaehollandiae</i>												
Hoary-headed Grebe <i>Poliiocephalus poliocephalus</i>												53
Australian Pelican <i>Pelecanus conspicillatus</i>												11
Great Cormorant <i>P. carbo</i>												
Little Black Cormorant <i>P. sulcirostris</i>												
Little Pied Cormorant <i>P. melanoleucos</i>												
White-necked Heron <i>Ardea pacifica</i>												
Great (Large) Egret <i>Egretta alba</i>												
White-faced Heron <i>E. novaehollandiae</i>		4	2								3	2
Little Egret <i>E. garzetta</i>												
Australian Bittern <i>Botaurus poiciloptilus</i>												
Australian Ibis <i>T. molucca</i>		23	4						1		2	1
Straw-necked Ibis <i>Carphibis spinicollis</i>												
Glossy Ibis <i>Plegadis falcinellus</i>												
Royal Spoonbill <i>Platalea regia</i>												1
Yellow-billed Spoonbill <i>P. flavipes</i>		35									6	7
Black Swan <i>Cygnus atratus</i>		11	4						130	100	37	173
Freckled Duck <i>Stictonetta naevosa</i>												32

Species	Date	3/1/2002	1/2/2002	4/3/2002 Dry	2/4/2002 Dry	6/5/2002 Dry	3/6/2002 Dry	1/7/2002 Dry	1/8/2002	1/9/2002	6/10/2002	6/11/2002
Australian Shelduck <i>Tadorna tadornoides</i>			130						40	30 (4)	50 (4)	62
Pink-eared Duck <i>Malacorhynchus membranaceus</i>		800								24	1250	4200
Grey Teal <i>A. gracilis</i>		6500	4000						1040	1700	5170	2100
Chestnut Teal <i>A. castanea</i>												
Pacific Black Duck <i>A. superciliosa</i>		20							8	10		4
Australasian Shoveler <i>A. rhynchotis</i>		6								240	165	162
Hardhead <i>Aythya australis</i>											6	8
Australian Wood Duck <i>Chenonetta jubata</i>												7
Blue-billed Duck <i>Oxyura australis</i>												
Swamp Harrier <i>Circus approximans</i>		2	2						1	2	2	2
Buff-banded Rail <i>Rallus philippensis</i>												
Australian Spotted Crake <i>P. fluminea</i>			15								3	
Black-tailed Native-hen <i>G. ventralis</i>			80								30	
Purple Swamphen <i>Porphyrio porphyrio</i>		4	6								6	4
Eurasian Coot <i>Fulica atra</i>		550										500
Black-winged Stilt <i>Himantopus himantopus</i>		90	7						22	280	225	80
Banded Stilt <i>Cladorhynchus leucocephalus</i>										54	210	
Red-necked Avocet <i>Recurvirostra novaehollandiae</i>		1680								840	6220	2550

Species	Date	3/1/2002	1/2/2002	4/3/2002 Dry	2/4/2002 Dry	6/5/2002 Dry	3/6/2002 Dry	1/7/2002 Dry	1/8/2002	1/9/2002	6/10/200 2	6/11/200 2
Masked Lapwing <i>Vanellus miles</i>		9	4						26	24	2	8
Common Greenshank <i>Tringa nebularia</i>		4	3							2	2	
Red-capped Plover <i>C. ruficapillus</i>									25		350	
Black-fronted Plover <i>C. melanops</i>										4	2	
Red-kneed Dotterel <i>E. cinctus</i>		15									4	
Red-necked Stint <i>Calidris ruficollis</i>											14	
Sharp-tailed Sandpiper <i>C. acuminata</i>		115	500								800	90
Curlew Sandpiper <i>C. ferruginea</i>											7	
Silver Gull <i>L. novaehollandiae</i>		10								6	4	
Whiskered Tern <i>Chidonias hybridus</i>		140								25	100	
Caspian Tern <i>Hydroprogne caspia</i>		9							46	48		30
Sum: Total Birds Counted		10027	4757						1339	3359	14620	10087

Bird species and numbers recorded at Coppermine Waterhole in 2006 and 2007

Species	Date	1/3/2006	11/29/2006	12/18/2006	1/25/2007	2/23/2007	3/28/2007	4/24/2007	5/31/2007	6/27/2007	7/27/2007	8/23/2007
Australian Grebe <i>Tachybaptus novaehollandiae</i>		37		28	16	14	78	40	39	4	6	
Hoary-headed Grebe <i>Poliiocephalus poliocephalus</i>		70		66	19	75	222	282	250	80	47	87
Great Crested Grebe <i>Podiceps cristatus</i>						1						
Australian Pelican <i>Pelecanus conspicillatus</i>				28	4	1	2	60	7	2	1	1
Great Cormorant <i>P. carbo</i>			1	8	1	2			10			
Little Black Cormorant <i>P. sulcirostris</i>							4					
Little Pied Cormorant <i>P. melanoleucos</i>			3	33	7	2	4	3	2			
Australian Darter <i>Anhinga novaehollandiae</i>					1			1				
White-necked Heron <i>Ardea pacifica</i>		2	7								1	1
Great (Large) Egret <i>Egretta alba</i>		1	10		7	1			1	1		
White-faced Heron <i>E. novaehollandiae</i>			14	41	14	5	8	4	2	4	2	3
Australian Ibis <i>T. molucca</i>			8	17	4		1	2	5	1	1	
Straw-necked Ibis <i>Carphibis spinicollis</i>				62	4	3				1	1	
Glossy Ibis <i>Plegadis falcinellus</i>			1	3								
Royal Spoonbill <i>Platalea regia</i>			4	10				1				
Yellow-billed Spoonbill <i>P. flavipes</i>				8	8			3	22	15	3	5
Black Swan <i>Cygnus atratus</i>		7	8	10	2	7	24	77	33	29	17	5
Freckled Duck <i>Stictonetta naevosa</i>			2	4	1							
Australian Shelduck <i>Tadorna tadornoides</i>			15							2	2	

