

Information Sheet on Ramsar Wetlands

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

1. Date this sheet was completed/updated:

January 2000

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Designation date

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Site Reference Number

2. Country:

Australia

3. Name of wetland:

The Macquarie Marshes

The Macquarie Marshes Ramsar site includes the northern and southern sections of the Macquarie Marshes Nature Reserve and the Wilgara wetland.

4. Geographical coordinates: Macquarie Marshes Nature Reserve

Latitude: 30° 45'S; Longitude: 147° 33'E

Wilgara wetland

Latitude: 30° 45'S; Longitude: 147° 56'E

5. Elevation: 135-145 m above mean sea level

6. Area: Nature Reserve

18,143 hectares

Wilgara:

583 hectares

7. Overview:

The Macquarie Marshes comprises a complex of braided swamps, lagoons, channels and gilgaied floodplain inundated by flooding from the lower Macquarie and its tributary streams. The Marshes incorporate extensive areas of reed swamp, river red gum woodland, and water couch grasslands which provide important habitat for many species of flora and fauna, particularly the large numbers of colonial waterbirds which breed here as well as many migratory species. The Marshes also support highly productive grazing and cropping industries. The Nature Reserve comprises three parcels of land on the western side of the North and South Marsh, while the Wilgara wetland is representative of the eastern side of the Marsh.

8. Wetland Type

marine-coastal: A B C D E F G H I J K Zk(a)

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

U Va Vt **(W)** **(Xf)** Xp Y Zg Zk(b)

human-made: 1 2 3 4 5 6 7 8 9 Zk(c)

Please now rank these wetland types by listing them from the most to the least dominant:

Inland Wetlands Xf, N, W, P, Ts, Tp

9. Ramsar Criteria:

(1) **(2)** **(3)** **(4)** **(5)** 6 7 8

Please specify the most significant criterion applicable to the site: 2/3/4/5/1 (All criteria are significant)

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

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

Group A

Criteria 1 Representative, rare or unique wetland types

The Macquarie Marshes are one of the largest remaining inland, semi-permanent wetlands in SE Australia. They constitute a relatively unaltered part of a major land system in NSW, the Northern Alluvial Fans, which is not well conserved (NPWS 1993). The Marshes not only represent an outstanding example of the lower floodplain wetlands characteristic of the Darling Riverine Plains, but they are geomorphologically and geologically unusual as an active network of inland braided streams (NPWS 1993). They are also unique in terms of both their size (approximately 200,000 hectares) and diversity. Together, the Nature Reserve and Wilgara sample most of the important habitats within the Marshes.

Group B

Criteria 2 Threatened species and ecological communities

The Ramsar sites support permanent populations of several threatened species including the Australasian Bittern (*Botaurus poiciloptilus*) and the Brolga (*Grus rubicunda*), which are listed as vulnerable at the State level. They also represent one of the few sites in NSW where Magpie Geese (*Anseranas semipalmata*), listed as vulnerable under NSW legislation, breed. The threatened plant, *Lepidium hyssopifolia* is known to be present in the Marshes and a number of other threatened species are likely to occur including *Eleocharis obicis*, *Pimelea elongata*, *Capparis loranthifolia*, *Sida rohlenae* and *Swainsona recta* (Brock 1997).

Criteria 3 Populations important for maintaining biological diversity

The Marshes contain a variety of habitat types as a result of differing landforms and changing water levels. Consequently the fauna and flora of the Marshes are particularly diverse. The Ramsar sites represent the limit of the range for several plant and animal species, including the most southerly occurrence of Coolibah (*Eucalyptus coolabah*), the northernmost limit of Black Box (*Eucalyptus largiflorens*) and the western limit for Gould's Long-eared Bat (*Nyctophilus gouldii*) (NPWS 1993). These wetlands also serve to maintain water-dependent ecosystems and populations of wetland-dependent species in a semi-arid environment.

Criteria 4 Species at a critical stage in their life cycles or a refuge in adverse conditions

The Ramsar wetlands represent highly significant habitat for colonially-breeding waterbirds. They are one of the few remaining sites supporting large breeding colonies of Straw-necked Ibis (*Threskiornis spinicollis*) in Australia, and one of only a few sites in NSW where Magpie Geese breed (Kingsford & Johnson 1998). They also support some of the largest breeding colonies of Intermediate Egret (*Ardea intermedia*), Rufous Night Heron (*Nycticorax caledonicus*) and Royal Spoonbill (*Platalea regia*) in southern Australia, as well as a rich diversity of other waterbirds including cormorants, herons, spoonbills and ducks, many of which breed here. In a catchment that has been modified by agricultural activities, these remaining wetlands have become a regionally important refuge for wildlife. Similarly, they represent an important drought refuge during periods when many other inland wetlands have dried out. The Ramsar sites also provide important habitat for a number of migratory bird species covered

under the Japan-Australia and China-Australia Migratory Bird Agreements (JAMBA and CAMBA) (see Question 18).

Criteria 5 Based on waterbird numbers

While waterbird populations have declined in recent years (Kingsford & Thomas 1995), the wetlands of the Macquarie Marshes still regularly support more than 20,000 waterbirds and over 500,000 in large floods. This includes substantial numbers of cormorants, herons, ibises, spoonbills, swans, geese, ducks, raptors, and migratory waders. Egret rookeries in these wetlands are amongst the largest in the state and significant proportions of the Australian population of a number of waterbird species breed here when conditions are suitable (NPWS 1993).

13. General location:

The Macquarie Marshes occur in central northern New South Wales, Australia. The Ramsar sites occur within the Macquarie Marshes system. The Macquarie Marshes Nature Reserve is approximately 100km north of Warren and 30km west of Quambone. The Wilgara wetland is 20 kms east-southeast of the Macquarie Marshes Nature Reserve.