Species	Date	1/3/2006	11/29/2006	12/18/2006	1/25/2007	2/23/2007	3/28/2007	4/24/2007	5/31/2007	6/27/2007	7/27/2007	8/23/2007
Pink-eared Duck <i>Malacorhynchos membranaceus</i>			38	846	64	23	6	2				6
Grey Teal <i>A. gracilis</i>		530	2704	5330	174	310	280	460	4	4	44	92
Chestnut Teal <i>A. castanea</i>								4				
Pacific Black Duck <i>A. superciliosa</i>		20	32	56	44	75	123	204	12	26	33	40
Australasian Shoveler <i>A. rhynchotis</i>		8	2	21	8	41	63	75	10	4	8	
Hardhead <i>Aythya australis</i>		60	18	345	35	7	4		8	7	91	180
Australian Wood Duck <i>Chenonetta jubata</i>		22	57	98	35	86	105	104	2			
Musk Duck <i>Biziura lobata</i>							1	2	1			
Swamp Harrier <i>Circus approximans</i>			1	1				1				
Australian Spotted Crake <i>P. fluminea</i>					1							
Black-tailed Native-hen <i>G. ventralis</i>			79	40								
Eurasian Coot <i>Fulica atra</i>		400	11	63	98	123	80	84	114	12	2	
Black-winged Stilt <i>Himantopus himantopus</i>			87			48	16		3			
Red-necked Avocet <i>Recurvirostra novaehollandiae</i>			24									
Masked Lapwing <i>Vanellus miles</i>			21	22	6	18	13	5	6	5	2	3
Common Greenshank <i>Tringa nebularia</i>						9	2					
Black-fronted Plover <i>C. melanops</i>			4	4	4	2	2			2		
Red-kneed Dotterel <i>E. cinctus</i>											2	
Sharp-tailed Sandpiper <i>C. acuminata</i>				10								
Silver Gull <i>L. novaehollandiae</i>			23									

Species	Date	1/3/2006	11/29/2006	12/18/2006	1/25/2007	2/23/2007	3/28/2007	4/24/2007	5/31/2007	6/27/2007	7/27/2007	8/23/2007
Whiskered Tern <i>Chidonias hybridus</i>				5								
Caspian Tern <i>Hydroprogne caspia</i>			6			2	7					
Emu <i>Dromaius novaehollandiae</i>				56								
Sum: Total Birds Counted		1157	3180	7215	557	855	1045	1414	531	199	263	423

Bird species and numbers recorded at Lake Littra in 1989 - 2004

Species	Date	10/29/1989	7/22/1990	1/7/1993	10/11/1995	3/12/1996	9/28/2004	10/14/2004	11/16/2004
Australian Grebe <i>Tachybaptus novaehollandiae</i>									
Hoary -Headed Grebe <i>Poliiocephalus poliocephalus</i>		5							
Australian Pelican <i>Pelecanus conspicillatus</i>					8	320			
Great Cormorant <i>P. carbo</i>									
Little Black Cormorant <i>P. sulcirostris</i>									
Pied Cormorant <i>P. varius</i>									
White-necked Heron <i>Ardea pacifica</i>							3		
Great (Large) Egret <i>Egretta alba</i>					2			5	
White-faced Heron <i>E. novaehollandiae</i>			2				4	10	
Australian Ibis <i>T. molucca</i>		5		20	3				
Straw-necked Ibis <i>Carphibis spinicollis</i>									
Royal Spoonbill <i>Platalea regia</i>								2	
Yellow-billed Spoonbill <i>P. flavipes</i>			3			40	1	23	3
Black Swan <i>Cygnus atratus</i>		2	2		4		6	15	6
Freckled Duck <i>Stictonetta naevosa</i>									
Australian Shelduck <i>Tadorna tadornoides</i>			25		2	80	24	10	
Pink-eared Duck <i>Malacorhynchos membranaceus</i>		8			10			10	12
Grey Teal <i>A. gracilis</i>		15	85		60	350	1300	740	160
Pacific Black Duck <i>A. superciliosa</i>			4		20		4	2	
Australasian Shoveler <i>A. rhynchotis</i>									
Hardhead <i>Aythya australis</i>		3			12				

Species	Date	10/29/1989	7/22/1990	1/7/1993	10/11/1995	3/12/1996	9/28/2004	10/14/2004	11/16/2004
Australian Wood Duck <i>Chenonetta jubata</i>		2							
Swamp Harrier <i>Circus approximans</i>									
Spotless Crake <i>Porzana tabuensis</i>									
Black-tailed Native-hen <i>G. ventralis</i>							50	120	125
Purple Swamphen <i>Porphyrio porphyrio</i>									
Eurasian Coot <i>Fulica atra</i>		10			50				
Black-winged Stilt <i>Himantopus himantopus</i>						30	39	95	
Red-necked Avocet <i>Recurvirostra novaehollandiae</i>						180	60	180	180
Masked Lapwing <i>Vanellus miles</i>			10				7	23	4
Common Greenshank <i>Tringa nebularia</i>									
Red-capped Plover <i>C. ruficapillus</i>									
Black-fronted Plover <i>C. melanops</i>			2					2	2
Red-kneed Dotterel <i>E. cinctus</i>								25	130
Sharp-tailed Sandpiper <i>C. acuminata</i>									10
Silver Gull <i>Larus novaehollandiae</i>							2		
Whiskered Tern <i>Childonias hybridus</i>							1		
Caspian Tern <i>Hydroprogne caspia</i>								1	
Sum: Total Birds Counted		50	133	20	171	1000	1501	1263	632