14. Physical features: The Macquarie Marshes are located on early Tertiary alluvium in the Great Artesian Basin, within the Northern Alluvial Fans land system. They consist of a complex of braided swamps, ephemeral lagoons or overflow depressions, channel country and gilgaied floodplain inundated by flooding from the lower Macquarie River and its tributaries and distributaries. The streams that feed the Nature Reserve comprise the Macquarie River, Monkeygar Creek and Bora Channel and their offshoots, while the Wilgara wetland is on the Gum Cowal-Terrigal Creek system.

The Macquarie River originates on the slopes of the Great Dividing Range of eastern Australia. It is one of the most variable systems in the Murray-Darling Basin. Floods can occur at any time of year and are highly variable in size and duration. The amount of water available and variability of inflows to the Macquarie Marshes have been reduced over the years by dam construction and upstream extractions. Burrendong Dam was built in 1965 to provide headwater storage and there has been increased regulation for irrigation and other water supply requirements since that time. The construction of Windamere Dam in the early 80s has resulted in further use of these water resources. Regulation of the river system and the abstraction of water have altered the natural flow regime and inundation patterns of the Marshes and only a proportion of the inflows now pass through and join the Barwon-Darling River.

Large fluctuations in inundation are a normal part of the Marsh environment. Consequently, the depth of the water in the wetlands is variable, with a maximum of 1.5m. The extent of inundation is also highly variable depending on inflows. However, some channels and streams have become permanent as a result of dam construction and the growth of irrigation altering the frequency and volume of inflows. The occurrence of flooding has subsequently decreased, while low, in-channel flows have increased. Most of the wetland is semi-permanent or ephemeral, depending on the distance from the main streams and channels.

The soil types of the Marshes are relatively uniform, comprising grey-brown soils to black organic loams over grey clays (Brock 1997).

The climate of the area is semi-arid. The average rainfall in the Marshes is 444 mm per year, with a slight summer dominance. Average maximum temperatures range from 16.5°C in July to 34.5°C in January. Average minimum temperatures range from 4°C in July to 20°C in January. Droughts are a common feature of the Marshes, occurring on average once every four to five years (Cunningham 1996).

15. Hydrological values: The Marshes play an important hydrological role, serving as the main sediment trap within the Macquarie catchment and maintaining water quality in the Murray-Darling Basin by intercepting nutrients, salt and chemical contaminants derived from agricultural and urban activities.

16. Ecological features: These wetlands contain a wide range of vegetation types which are primarily determined by the frequency and duration of flooding. Minor variations in elevation are associated with marked localised vegetation differences. The dominant types are River Red Gum (*Eucalyptus camaldulensis*) forest and woodland,

as well as extensive beds of Common Reed (*Phragmites australis*). Also present are Coolibah (*E. coolabah*), Black Box (*E. largiflorens*), Lignum (*Muehlenbeckia florulenta*), Water Couch (*Paspalum distichum*), Cumbungi (*Typha domingensis*) and River Cooba (*Acacia stenophylla*). Various associations of these species are found throughout the wetlands providing habitat for many species of waterbird, as well as a diverse array of other wildlife including 211 bird species, 8 species of native mammal, 15 frog species, 56 reptile species and 24 native fish species (Brock 1997).

The Wilgara wetland is one of a number of significant wetland areas outside the Nature Reserve which incorporate extensive areas of prime River Red Gum habitat and some of the largest rookeries in the Marshes (NPWS 1993).

Plant communities on areas surrounding the Ramsar sites are similar to those within, but contain a greater proportion of ephemeral wetland and dryland vegetation. Dryland communities grow adjacent to the floodplain on red soils, as well as islands of red soil within the Marshes. These communities are typical of the region, comprising Bimble Box (*E. populnea*), Wilga (*Geijera parviflora*), Leopardwood (*Flindersia maculosa*) and a wide range of chenopods, including saltbushes (*Atriplex spp.*) and Roly Poly (*Sclerolaena spp.*).

17. Noteworthy flora: Despite river regulation, the Macquarie Marshes represent an outstanding example of the River Red Gum-Common Reed-Water Couch vegetation association. The wetlands are particularly important because they contain the largest and most northerly area of Common Reed (*Phragmites australis*) in south-eastern Australia, as well as a major area of River Red Gum (*E. camaldulensis*), which is recognised as the largest in northern NSW. In addition, the Marshes represent the most northerly occurrence of Black Box (*E. largiflorens*) and one of the most southerly stands of Coolibah (*E. coolabah*) (NPWS 1993).

The threatened plant, *Lepidium hyssopifolia* is known to be present in the Marshes and a number of other threatened species are likely to occur including *Eleocharis obicis*, *Pimelea elongata*, *Capparis loranthifolia*, *Sida rohlenae* and *Swainsona recta* (Brock 1997). A vegetation list for the Marshes is attached (see Appendix 1).

18. Noteworthy fauna: A number of birds listed as vulnerable under the NSW *Threatened Species Conservation Act* have been recorded at the Ramsar sites. These include the Magpie Goose (*Anseranas semipalmata*), which is known to breed here, as well as the Blue-billed Duck (*Oxyura australis*), Freckled Duck (*Stictonetta naevosa*), Australasian Bittern (*Botaurus poiciloptilus*), Brolga (*Grus rubicundus*), Painted Snipe (*Rostratula benghalensis*), Osprey (*Pandion haliaetus*), Glossy Black-cockatoo (*Calyptorhynchus lathami*) and Turquoise Parrot (*Neophema pulchella*). The wetlands support breeding colonies of Intermediate Egret (*Ardea intermedia*) which are possibly the largest in southern Australia, and they are also one of the most important breeding sites for Straw-necked Ibis (*Threskiornis spinicollis*) in Australia. Other threatened bird species found here include the Square-tailed Kite (*Lophoictinia isura*) and Major Mitchell's Cockatoo (*Cacatua leadbeateri*).

The wetlands also provide important habitat for a number of migratory bird species covered under JAMBA and CAMBA including the Sharp-tailed Sandpiper (*Calidris acuminata*), Latham's Snipe (*Gallinago hardwickii*), Black-tailed Godwit (*Limosa limosa*), Cattle Egret* (*Ardea ibis*), Great Egret* (*Ardea alba*), Glossy Ibis* (*Plegadis falcinellus*), Painted Snipe* (*Rostratula benghalensis*), Caspian Tern (*Sterna caspia*), White-throated Needletail (*Hirundapus caudacutus*), Fork-tailed Swift (*Apus pacificus*), White-bellied Sea Eagle (*Haliaeetus leucogaster*) and Rainbow Bee-eater (*Merops ornatus*) (NPWS, unpublished data). Some of these species (*) also breed in the Marshes.

There are at least 8 species of native mammal still present throughout the Marshes including Red Kangaroo (*Macropus rufa*), Eastern Grey Kangaroo (*Macropus giganteus*), Little Mastiff (*Mormopterus planiceps*) and White Striped Mastiff (*Nyctinomus australis*) Bats, Lesser Long-eared (*Nyctophilus geoffroyi*) and Gould's Long-eared (*Nyctophilus gouldii*) Bats, Common Brush-tailed (*Trichosurus vulpecula*) and Ring-tailed Possums (*Pseudocheirus peregrinus*), Water Rat (*Hydromys chrysogaster*) and Echidna (*Tachyglossus aculeatus*). The Yellow-bellied Sheath-tail Bat (*Saccolaimus flaviventris*), listed as vulnerable under the NSW *Threatened Species Conservation Act*, is found in the Marshes which represent the most westerly occurrence of Gould's Long-eared Bat (*Nyctophilus gouldii*). The wetlands also provide habitat for a wide range of reptiles and amphibians, as well as a number of native fish including the Murray Cod (*Maccullochella peelii*), Golden Perch (*Macquaria ambigua*), Silver Perch (*Bidyanus bidyanus*) and Freshwater Catfish (*Tandus tandus*). See attached fauna list (Appendix 2).

19. Social and cultural values: The fertile soils, permanent water and an abundant supply of wildlife indicate that these wetlands were probably a favourable location for Aboriginal occupation, particularly during periods of drought. The Marshes were the home of the Wayilwan people and a range of significant archaeological sites have been recorded here. Within the Nature Reserve, scarred trees are common and there are a number of Aboriginal oven mounds, which are rare in NSW, representing the only examples of this type of mound outside the Murray Valley. There are also the remains of campsites, burial and ceremonial grounds, as well as scattered artefacts, adjacent to the wetlands. A systematic survey of the Nature Reserve has revealed over 100 sites. However, changed flooding regimes and European land use practices have largely obscured records of Aboriginal occupation in the remainder of the Marshes (NPWS 1993).

The Marshes also have historical significance with respect to European occupation. They were discovered during John Oxley's expedition in search of an inland sea in 1818. They were also explored by Sturt and Hume in 1829 and were first surveyed in 1847. Settlement began in the 1840's when the area was almost exclusively used for grazing sheep and cattle. There are structures in the Nature Reserve, such as old fence lines, sheds, tanks and water control devices, which have historical significance in relation to these early developments. Wilgara, which has been managed by the Fisher family for over 100 years, also provides an important record of European agricultural practices in relation to sheep and cattle grazing within the Marshes. The listing of the Wilgara wetland also highlights a significant new partnership between private landholders, conservation groups and governments to manage wetlands for both sustainable production and conservation.

The Marshes represent a very valuable economic resource supporting a range of rural industries including grazing as well as dryland and irrigated cropping.

20. Land tenure/ownership of:

(a) site

The Macquarie Marshes Nature Reserve was previously Crown land originally reserved for the Preservation of Game in 1900. It was gazetted as a Nature Reserve in 1971 and is managed by the NSW National Parks and Wildlife Service.

The Wilgara wetland is on freehold land owned and managed by the Fisher family.

(b) surrounding area

The surrounding area is mainly freehold land.

21. Current land use:

(a) site

The land within the Macquarie Marshes Nature Reserve is permanently dedicated as a Nature Reserve and there is limited public access. The Wilgara wetland is used for grazing beef cattle and managed for conservation through the application of sustainable grazing management practices.

(b) surrounding area

A range of agricultural industries are undertaken on surrounding private lands. Beef cattle are grazed within the more frequently flooded areas and sheep (wool and meat) on surrounding drier land. Some dryland farming (wheat, oats, sorghum and barley) and irrigated cropping (cotton), along with introduced pasture establishment, also occur within the Marshes (Cunningham 1996).

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

(a) at the site and (b) around the site

Water supply: River regulation, ranging from large dams to weirs, levees and banks, combined with the extraction of water for irrigation and other purposes upstream of the Ramsar site have reduced the water supply to these wetlands as well as the frequency, area and duration of flooding. This has led to a decline in the extent and vigour of wetland vegetation and a concomitant decline in the diversity and abundance of waterbirds and other fauna at these sites. The construction of various bypass channels has also had a detrimental impact, particularly the Northern Bypass Channel which passes through the northern part of the Nature Reserve and was constructed in the early 1970's to deliver water for irrigation to areas below the Marshes. Significant waterlogging, erosion, sedimentation, salinity and dieback problems have been associated with this channel in the past (Brock 1997). Remediation works

undertaken by NPWS and DLWC have brought the problems of the Northern Bypass Channel under control, but it remains a potential threat to the integrity of the Nature Reserve. The channel has never been used to provide water for irrigation, but landholders downstream of the Marshes have become dependent on it for stock and domestic water supplies.

Water quality: The water quality of the Macquarie River has deteriorated due to contamination by nutrients and pesticide residues derived from urban and agricultural runoff. Salinity is an emerging issue with increasing concentrations being detected in flows both within and upstream of the Marshes. In addition, there has been accelerated erosion and enlargement of the channels and streambeds that traverse the Marshes, particularly Monkeygar Creek, leading to increased sedimentation downstream and reduced overbank flows to wetlands. High turbidity, nitrogen and phosphorus levels have led to blue-green algal blooms in water storages within the Macquarie catchment and the Macquarie River. There was an intense 300km bloom in the Macquarie River downstream of Burrendong Dam in the summer and autumn of 1997/98.