Bird species and numbers recorded at Lake Littra in 2005 & 2006

Species	Date	1/13/2005	2/8/2005	1/10/2006	2/16/2006	3/22/2006	4/26/2006	5/22/2006	6/26/2006	7/24/2006
Australian Grebe <i>Tachybaptus novaehollandiae</i>					23					
Hoary -Headed Grebe <i>Poliiocephalus poliocephalus</i>		330		80	840	500	20	2		
Australian Pelican <i>Pelecanus conspicillatus</i>				4				6		
Great Cormorant <i>P. carbo</i>					24					
Little Black Cormorant <i>P. sulcirostris</i>					4	10				
Pied Cormorant <i>P. varius</i>					1					
White-necked Heron <i>Ardea pacifica</i>				2						
Great (Large) Egret <i>Egretta alba</i>										
White-faced Heron <i>E. novaehollandiae</i>			3	21	14	8		1	6	4
Australian Ibis <i>T. molucca</i>				10		1		1	3	3
Straw-necked Ibis <i>Carphibis spinicollis</i>				300						
Royal Spoonbill <i>Platalea regia</i>				1						
Yellow-billed Spoonbill <i>P. flavipes</i>								14	6	14
Black Swan <i>Cygnus atratus</i>				4	9	37	45	31	23	26
Freckled Duck <i>Stictonetta naevosa</i>					73	2	16			
Australian Shelduck <i>Tadorna tadornoides</i>				45			2			2
Pink-eared Duck <i>Malacorhynchos membranaceus</i>		12	80	350	90	15	190	300		10
Grey Teal <i>A. gracilis</i>		1200	1900	2400	1600	560	2000	150	110	400
Pacific Black Duck <i>A. superciliosa</i>				120	45	6	16			10
Australasian Shoveler <i>A. rhynchotis</i>		9	50	45	50	58	86	50		27
Hardhead <i>Aythya australis</i>		20		1010	360	22				6

Species	Date	1/13/2005	2/8/2005	1/10/2006	2/16/2006	3/22/2006	4/26/2006	5/22/2006	6/26/2006	7/24/2006
Australian Wood Duck <i>Chenonetta jubata</i>		5		6	6	6	6	6	6	6
Swamp Harrier <i>Circus approximans</i>		1			1	1			1	
Spotless Crake <i>Porzana tabuensis</i>				2						
Black-tailed Native-hen <i>G. ventralis</i>		54	135	165	30		12	16	23	14
Purple Swamphen <i>Porphyrio porphyrio</i>					1	3				
Eurasian Coot <i>Fulica atra</i>				1350	450	750	143			
Black-winged Stilt <i>Himantopus himantopus</i>		40	126	165	100			7	40	45
Red-necked Avocet <i>Recurvirostra novaehollandiae</i>		500	1000	520	10	18		3	160	150
Masked Lapwing <i>Vanellus miles</i>		6	24	31	12	6		4	10	10
Common Greenshank <i>Tringa nebularia</i>		1	2							
Red-capped Plover <i>C. ruficapillus</i>									2	
Black-fronted Plover <i>C. melanops</i>		2	26	2	2		2		12	2
Red-kneed Dotterel <i>E. cinctus</i>		148	120	135	11	6	6	12	26	24
Sharp-tailed Sandpiper <i>C. acuminata</i>		1	8							
Silver Gull <i>Larus novaehollandiae</i>		2		4						7
Whiskered Tern <i>Childonias hybridus</i>										
Caspian Tern <i>Hydroprogne caspia</i>				1						
Sum: Total Birds Counted		2326	3474	6767	3750	2003	2538	597	422	766

Bird species and numbers recorded at Pilby Lagoon between April 1998 & August 2003

Species	Date	4/3/1998	4/16/200 3	4/28/200 3	5/5/2003	5/21/200 3	6/3/2003	6/19/200 3	7/4/2003	8/4/2003	8/27/200 3
Australasian Grebe <i>Tachybaptus novaehollandiae</i>									2		2
Hoary -Headed Grebe <i>Poliiocephalus poliocephalus</i>		6			2	2	6	15	12	22	33
Australian Pelican <i>Pelecanus conspicillatus</i>											
Great Cormorant <i>P. carbo</i>		2									
Little Black Cormorant <i>P. sulcirostris</i>		4									
Little Pied Cormorant <i>P. melanoleucos</i>		10		1					1	1	
Australian Darter <i>Anhinga melanogaster</i>		4									
White-necked Heron <i>Ardea pacifica</i>											
Great (Large) Egret <i>Egretta alba</i>											
Intermediate Egret <i>E. intermedia</i>											
White-faced Heron <i>A. novaehollandiae</i>											
Australian Ibis <i>T. molucca</i>		3									
Straw-necked Ibis <i>Carphibis spinicollis</i>											
Royal Spoonbill <i>Platalea regia</i>											
Yellow-billed Spoonbill <i>P. flavipes</i>									1		
Black Swan <i>Cygnus atratus</i>		15							3		
Freckled Duck <i>Stictonetta naevosa</i>											
Australian Shelduck <i>Tadorna tadornoides</i>				4	4	4	4				6
Pink-eared Duck <i>Malacorhynchos membranaceus</i>											
Grey Teal <i>A. gracilis</i>		180	40	38	110	154	180	154	40	25	97
Pacific Black Duck <i>A. superciliosa</i>		120	12	18	27	26	32	2	2	4	4

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Species	Date	4/3/1998	4/16/2003	4/28/2003	5/5/2003	5/21/2003	6/3/2003	6/19/2003	7/4/2003	8/4/2003	8/27/2003
Australasian Shoveler <i>A. rhynchotis</i>			3	3	4	4	6	1			5
Hardhead <i>Aythya australis</i>		20			1	17	48	13	7	11	14
Australian Wood Duck <i>Chenonetta jubata</i>											
White-bellied Sea-Eagle <i>Haliaeetus leucogaster</i>											
Swamp Harrier <i>Circus approximans</i>											
Black-tailed Native-hen <i>G. ventralis</i>											
Purple Swamphen <i>Porphyrio porphyrio</i>											
Eurasian Coot <i>Fulica atra</i>				41			10		9		
Black-winged Stilt <i>Himantopus himantopus</i>											
Masked Lapwing <i>Vanellus miles</i>			2								
Black-fronted Plover <i>C. melanops</i>							2			2	
Silver Gull <i>L. novaehollandiae</i>											
Whiskered Tern <i>Chidonias hybridus</i>											
Sum: Total Birds Counted		364	54	102	148	207	288	185	77	65	161

Bird species and numbers recorded at Pilby Lagoon between Sept. 2003 & August 2004