Surrounding land use: Grazing and associated practices, such as inappropriate or inopportune burning, have had some impact, especially on the saltbush communities of dryland areas surrounding the Marshes (Cunningham 1996). Clearing, within and upstream of the Marshes, together with tree death due to changed water regimes, have impacted on water quality by removing the filtering effect of riparian/wetland vegetation and raising groundwater levels (NPWS 1993). Dryland salinity in the upper reaches of the Macquarie catchment is raising the salt load in the Macquarie River at a rate that will result in ecosystem damage by 2050. Increasing rates of cumulative deposition of salt in the Macquarie Marshes are cause for grave concern (MDBC 1999). Expansion of irrigated agriculture upstream of the Macquarie Marshes, particularly the Pillicawarrina cotton development adjacent to the northern section of the Nature Reserve, is of major concern. This has the potential to further impede flows to the wetlands during large floods and cause major contamination from pesticides such as Endosulfan, which is used extensively on cotton crops and has already been detected in the upper reaches of the Marshes (Brock 1997).

Introduced plants and animals: A number of weed species have been introduced to the Marshes and are cause for concern. *Lippia (Phyla canescens)* is widespread, particularly along the Northern Bypass Channel, and is increasing on the flooded country (Cunningham 1996). Chemical control of this weed is constrained by the sensitivity of the Marsh environment and by cost (Brock 1997). Noogoora Burr (*Xanthium occidentale*), Bathurst Burr (*X. spinosum*), Golden Dodder (*Cuscuta campestris*) and a number of species of thistle are all present, but do not constitute a major threat. More recently, Boxthorn (*Lycium* sp.) has become a problem. Weed invasion is an ongoing problem in the Marshes and it is exacerbated by the inaccessibility of many areas. Introduced animals include feral pigs, cats, foxes, rats and mice. Feral pigs are widespread in the area especially on the lower floodplain and amongst the reed beds. They compete with, and prey upon, waterbirds and other native fauna. Pigs are subject to an ongoing control program and their numbers have decreased. Predation by foxes and feral cats has also probably affected bird numbers and contributed to the absence of many small mammals, as well as reptiles and frogs. In addition, the Nature Reserve has a problem with starlings which compete with other birds for nesting sites. European Carp (*Cyprinus carpio*), Mosquito Fish (*Gambusia holbrooki*) and Common Carp (*Carassius auratus*) have become dominant in the Marsh's waterways, with a corresponding decline in native fish. Management of these pests is limited by the inaccessibility of many areas and the lack of appropriate technologies to control these species (NPWS and DLWC 1996).

Fire: The impact of fire on Marsh vegetation is not well understood. The natural fire regime of the Marshes has changed over the years. Frequent fires have altered the structure and pattern of vegetation, favouring annual over perennial species (NPWS 1993). While fires are integral to the survival of some species, they are difficult to manage in the Marsh environment and they can cause significant damage to wetland communities, particularly when they are dry. In the past, River Red Gums in the Northern Marsh have been damaged by intense fires (Brock 1997). Fire reduces cover for native animals and in dry periods it can reduce the waterholding capacity of wetland soils by removing organic matter.

23. Conservation measures taken:

The Macquarie Marshes has been listed on the Australian Heritage Commission's Register of the National Estate and as a Landscape Conservation Area on the Register of the National Trust of Australia (NSW). The Macquarie Marshes Nature Reserve was listed as a Wetland of International Importance under the Ramsar Convention in 1986.

The most important conservation issue currently being addressed in the Macquarie Marshes is water management and the provision of environmental flows. To maintain the health of the Marshes an adequate water regime is required.

In 1986, a Water Management Plan (WMP) was developed by the National Parks and Wildlife Service (NPWS) and Department of Water Resources (DWR). The primary objective of this plan was to ensure a water regime capable of maintaining the maximum possible extent, diversity and productivity of wetland habitats and suitable conditions for waterbird breeding, while meeting the requirements of other water users. A secondary objective was to control erosion and sedimentation in the Marshes. The plan provided for a 50,000 ML per annum high security Wildlife Allocation to the Marshes, the first formal commitment to provide environmental flows to a wetland ecosystem by a state government in Australia.

Continuing concern for the future of the Macquarie Marshes resulted in the review of the 1986 Water Management Plan. In 1996, the State Government released a new Macquarie Marshes Water Management Plan. Included in the wide range of initiatives contained within this plan were an increase in the volume of water allocated to the Marshes, restrictions on irrigators' access to unregulated flows and provision for wide community involvement in the management of the Marshes and the Macquarie River. The new Water Management Plan forms part of the NSW government's water reform package. It increases the annual Wildlife Allocation to the Macquarie Marshes by 75,000 ML general security, with a carry-over provision and restricted off-allocations, while at the same time guaranteeing stock and domestic supplies. In addition, the plan addresses water quality, regulatory works, research and monitoring issues. It aims to provide water to the Marshes in a pattern more closely resembling the natural flows which existed prior to river regulation so that the ecological character of the Marshes is maintained and water is shared equitably amongst all users. In the future, these flows into the Marshes will be reinforced through the implementation of water quality and river flow objectives under the NSW water reform process. The plan also established an Audit and Advisory Committee comprising community, agency and industry representatives to provide feedback on the performance of the WMP. The Macquarie River Management Committee, established as part of the government's water reform process, has subsequently taken on this role.

In 1989, under the *Catchment Management Act*, the Macquarie Marshes Catchment Committee was formed to provide a focus for identifying key management issues in the Marshes and to initiate community-based planning. In line with the Murray-Darling Basin Commission's Natural Resource Management Strategy, the committee conducted an appraisal of the status of the Marshes and identified a number of issues which required co-ordinated action (Brock 1997). Various working groups, comprising landholders, government agency representatives and experts, were subsequently set up to address issues such as water distribution and quality, erosion, fauna and flora, as well as cultural heritage. The information compiled by these groups has formed the basis of an overarching management plan for the Marshes. The 1997 Macquarie Marshes Land and Water Management Plan (LWMP) is the result of extensive consultation with local landholders, agencies, councils, environmental and Aboriginal groups, as well as the general public. The LWMP represents a co-ordinated action plan to address key management issues for the entire Marsh catchment. It is consistent with current research, existing legislation and government policy such as the Commonwealth Wetlands Policy and NSW Wetland Management Policy. This plan will subsequently feed into the River Management Plan being prepared for the Macquarie River under the NSW government's water reform process.