Species	Date	9/23/2003	10/30/2003	12/8/2003	1/12/2004	3/3/2004	3/10/2004	4/7/2004	5/21/2004	8/10/2004	8/26/2004
Australasian Grebe <i>Tachybaptus novaehollandiae</i>		2						2		7	10
Hoary -Headed Grebe <i>Poliiocephalus poliocephalus</i>		4	4	10	22	7	6	2		5	
Australian Pelican <i>Pelecanus conspicillatus</i>				3	11	1	1		1	2	
Great Cormorant <i>P. carbo</i>				1		2	2			1	12
Little Black Cormorant <i>P. sulcirostris</i>				6	14	5	2				
Little Pied Cormorant <i>P. melanoleucos</i>		4	5	5	20	17		11	2	6	3
Australian Darter <i>Anhinga melanogaster</i>		1	1	1	2		4	1	2	1	1
White-necked Heron <i>Ardea pacifica</i>					1	1				2	
Great (Large) Egret <i>Egretta alba</i>			1	1	1	1					1
Intermediate Egret <i>E. intermedia</i>											
White-faced Heron <i>A. novaehollandiae</i>				2							2
Australian Ibis <i>T. molucca</i>		1		5	4	10	8	1		1	3
Straw-necked Ibis <i>Carphibis spinicollis</i>											
Royal Spoonbill <i>Platalea regia</i>											
Yellow-billed Spoonbill <i>P. flavipes</i>				1							
Black Swan <i>Cygnus atratus</i>		2				15	40	37	7	2	6
Freckled Duck <i>Stictonetta naevosa</i>											
Australian Shelduck <i>Tadorna tadornoides</i>								7		2	8
Pink-eared Duck <i>Malacorhynchos membranaceus</i>											
Grey Teal <i>A. gracilis</i>		55	45	120	37	76	41	69	80	21	25
Pacific Black Duck <i>A. superciliosa</i>		10	13	14	6	4	2	6	13	16	24

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Species	Date	9/23/200 3	10/30/20 03	12/8/200 3	1/12/200 4	3/3/2004	3/10/200 4	4/7/2004	5/21/200 4	8/10/200 4	8/26/200 4
Australasian Shoveler <i>A. rhynchotis</i>											
Hardhead <i>Aythya australis</i>				15	3		1	2			8
Australian Wood Duck <i>Chenonetta jubata</i>			2								
White-bellied Sea-Eagle <i>Haliaeetus leucogaster</i>							1			1	
Swamp Harrier <i>Circus approximans</i>			1								
Black-tailed Native-hen <i>G. ventralis</i>					3						
Purple Swamphen <i>Porphyrio porphyrio</i>					1	1					
Eurasian Coot <i>Fulica atra</i>		4	10	10	132	38	42	55	52	16	
Black-winged Stilt <i>Himantopus himantopus</i>											
Masked Lapwing <i>Vanellus miles</i>											
Black-fronted Plover <i>C. melanops</i>		2					2	2			
Silver Gull <i>L. novaehollandiae</i>											
Whiskered Tern <i>Chidonias hybridus</i>											
Sum: Total Birds Counted		85	82	194	257	178	152	195	157	83	103

Bird species and numbers recorded at Pilby Lagoon between Sept. 2004 & Nov. 2005

Species	Date	9/28/2004	14/1/2005	2/22/2005	4/19/2005	5/11/2005	6/30/2005	8/5/2005	9/13/2005	10/26/2005	11/23/2005
Australasian Grebe <i>Tachybaptus novaehollandiae</i>		10	4	13		10	45	55	14		
Hoary -Headed Grebe <i>Poliiocephalus poliocephalus</i>				10	40	80	58	40	18		
Australian Pelican <i>Pelecanus conspicillatus</i>		12	22	29	1	11	30	13	8	2	3
Great Cormorant <i>P. carbo</i>		2	4	8	1	2	14	2	6		1
Little Black Cormorant <i>P. sulcirostris</i>		19	32	24	6	2	3	6	18	47	21
Little Pied Cormorant <i>P. melanoleucos</i>		27	22	4	8	6	20	3	14	6	
Australian Darter <i>Anhinga melanogaster</i>		3	3	3	4	3	10	4	5	2	2
White-necked Heron <i>Ardea pacifica</i>											
Great (Large) Egret <i>Egretta alba</i>		1					2	1			
Intermediate Egret <i>E. intermedia</i>											
White-faced Heron <i>A. novaehollandiae</i>				2		1	2	1			1
Australian Ibis <i>T. molucca</i>		5	9		1	3	6	2	1		1
Straw-necked Ibis <i>Carphibis spinicollis</i>											
Royal Spoonbill <i>Platalea regia</i>		1									
Yellow-billed Spoonbill <i>P. flavipes</i>		1	1			2	10	10	1		
Black Swan <i>Cygnus atratus</i>		2	4	6	2	5	13	8	4	6	2
Freckled Duck <i>Stictonetta naevosa</i>						4					
Australian Shelduck <i>Tadorna tadornoides</i>		4				4			2		
Pink-eared Duck <i>Malacorhynchos membranaceus</i>					4	50	140				
Grey Teal <i>A. gracilis</i>		27	70	32	228	240	135	28	110	10	51
Pacific Black Duck <i>A. superciliosa</i>		13	34	4	2	20	8	40	26		12

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Species	Date	9/28/2004	14/1/2004	2/22/2005	4/19/2005	5/11/2005	6/30/2005	8/5/2005	9/13/2005	10/26/2005	11/23/2005
Australasian Shoveler <i>A. rhynchotis</i>					2	28	55				
Hardhead <i>Aythya australis</i>		14	6	2	5	35	24	50	35	4	4
Australian Wood Duck <i>Chenonetta jubata</i>											
White-bellied Sea-Eagle <i>Haliaeetus leucogaster</i>											1
Swamp Harrier <i>Circus approximans</i>			1					1			
Black-tailed Native-hen <i>G. ventralis</i>											
Purple Swamphen <i>Porphyrio porphyrio</i>		1		2	1	2		5	7		3
Eurasian Coot <i>Fulica atra</i>		12	100	122	95	230	300	350	420	350	360
Black-winged Stilt <i>Himantopus himantopus</i>											
Masked Lapwing <i>Vanellus miles</i>				2							
Black-fronted Plover <i>C. melanops</i>				2							
Silver Gull <i>L. novaehollandiae</i>											
Whiskered Tern <i>Chlidonias hybridus</i>											
Sum: Total Birds Counted		154	312	265	400	738	875	619	689	427	462

Bird species and numbers recorded at Pilby Lagoon between Dec. 2005 & Apr. 2007

Species	Date	12/21/2005	1/23/2006	9/28/2006	10/30/2003	11/27/2006	12/18/2006	1/25/2007	2/23/2007	3/28/2007	4/24/2007
Australasian Grebe <i>Tachybaptus novaehollandiae</i>				2	2						
Hoary -Headed Grebe <i>Poliiocephalus poliocephalus</i>					2						
Australian Pelican <i>Pelecanus conspicillatus</i>		19		2		3	5	6	4	40	8
Great Cormorant <i>P. carbo</i>		2	4				8				
Little Black Cormorant <i>P. sulcirostris</i>		16	90	4	2	6	47	47	52		
Little Pied Cormorant <i>P. melanoleucos</i>		2		8	22	14	38	9	6		
Australian Darter <i>Anhinga melanogaster</i>		3	6	1	2	4	5	2			
White-necked Heron <i>Ardea pacifica</i>											
Great (Large) Egret <i>Egretta alba</i>			4				15	3	3		2
Intermediate Egret <i>E. intermedia</i>							1				
White-faced Heron <i>A. novaehollandiae</i>			7	2			1	2	7	6	8
Australian Ibis <i>T. molucca</i>			18	3			5	12	2		
Straw-necked Ibis <i>Carphibis spinicollis</i>			3							1	
Royal Spoonbill <i>Platalea regia</i>									1		
Yellow-billed Spoonbill <i>P. flavipes</i>			21						1		2
Black Swan <i>Cygnus atratus</i>			5	6				2	2	2	
Freckled Duck <i>Stictonetta naevosa</i>											
Australian Shelduck <i>Tadorna tadornoides</i>				8					2	3	2
Pink-eared Duck <i>Malacorhynchos membranaceus</i>			8		4	2	4				
Grey Teal <i>A. gracilis</i>		206	70	50	121	62	10	20	260	260	25
Pacific Black Duck <i>A. superciliosa</i>		43	16	14	2	6	7	20	70	31	38

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Species	Date	12/21/20 05	1/23/200 6	9/28/200 6	10/30/20 03	11/27/20 06	12/18/20 06	1/25/200 7	2/23/200 7	3/28/200 7	4/24/200 7
Australasian Shoveler <i>A. rhynchotis</i>				4	10	23		2	4	2	
Hardhead <i>Aythya australis</i>		2	2		42	2					
Australian Wood Duck <i>Chenonetta jubata</i>											
White-bellied Sea-Eagle <i>Haliaeetus leucogaster</i>					1						
Swamp Harrier <i>Circus approximans</i>											
Black-tailed Native-hen <i>G. ventralis</i>											
Purple Swamphen <i>Porphyrio porphyrio</i>		2	2	2	2	3	3				
Eurasian Coot <i>Fulica atra</i>		280	80	10	66	36	16	10	33		
Black-winged Stilt <i>Himantopus himantopus</i>			1							3	
Masked Lapwing <i>Vanellus miles</i>			4						12	12	2
Black-fronted Plover <i>C. melanops</i>								6	13	85	
Silver Gull <i>L. novaehollandiae</i>										16	
Whiskered Tern <i>Chidonias hybridus</i>			3								
Sum: Total Birds Counted		575	344	116	278	161	165	135	465	389	172

Bird species and numbers recorded at Lake Werta Wert between Sept. 2004 & Dec. 2005

Species	Date	9/28/2004	10/14/2004	11/16/2004	12/13/2004	1/13/2005	2/8/2005	4/5/2005	12/21/2005
Australian Grebe <i>Tachybaptus novaehollandiae</i>		6	6	14	2	3	2		
Hoary -Headed Grebe <i>Poliiocephalus poliocephalus</i>		32	81	82	43	25	40		565
Great Crested Grebe <i>Podiceps cristatus</i>									2
Australian Pelican <i>Pelecanus conspicillatus</i>						6	80		
Great Cormorant <i>P. carbo</i>									
Little Pied Cormorant <i>P. melanoleucos</i>			1		1			1	
Australian Darter <i>Anhinga novaehollandiae</i>					1	1	1		
Great (Large) Egret <i>Egretta alba</i>						1			
White-faced Heron <i>E. novaehollandiae</i>					2	6	2		4
Australian Ibis <i>T. molucca</i>							1		
Straw-necked Ibis <i>Carphibis spinicollis</i>								1	
Yellow-billed Spoonbill <i>P. flavipes</i>				3			5	13	
Black Swan <i>Cygnus atratus</i>		4			2	3			
Freckled Duck <i>Stictonetta naevosa</i>			5	28	28				6
Australian Shelduck <i>Tadorna tadornoides</i>									
Pink-eared Duck <i>Malacorhynchos membranaceus</i>		4	140	30	177	36	46	50	500
Grey Teal <i>A. gracilis</i>		248	118	330	310	860	880	320	1080
Chestnut Teal <i>A. castanea</i>									
Pacific Black Duck <i>A. superciliosa</i>		4	2	10	8	18	5	6	15
Australasian Shoveler <i>A. rhynchotis</i>					2	32	24	7	
Hardhead <i>Aythya australis</i>		22	38	20	115	2	23		660