The Macquarie Marshes Nature Reserve was gazetted in 1971 and grazed under licence until 1990. In 1993, the NPWS adopted a Plan of Management (PoM) for the site. This plan addresses the numerous conservation and management issues required to preserve and rehabilitate the area such as water allocations, native flora and fauna, introduced species, fire, Aboriginal and European cultural heritage, as well as public access. Emphasis is placed on the water requirements of the Marshes as the key to maintaining the diversity and productivity of its wetland habitats and those of the Nature Reserve. The PoM also acknowledges that broader environmental planning mechanisms and community participation are essential to ensure effective, long-term management of the Reserve. A NPWS field officer is permanently stationed at the Reserve to undertake activities outlined within the Plan of Management, together with law enforcement duties. The Nature Reserve constitutes approximately 10% of the overall Marsh area and is significant both for the wetland ecosystems it encompasses and in terms of the small amount of land currently protected within the reserve estate in Western NSW.

Various control programs exist for introduced plant and animal species within the Nature Reserve and Wilgara. The Wilgara wetland is managed for grazing as well as conservation, but sheep and cattle have been excluded from the

Nature Reserve since 1990. Feral pig numbers are being kept down via regular aerial shoots and fox numbers have been reduced through co-operative baiting programs. Developing control methods for feral cats has been more problematic, but both the Service and landholders are working to monitor and eradicate these pests on their land. Weed control in the Marshes involves manual removal and spraying with herbicides, when and where appropriate. Biological control has been introduced for Noogoora Burr (*Xanthium occidentale*) and Horehound (*Marrubium vulgare*) (NPWS 1993). The current strategies for controlling scheduled weeds involve collaboration between the Service, landholders, DLWC, NSW Agriculture and Castlereagh Macquarie County Council and appear to be adequate (Brock 1997).

A Fire Management Plan has been prepared by the Service in accordance with the Nature Reserve Plan of Management outlining fire management strategies, resourcing issues and co-operative arrangements with neighbouring properties.

The Wilgara wetland on the Gum Cowal-Terrigal Creek system falls within the planning area subject to the Macquarie Marshes Land and Water Management Plan and the Macquarie Marshes Water Management Plan. In addition, a Ramsar Memorandum of Understanding (MoU) has been signed between the landowner, the Government and conservation groups expressing their intention to manage the site in accordance with the Ramsar 'wise use' guidelines. A Property Management Plan is being prepared for the site which details management actions derived directly from the management principles outlined in this Ramsar MoU. Wilgara has been sustainably managed for both grazing and conservation for over 100 years by the Fisher family and stocking rates, as well as grazing regimes, have been sympathetic to the character and carrying capacity of the wetland, as evidenced by its good condition. The Property Management Plan will document these ongoing management practices.

24. Conservation measures proposed but not yet implemented:

The Water Management Plan, the Macquarie Marshes Land and Water Management Plan, the Plan of Management for the Nature Reserve and the Property Management Plan for the Wilgara wetland outline a number of proposed actions aimed at conserving the ecological character of the Macquarie Marshes Ramsar site. These include:

- Erosion control plans, specifically erosion control works within the southern part of the Nature Reserve which have been partially implemented.
- Works necessary to deal with the hydrological, erosion and salinisation problems associated with the Northern Bypass Channel. These have been identified and initiated.
- The most efficient and beneficial application of the Wildlife Allocation and surplus flows. These are being investigated and implementation is ongoing.
- Identifying areas affected, and causes of, River Red Gum dieback and introducing measures to halt further deterioration and encourage regeneration. These have investigated and some have been implemented.
- Protecting further significant habitat outside the Ramsar site by developing co-operative conservation agreements with relevant landholders.
- Preparation of conservation plans for culturally significant sites in the Marshes.
- Preparation and implementation of a River Management Plan for the Macquarie catchment. This is in progress.
- Monitoring and reporting on the long-term impacts of flow distribution within the Marshes utilising various indicators of wetland health.

25. Current scientific research and facilities:

The variety of habitats and associated fauna, particularly waterbirds, make the Marshes a valuable location for scientific research. However, access is often difficult and facilities are limited. Specific research projects on some aspects of Marsh ecology are being carried out by NPWS, DLWC and the Macquarie Marshes Catchment Committee, while broader research efforts to assess the effectiveness of the 1996 Water Management Plan and to update the current information base in order to improve management practices in the Marshes have involved a collaborative effort between NPWS, DLWC, other government agencies and non government bodies. These include:

- vegetation surveys and mapping,
- a study of River Red Gum physiology,
- studies of the relationship between waterbird breeding and flooding,

- fauna surveys,
 - establishment of a piezometric network to study hydrogeology,
 - water quality monitoring programs,
 - development of a GIS database, and
 - investigation of erosion profiles in the Southern Marshes.
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26. Current conservation education:

The Macquarie Marshes and, in particular, the Nature Reserve are utilised for educational visits by schools and universities. The National Parks & Wildlife Service holds open days (weather permitting) at the Nature Reserve in October each year during which guided walks and talks are provided by NPWS staff. The education centre run by the NSW Department of Education and Training in the nearby Warrumbungle National Park focuses on environmental issues in the Macquarie catchment and, together with NPWS, the Macquarie Marshes Catchment Committee and the Murray-Darling Basin Commission, they recently produced an educational poster on the key management issues facing the Macquarie Marshes. The NPWS has compiled a small guidebook for landholders on the threatened species of the Macquarie Marshes to help identify these species and the threats to their habitat.

27. Current recreation and tourism:

The natural heritage values of the Macquarie Marshes Ramsar site together with its size and variety should make it a potentially significant focus for tourism and recreation. However, the Wilgara wetland is on private property which is not accessible to the public and visitation at the Nature Reserve is closely managed due to the sensitivity of the environment. The inaccessible nature of the site, as well as the restricted road access, difficult terrain and lack of facilities have restricted visitation to educational groups and special interest tours (NPWS 1993). Limited resources have placed a further constraint on the development of tourism. While the Nature Reserve does not include recreation as an objective in its Plan of Management, public use is permitted as long as it does not interfere with waterbird breeding or damage habitat. Recently, Tourism NSW, NPWS, DLWC and the Macquarie Marshes Catchment commissioned a feasibility study into the tourism potential of the Macquarie Marshes which found that tourism development opportunities do not currently exist for the above-mentioned reasons (McFeeters 1999).

28. Jurisdiction:

<u>Property Name</u>	<u>County</u>	<u>Parish</u>
'Wilgara'	Gregory	Weenculling

Territorial: Commonwealth of Australia, State of New South Wales, and Shires of Coonamble, Walgett and Warren
 Functional: NSW National Parks and Wildlife Service
 NSW Department of Land and Water Conservation
 NSW Department of Fisheries
 NSW Department of Urban Affairs and Planning
 NSW Department of Agriculture

29. Management authority:

Macquarie Marshes Nature Reserve
 NSW National Parks and Wildlife Service
 Western Directorate
 PO Box 2111
 Dubbo NSW 2830
 Australia
 Phone: 68 835 330
 Fax: 68 849 382

Wilgara

Macquarie Marshes Ramsar Management Group (as outlined in the Memorandum of Understanding) convened by:
 Quambone NSW 2831
 Eric & Carollyn Fisher Phone: 68 242 072
 Wilgara Fax: 68 242 272

Cath Webb
WWF/NPA Western NSW Conservation Project
GPO Box 528
Sydney NSW 2001
Phone: 02 9281 5515
Fax: 02 9281 1060

National Parks and Wildlife Service
Western Directorate

Dubbo NSW 2830
Phone: 68 835 330
Fax: 68 849 382

Environment Australia
GPO Box 787
Canberra ACT 2601
Phone: 62 742 777
Fax: 62 742 735

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Appendix 1: Plant species recorded within the Macquarie Marshes Ramsar site
 (from Macquarie Marshes Vegetation Survey completed in 1992 by Janeen Rob NPWS)

Family	Species name	Conservation status
Aizoaceae	<i>Tetragonia tetragonoides</i>	
	<i>Trianthema triquetra</i> var. <i>triqu</i>	
	<i>Zaleya galericulata</i> ssp. <i>austr</i>	
Alismataceae	<i>Damasonium minus</i>	
Amaranthaceae	<i>Alternanthera denticulata</i>	
	<i>Alternanthera nana</i>	
	<i>Alternanthera pungens</i>	
	<i>Amaranthus macrocarpus</i>	
	<i>Ptilotus semilanatus</i>	
Apiaceae	<i>Ammi visnaga</i>	
	<i>Daucus glochidiatus</i>	
Apocynaceae	<i>Alstonia constricta</i>	
Asclepiadaceae	<i>Marsdenia australis</i>	
Asteraceae	<i>Aster subulatus</i>	
	<i>Brachycome basaltica</i>	
	<i>Brachycome debilis</i>	
	<i>Brachycome heterodonta</i>	
	<i>Brachycome leptocarpa</i>	
	<i>Brachycome lineariloba</i>	
	<i>Brachycome whitei</i>	
	<i>Bracteantha bracteata</i>	
	<i>Calotis hispidula</i>	
	<i>Calotis scabiosifolia</i> var. <i>sca</i>	
	<i>Calotis scapigera</i>	
	<i>Carthamus lanatus</i>	
	<i>Centaurea melitensis</i>	
	<i>Centipeda minima</i>	
	<i>Chrysocoryne pusilla</i>	
	<i>Cirsium vulgare</i>	
	<i>Conyza albida</i>	
	<i>Conyza bonariensis</i>	
	<i>Cotula australis</i>	
	<i>Cotula coronopifolia</i>	
	<i>Eclipta platyglossa</i>	
	<i>Glossogyne tannensis</i>	
	<i>Hypochaeris glabra</i>	
	<i>Hypochaeris radicata</i>	
	<i>Isoetopsis graminifolia</i>	
	<i>Lactuca saligna</i>	
	<i>Lactuca serriola</i>	
	<i>Leontodon taraxacoides</i>	
	<i>Minuria cunninghamii</i>	
	<i>Minuria denticulata</i>	
	<i>Minuria integerrima</i>	
<i>Minuria leptophylla</i>		
<i>Onopordum acanthium</i>		
<i>Picris hieracioides</i>		
<i>Senecio cunninghamii</i>		
<i>Senecio lautus</i> ssp. <i>dissectifo</i>		
<i>Senecio quadridentatus</i>		
<i>Senecio runcinifolius</i>		
<i>Silybum marianum</i>		