Species	Date	9/28/2004	10/14/2004	11/16/2004	12/13/2004	1/13/2005	2/8/2005	4/5/2005	12/21/2005
Australian Wood Duck <i>Chenonetta jubata</i>		54	16	15	6	180	80	14	55
Blue-billed Duck <i>Oxyura australis</i>									
Musk Duck <i>Biziura lobata</i>		1	1	1	1				
Dusky Moorhen <i>Gallinura tenebrosa</i>									
Black-tailed Native-hen <i>G. ventralis</i>			20	14		63			
Purple Swamphen <i>Porphyrio porphyrio</i>					1				
Eurasian Coot <i>Fulica atra</i>		17	60	50	170	2	12		176
Black-winged Stilt <i>Himantopus himantopus</i>					3	33	23	13	1
Red-necked Avocet <i>Recurvirostra novaehollandiae</i>							18		
Masked Lapwing <i>Vanellus miles</i>		4	8	6	15	8	7	5	2
Red-capped Plover <i>C. ruficapillus</i>						2			
Black-fronted Plover <i>C. melanops</i>			6	6	5	4		2	
Red-kneed Dotterel <i>Erythronyctes cinctus</i>		4	2	12	2	8	40	6	
Sum: Total Birds Counted		400	504	621	894	1293	1289	438	3066

Bird species and numbers recorded at Lake Werta Wert between Jan. 2006 & Feb. 2008

Species	Date	1/23/2006	2/16/2006	3/22/2006	4/26/2006	5/22/2006	6/26/2006	7/24/2006	8/29/2006	2/19/2008
Australian Grebe <i>Tachybaptus novaehollandiae</i>										16
Hoary -Headed Grebe <i>Poliiocephalus poliocephalus</i>		360	405	310	152	28				62
Great Crested Grebe <i>Podiceps cristatus</i>										
Australian Pelican <i>Pelecanus conspicillatus</i>			6	40		5	1			
Great Cormorant <i>P. carbo</i>			1							
Little Pied Cormorant <i>P. melanoleucos</i>						2	1	4		
Australian Darter <i>Anhinga novaehollandiae</i>			2			2				
Great (Large) Egret <i>Egretta alba</i>			1							
White-faced Heron <i>E. novaehollandiae</i>		2	2							
Australian Ibis <i>T. molucca</i>		1	1	2						
Straw-necked Ibis <i>Carphibis spinicollis</i>										
Yellow-billed Spoonbill <i>P. flavipes</i>			22	4	4	7	3	6	5	1
Black Swan <i>Cygnus atratus</i>		6	13	14	4			2	3	
Freckled Duck <i>Stictonetta naevosa</i>		84	122	30	32	10				
Australian Shelduck <i>Tadorna tadornoides</i>								2		2
Pink-eared Duck <i>Malacorhynchos membranaceus</i>		214	970	145	420	625	28			1
Grey Teal <i>A. gracilis</i>		650	1330	1550	1440	330	180	712	400	24
Chestnut Teal <i>A. castanea</i>								2		
Pacific Black Duck <i>A. superciliosa</i>		30	15	12	8			15	2	3
Australasian Shoveler <i>A. rhynchotis</i>		10	16	18	100	32	8	16		12
Hardhead <i>Aythya australis</i>		240	60	6						

Species	Date	1/23/2006	2/16/2006	3/22/2006	4/26/2006	5/22/2006	6/26/2006	7/24/2006	8/29/2006	2/19/2008
Australian Wood Duck <i>Chenonetta jubata</i>		22	125	320	132	28	2	14	14	7
Blue-billed Duck <i>Oxyura australis</i>			10							
Musk Duck <i>Biziura lobata</i>										
Dusky Moorhen <i>Gallinura tenebrosa</i>				1						
Black-tailed Native-hen <i>G. ventralis</i>										
Purple Swamphen <i>Porphyrio porphyrio</i>										
Eurasian Coot <i>Fulica atra</i>		76	37	8	6	4				14
Black-winged Stilt <i>Himantopus himantopus</i>			10		21	30	23	30	2	
Red-necked Avocet <i>Recurvirostra novaehollandiae</i>				30	3	14	96	122	15	
Masked Lapwing <i>Vanellus miles</i>		2	2	13	8	11	14	2	2	4
Red-capped Plover <i>C. ruficapillus</i>							8			
Black-fronted Plover <i>C. melanops</i>		5	11	15	20	5	55	7	9	
Red-kneed Dotterel <i>Erythrogonys cinctus</i>						65	70	2		
Sum: Total Birds Counted		1702	3161	2518	2350	1198	489	936	452	146

10.3 Appendix 3: The Consultants

Peter Newall, Independent Consulting Aquatic Ecologist

Peter Newall has over 20 years experience in studying, monitoring and assessing the physical, chemical and biological condition of water bodies and their catchments. He holds a B.Sc. Honours degree in Botany/Physical Geography (wetland ecology), a M.Env.Sci. degree in stream ecology and a PhD. on fish distributions across aquatic ecoregions. His work has included: examining the ecological condition of a broad range of aquatic ecosystems; developing systems for the use of biological indicators in ecosystem assessment and management; derivation of condition targets/objectives for natural resources; and developing river management policies for the care and protection of rivers.

Peter has been involved in developing water quality guidelines and objectives for aquatic ecosystem health, deriving biological regions for the assessment of stream condition across Victoria, developing the EPA (Victoria) protocol for the monitoring of licensed discharges to streams across Victoria, and furthering the development of biological indicators of stream condition. His work in these areas has been incorporated into the Victorian State Environment Protection Policy (Waters of Victoria) and its supporting documents.

Other studies he has undertaken include assessing catchment and land use management impacts upon receiving waterways; ecological risk assessments of streams; environmental assessment of streams and catchments; and character descriptions of wetlands.

Peter was a member of the CRC for Freshwater Ecology for five years, and has also worked in Environmental Auditing with EPA and as a consultant, particularly in natural resource auditing, focusing on waterway and catchment auditing.

Lance Lloyd, Principal Ecologist, Lloyd Environmental Pty Ltd

Principal Ecologist, Lance Lloyd, BSc, MSc. MAIBiol., provides high level strategic advice and services to industry and Government across Australia. He has 27 years experience in environmental consulting, research and management. His key expertise developed over this time is in relating the ecology of aquatic systems to the needs of management issues. The majority of his work during his professional life, since 1979, has been in the ecology of aquatic and floodplain ecosystems and water regimes in flowing & lentic waters and their management. His M.Sc. studies and some of his major research projects and several published papers focused upon the central role of environmental water management to the ecology and biological requirements of fish, invertebrates and plants.