	<i>Sonchus oleraceus</i>	
	<i>Verbesina encelioides</i>	
	<i>Vittadinia cuneata</i>	
	<i>Vittadinia pterochaeta</i>	
	<i>Xanthium occidentale</i>	
	<i>Xanthium orientale</i>	
	<i>Xanthium spinosum</i>	
Azollaceae	<i>Azolla filiculoides</i> var. <i>rubra</i>	
	<i>Azolla pinnata</i>	
Bignoniaceae	<i>Pandorea pandorana</i>	
Boraginaceae	<i>Cynoglossum australe</i>	
	<i>Echium plantagineum</i>	
	<i>Heliotropium supinum</i>	
	<i>Plagiobothrys plurisepalus</i>	
Brassicaceae	<i>Brassica tournefortii</i>	
	<i>Capsella bursa-pastoris</i>	
	<i>Capsella bursa-pastoris</i>	
	<i>Lepidium fasciculatum</i>	
	<i>Lepidium hyssopifolia</i>	Endangered (TSC Act 1995)
	<i>Rapistrum rugosum</i>	
	<i>Rorippa eustylis</i>	
	<i>Rorippa palustris</i>	
	<i>Sisymbrium irio</i>	
Campanulaceae	<i>Pratia concolor</i>	
	<i>Wahlenbergia communis</i>	
Capparaceae	<i>Apophyllum anomalum</i>	
	<i>Capparis lasiantha</i>	
	<i>Capparis mitchellii</i>	
Caryophyllaceae	<i>Scleranthus biflorus</i>	
	<i>Scleranthus pungens</i>	
	<i>Spergularia rubra</i>	
	<i>Stellaria angustifolia</i>	
	<i>Stellaria media</i>	
	<i>Vaccaria pyramidata</i>	
Casuarinaceae	<i>Allocasuarina luehmannii</i>	
	<i>Casuarina cristata</i>	
Chenopodiaceae	<i>Atriplex conduplicata</i>	
	<i>Atriplex eardleyae</i>	
	<i>Atriplex leptocarpa</i>	
	<i>Atriplex lindleyi</i>	
	<i>Atriplex nummularia</i>	
	<i>Atriplex pseudocampanulata</i>	
	<i>Atriplex semibaccata</i>	
	<i>Atriplex suberecta</i>	
Chenopodiaceae	<i>Atriplex vesicaria</i>	
	<i>Babbagia acroptera</i>	
	<i>Chenopodium melanocarpum</i>	
	<i>Chenopodium murale</i>	
	<i>Chenopodium pumilio</i>	
	<i>Einadia nutans</i>	
	<i>Enchylaena tomentosa</i>	
	<i>Maireana aphylla</i>	
	<i>Maireana brevifolia</i>	
	<i>Maireana ciliata</i>	
	<i>Maireana coronata</i>	

Maireana decalvans
Maireana enchylaenoides
Maireana pentagona
Malacocera tricornis
Osteocarpum acropterum var. *de*
Rhagodia gaudichaudiana
Rhagodia spinescens
Salsola kali
Scleroblitum atriplicinum
Sclerolaena anisacanthoides
Sclerolaena bicornis
Sclerolaena birchii
Sclerolaena brachyptera
Sclerolaena calcarata
Sclerolaena limbata
Sclerolaena muricata
Sclerolaena stelligera
Sclerolaena tricuspis
 Convolvulaceae *Convolvulus erubescens*
Dichondra repens
Evolvulus alsinoides var. *decu*
 Cucurbitaceae *Citrullus colocynthis*
Cucumis myriocarpus
 Cupressaceae *Callitris glaucophylla*
 Cuscutaceae *Cuscuta tatei*
 Cyperaceae *Carex inversa*
Cyperus bifax
Cyperus concinnus
Cyperus dactylotes
Cyperus difformis
Cyperus exaltatus
Cyperus involucratus
Cyperus pygmaeus
Cyperus victoriensis
Eleocharis pallens
Eleocharis plana
Eleocharis pusilla
Eleocharis sphacelata
Schoenoplectus validus
 Euphorbiaceae *Chamaesyce drummondii*
Euphorbia planiticola
Phyllanthus virgatus
 Fabaceae *Aeschynomene indica*
Glycine clandestina
Indigofera australis
Medicago laciniata
Medicago minima
Medicago polymorpha
Melilotus indica
Psoralea cinerea
Psoralea tenax
Rhynchosia minima
Sesbania cannabina
Swainsona swainsonioides
 Geraniaceae *Erodium crinitum*
Erodium malacoides

Goodeniaceae	<i>Goodenia cycloptera</i> <i>Goodenia fascicularis</i> <i>Goodenia glauca</i> <i>Goodenia hederacea</i> <i>Goodenia lunata</i> <i>Velleia paradoxa</i>
Haloragaceae	<i>Haloragis aspera</i> <i>Haloragis glauca</i> <i>Haloragis heterophylla</i> <i>Myriophyllum propinquum</i>
Isoetaceae	<i>Isoetes muelleri</i>
Juncaceae	<i>Juncus amabilis</i> <i>Juncus aridicola</i> <i>Juncus radula</i> <i>Juncus subsecundus</i>
Juncaginaceae	<i>Triglochin procera</i>
Lamiaceae	<i>Lamium amplexicaule</i> <i>Marrubium vulgare</i> <i>Mentha australis</i> <i>Salvia verbenaca</i> <i>Stachys arvensis</i> <i>Teucrium racemosum</i>
Lemnaceae	<i>Lemna minor</i>
Liliaceae	<i>Crinum flaccidum</i> <i>Hypoxis hookeri</i>
Loranthaceae	<i>Amyema gaudichaudii</i> <i>Amyema lucasii</i> <i>Amyema miquelii</i> <i>Amyema miraculosum ssp. boorma</i> <i>Amyema quandang var. quandang</i> <i>Lysiana subfalcata</i>
Lythraceae	<i>Lythrum hyssopifolia</i>
Malvaceae	<i>Abutilon fraseri</i>
Malvaceae	<i>Abutilon malvifolium</i> <i>Abutilon otocarpum</i> <i>Abutilon theophrasti</i> <i>Hibiscus trionum</i> <i>Malva parviflora</i> <i>Malva sylvestris</i> <i>Malvastrum americanum</i> <i>Sida corrugata</i> <i>Sida cunninghamii</i> <i>Sida fibulifera</i> <i>Sida rhombifolia</i> <i>Sida trichopoda</i>
Marsileaceae	<i>Marsilea angustifolia</i> <i>Marsilea drummondii</i>
Menyanthaceae	<i>Nymphoides crenata</i>
Mimosaceae	<i>Acacia excelsa</i> <i>Acacia oswaldii</i> <i>Acacia paradoxa</i> <i>Acacia pendula</i> <i>Acacia salicina</i> <i>Acacia stenophylla</i> <i>Neptunia gracilis</i>