Lance also led a project to develop a wetlands inventory on Commonwealth Lands as a contribution to the "Directory of Important Wetlands in Australia (3rd Edition)". In 2003, Lance led an expert team to review the Environmental Water Requirements for Internationally significant Wetlands Framework where he undertook detailed

studies on the Wyndgate Wetlands which are part of Coorong and Lakes Alexandrina and Albert Ramsar Site. He has contributed significantly to the MDBC Floodplain Wetlands Management Strategy. He was the lead author of the paper entitled "Natural Processes in Floodplain Ecosystems" which synthesised the current knowledge of floodplain wetland ecosystems and was produced as part of the MDBC Floodplain Wetlands Management Strategy.

Lance was a co-author of the FLOWS methodology for Victorian Streams and Rivers and is currently leading a project to develop, pilot and refine a draft FLOWS methodology for the estuary ecosystems of Victoria. He was a key member of the team which developed the wetlands R&D requirements for Land & Water Australia in 1998, which included a specific review of water regime management and its research requirements.

Further, he was a board member of the Fisheries Co-management Council of Victoria (an advisory group to the Victorian Minister of Agriculture) in 2002 -2005. On the FCC he was responsible for the Estuaries, Bays and Inlets Fisheries. He led a process to develop a 10 year Vision for the Fisheries Industry in the region. He also served on the Victorian Fisheries Research Advisory Board for the Fisheries R&D Corporation. He currently chairs the Translocation Evaluation Panel for the Victorian Government which evaluates risks from fish translocations in Victoria.

In addition to the Riverland Ramsar site ECD, Lance is also leading the Ecological Character Description Project for the Tasmanian Government on the Floodplain Lower Ringarooma Ramsar Site. He was a key team members of the Gippsland Lakes and Corner Inlet Ecological Character Description Projects.

Prof. Peter Gell, Wetland Palaeolimnology and Avifauna Specialist

Peter is a limnologist and palaeoecologist with 22 years experience in environmental consulting. He is sole chief investigator on an Australian Research Council Linkage grant examining the long term ecological history of lower River Murray Wetlands in association with the River Murray Natural Resource Management Board and chief investigator on an ARC Linkage grant with Department of Water land & Biodiversity Conservation on the long term ecological character of The Coorong. He was part of the team that reviewed the Ecological character of The Coorong for the Department of Environment and Heritage. He has undertaken major projects examining the ecological character of Lake Bonney (SE) and South Australian estuaries for the EPA of SA. He is convener of the ARC network Ozpacs that integrates short term palaeoecological studies Australia-wide to provide a long term state of the environment report for the continent. He is co-chair of the Salinity, Climate and Salinisation working group within the International Geosphere-Biosphere Project Past Global Changes project Limpacs that examines the impact of climate and people on lake ecosystems worldwide. He is a member of the eWater CRC's research project team 'Multiple Drivers of River Ecosystems'. He has been monitoring the waterbirds of Lake Cowal NSW for 15 years and has examined the long term history of over 30 MDB wetlands using fossil bioindicators in sediments. He has produced over 65 publications and 60 industry reports.

A. Prof. Keith Walker, Expert Ecologist on the River Murray System

Associate Professor Keith Walker is a lecturer at the Dept of Environmental Biology in the University of Adelaide and is an internationally recognised expert on river ecology and the impacts of flow regulation with over thirty years experience in research, university education and consultancies. He has undertaken more than 40 significant consultancies, conducted over 40 research projects for the Australian and State Governments and research funding bodies and published over 200 scientific papers. His work has focussed on the rivers of the Murray-Darling Basin, on fish, aquatic plants, macroinvertebrates and mussels in particular. He is currently a member of the Living Murray Scientific Reference Panel and the Independent Sustainable Rivers Audit Group for the MDBC. In the later role, he has overseen the development of an independent audit and assessment program for the rivers of the Murray-Darling Basin.

10.4 Appendix 4: Methodology to Develop the ECD

Completion of the ECD comprised eight major tasks:

1. Project Inception and site visit
2. Literature and Information Review
3. Content of the ECD
4. Preparation of 1st Draft ECD for review by DEWHA
5. Preparation of revised RIS, using the ECD
6. Revision of 1st Draft ECD (with DEWHA comments)
7. Presentation of 2nd Draft ECD to stakeholders in a workshop format, seeking comments/feedback
8. Finalisation of ECD, incorporating stakeholder comments

Client-consultant partnership was an important component of the process to ensure alignment of goals and common understanding of approaches. This included client-consultant meetings to ensure a high level of communication. The team also conducted interviews and informal discussions with relevant stakeholders and resource managers, to further develop our understanding of the site. The structured workshop (Task 7) assisted with crystallising our understanding of the site and developing the conceptual model for the wetland.

The tasks outlined above are described in the following sections.

Task 1: Project Inception and Site Inspection

The project commenced with an inception meeting with the Client Project Manager and the Consultants' project manager. This meeting was to:

- **Confirm** project objectives, and outputs sought;
- **Discuss and finalise** timeframes and key dates for delivery of project outputs; and,
- **Confirm** existing information sources and **obtain** relevant reports, information, and data from the client.

This component was vital for ensuring alignment of objectives and discussion of approaches. The inception meeting was also used as a springboard for making contacts, obtaining details of key stakeholders and pursuing reference documents.

Site Inspection: Following the inception meeting a site inspection was undertaken to view the key areas and habitats of the Riverland Ramsar site. The site inspection was led by the client Project Manager, who had extensive experience managing the Site. A small plane was also chartered to fly over the Ramsar site, providing greater spatial perspective of the site.

Task 2: Literature and Information Review

The literature review initially focussed on the condition of the Ramsar site at the time of Ramsar listing. Information on changes to condition since listing was subsequently reviewed and documented. Information reviewed included documents prepared prior to and during the listing process, as well as through perusal of subsequent reports and studies on the condition of the wetland.

Collate/summarise information from inception meeting and Stakeholders: At the inception meeting relevant available documents held by the client were requested, as well as contact details of stakeholders and their relevant roles in relation to the Ramsar Site. Subsequent to the inception meeting contact was made with relevant stakeholders as part of document searching/gathering. The collated and summarised information enabled an assessment of information gaps and needs.

Information and data search and review: Using the approaches and structures identified at the inception meeting and the collated information, information needs were prioritised and the most likely sources (people and documents) were identified. The data search and summary was a key component of the project and was allocated a substantial amount of time. An "information log" was developed to document the reports and information resources available to the project. The "information log" was used during the course of the project to inform stakeholders which documents the project team possessed and which ones were missing for the project. The "information log" will be continually updated throughout the project. A significant component of this included interviews and discussions with key stakeholders.

Literature Summary: The information and data obtained was summarised to facilitate review of knowledge status and gaps, and was used as an important basis for the production of the ECD. The literature summary was structured to enable ready assessment against ECD requirements.

Discussions with DEH and Government Agencies: Discussion with the client and key Government stakeholders was a regular and vital part of the project, both in the collection of information and also in the compilation of the literature summary. Regular feedback maximised the opportunity to uncover all relevant information.

Task 3: Content of the ECD

A scientific panel was convened and focussed on identifying:

- key ecological components and processes in the Riverland Ramsar site;
- the benefits and services that characterise the site;
- key actual or potential threats to the site;
- knowledge gaps;
- monitoring needs; and,
- an appropriate preliminary conceptual model of the system.

The Panel workshop consisted of the project team (Dr Peter Newall, Lance Lloyd, Dr Peter Gell and Assoc. Prof. Keith Walker) who have substantial knowledge of the River Murray and its associated wetlands, covering a broad range of environmental/ecological disciplines.

Task 4: Preparation of a Draft ECD for review by DEWR

A Draft of the ECD was prepared from the information gathered through the literature review, Scientific Panel and through liaison with the client. The draft was provided to the client manager, for distribution to relevant staff within DEWR.

The Draft ECD generally followed the draft national framework, which includes:

- o Executive Summary
- o Acknowledgements
- o Table of Contents
- o List of Abbreviations
- o **Introduction**, including site details, purpose of the ECD, legislative context
- o **Detailed Description of the Site**, including overview of the site; ECD context; Ramsar/DIWA criteria; geographic and ecosystem description
- o **Description of Ecological Character of the Site**, focusing on components, processes & benefits/services; conceptual model of site & system, quantified limits of change. Consideration will need to include biological, physical and chemical aspects of wetland condition and processes
- o **Key Actual or Potential Threats or Risks to the Site**, to aid identification of potential changes and their importance
- o **Knowledge Gaps** (and suggested approaches for addressing them)
- o **Changes in Ecological Character** (if appropriate), including whether changes have occurred since listing
- o **Key Site Monitoring Needs**, identified from conceptual model, and covering knowledge gaps, assessing trends/changes and relevant triggers, monitoring management outcomes
- o **Triggers for Management Action**, to be quantitative and place high importance on identified risks/threats
- o **Communication, Education and Public Awareness (CEPA) Messages**, summarising key ecological messages that will facilitate management planning and action
- o Glossary
- o References; and,
- o Appendices.

The 'Executive Summary' to 'List of Abbreviations' and 'Glossary' to 'Appendices' were not completed at this draft stage.

Describing the Components, Processes and Benefits/Services: The development of ecological character required a description of the ecosystem components, processes and benefits/services that characterise the Ramsar site. An important requirement within this task was the need to document the condition of the site at the time of its designation for the Ramsar list as well as current condition. This included assessments of trends in the condition of relevant components, processes and services and past and current changes in its character.

Development of Conceptual Models: Conceptual models were developed to represent the ecological processes and components of the Ramsar Site in a simplified way, to will assist in describing the ecological character of the site.

Conceptual models draw on existing scientific information to describe the critical processes that contribute to (or limit) wetland or ecosystem health. A model can describe a 'healthy' ecosystem that meets the management objective and can include known impacts and show how they reduce health or biodiversity.

Conceptual models are defined as “a generalised description or representation of the structure and function of a complex system”. In order to develop a conceptual model, the following steps were undertaken:

- o define the purpose of the conceptual model
- o specify the system boundaries
- o identify individual model components
- o describe relationships between components
- o “build” the conceptual model

Prepare Draft ECD: The ecological character was described in accordance with the Draft National Framework. This required a description of the ecosystem components, processes and benefits/services that characterise the wetland as well as the conceptual model of the ecological functioning of the wetland system (described above).

Beyond the description of the wetland site, knowledge gaps were identified and recommendations made accordingly, including the development of monitoring recommendations. As well as filling of knowledge gaps, monitoring recommendations considered information required for assessment of trends, triggers for management action (including assessments of threats/risks), and feedback on management actions.

Task 5: Preparation of revised RIS, using the ECD

The preparation of the revised RIS used the existing RIS as a basis and incorporated changes to the site boundaries as well as any relevant changes to the ecology of the site since the preparation of the previous RIS. Much of the work undertaken as part of the Literature Review and also stakeholder discussion and team-member knowledge of the site fed into this task.

Task 6: Revision of 1st Draft ECD (DEWHA comments)

The project team collated the comments provided by DEWR and incorporated those comments into a revision of the draft ECD, producing a 2nd Draft ECD for Key Stakeholder review. The 2nd draft ECD was circulated to the Key Stakeholders approximately 2 weeks prior to the presentation & workshop (Task 7).

Task 7: Presentation of 2nd Draft ECD to stakeholders in a workshop format, seeking comments/feedback

The purpose of the presentation was to field feedback from the client, Steering Committee and other key stakeholders in a face-to-face situation. The goal was to encapsulate the key comments in a workshop environment after the presentation and seek agreement/consensus on those comments. Feedback received from the presentation/workshop was documented and circulated to ensure completeness and alignment of understandings prior to preparation of the final draft of the ECD.

Task 8: Finalisation of ECD.

The ECD was finalised, incorporating the stakeholder comments following the workshop and subsequent feedback.

10.5 Appendix 5: Ramsar Information Sheet for the Riverland Ramsar Site