Molluginaceae	<i>Glinus lotoides</i>
Myoporaceae	<i>Eremophila debilis</i>
	<i>Eremophila deserti</i>
	<i>Eremophila longifolia</i>
	<i>Eremophila mitchellii</i>
	<i>Myoporum montanum</i>
	<i>Myoporum platycarpum</i>
Myrtaceae	<i>Eucalyptus camaldulensis</i>
	<i>Eucalyptus chloroclada</i>
	<i>Eucalyptus coolabah</i>
	<i>Eucalyptus largiflorens</i>
	<i>Eucalyptus populnea</i>
Nyctaginaceae	<i>Boerhavia dominii</i>
Oleaceae	<i>Jasminum lineare</i>
Onagraceae	<i>Epilobium hirtigerum</i>
	<i>Ludwigia peploides</i>
	<i>Ludwigia peploides ssp. montev</i>
	<i>Oenothera indecora ssp. bonari</i>
Oxalidaceae	<i>Oxalis corniculata</i>
	<i>Oxalis perennans</i>
Phormiaceae	<i>Dianella revoluta</i>
Plantaginaceae	<i>Plantago cunninghamii</i>
	<i>Plantago turrifera</i>
Poaceae	<i>Agrostis avenacea</i>
	<i>Aristida muricata</i>
	<i>Astrebla pectinata</i>
	<i>Avena fatua</i>
	<i>Chloris divaricata</i>
Poaceae	<i>Chloris truncata</i>
	<i>Cynodon dactylon</i>
	<i>Cynodon incompletus</i>
	<i>Dactyloctenium radulans</i>
	<i>Danthonia caespitosa</i>
	<i>Diplachne fusca</i>
	<i>Echinochloa colona</i>
	<i>Enneapogon nigricans</i>
	<i>Eragrostis cilianensis</i>
	<i>Eragrostis elongata</i>
	<i>Eragrostis falcata</i>
	<i>Eragrostis kennedyae</i>
	<i>Eragrostis lacunaria</i>
	<i>Eragrostis parviflora</i>
	<i>Eragrostis pilosa</i>
	<i>Eragrostis setifolia</i>
	<i>Eriochloa crebra</i>
	<i>Hordeum leporinum</i>
	<i>Leptochloa digitata</i>
	<i>Panicum decompositum</i>
	<i>Panicum effusum</i>
	<i>Panicum laevinode</i>
	<i>Panicum miliaceum</i>
	<i>Paspalidium constrictum</i>
	<i>Paspalidium gracile</i>
	<i>Paspalidium jubiflorum</i>
	<i>Paspalum dilatatum</i>
	<i>Paspalum distichum</i>

	<i>Phragmites australis</i>
	<i>Poa annua</i>
	<i>Sporobolus caroli</i>
	<i>Sporobolus contiguus</i>
	<i>Sporobolus mitchellii</i>
	<i>Stipa scabra</i>
	<i>Themeda avenacea</i>
	<i>Tragus australianus</i>
	<i>Tripogon loliiformis</i>
Polygonaceae	<i>Muehlenbeckia florulenta</i>
	<i>Muehlenbeckia horrida</i>
	<i>Persicaria orientalis</i>
	<i>Persicaria prostrata</i>
	<i>Polygonum aviculare</i>
	<i>Polygonum decipiens</i>
	<i>Rumex bidens</i>
	<i>Rumex brownii</i>
	<i>Rumex crystallinus</i>
Portulacaceae	<i>Anacampseros australiana</i>
	<i>Portulaca oleracea</i>
Primulaceae	<i>Anagallis arvensis</i>
Ranunculaceae	<i>Ranunculus pumilio</i>
Ranunculaceae	<i>Ranunculus sceleratus</i>
	<i>Ranunculus undosus</i>
Rhamnaceae	<i>Ventilago viminalis</i>
Rubiaceae	<i>Canthium oleifolium</i>
Rutaceae	<i>Flindersia maculosa</i>
	<i>Geijera parviflora</i>
Sapindaceae	<i>Alectryon oleifolius</i>
	<i>Atalaya hemiglauca</i>
	<i>Dodonaea viscosa</i>
Scrophulariaceae	<i>Mimulus gracilis</i>
	<i>Verbascum virgatum</i>
Sinopteridaceae	<i>Cheilanthes austrotenuifolia</i>
Solanaceae	<i>Lycium ferocissimum</i>
	<i>Nicotiana glauca</i>
	<i>Nicotiana simulans</i>
	<i>Nicotiana velutina</i>
	<i>Physalis ixocarpa</i>
	<i>Solanum esuriale</i>
	<i>Solanum nigrum</i>
Sterculiaceae	<i>Brachychiton populneus</i>
Thymelaeaceae	<i>Pimelea microcephala</i>
Typhaceae	<i>Typha domingensis</i>
Urticaceae	<i>Parietaria debilis</i>
	<i>Urtica urens</i>
Verbenaceae	<i>Phyla nodiflora</i>
	<i>Verbena bonariensis</i>
	<i>Verbena officinalis</i>
Zygophyllaceae	<i>Tribulus terrestris</i>
	<i>Zygophyllum glaucum</i>

Indet sp. a

Indet sp. b

Indet sp. c

Indet sp. s

Appendix 2: Animal species recorded within the Macquarie Marshes Ramsar site

Species name	Common name	Conservation status
<u>Amphibians</u>		
<i>Crinia parinsignifera</i>	Plains Froglet	
<i>Crinia signifera</i>	Common Eastern Froglet	
<i>Limnodynastes fletcheri</i>	Long-thumbbed Frog	
<i>Limnodynastes salmini</i>	Salmon-striped Frog	
<i>Limnodynastes tasmaniensis</i>	Spotted Grass Frog	
<i>Neobatrachus sudelli</i>	Common Spadefoot Toad	
<i>Notaden bennettii</i>	Crucifix Frog	
<i>Uperoleia rugosa</i>		
<i>Cyclorana platycephala</i>	Water-holding Frog	
<i>Litoria alboguttata</i>	Striped Burrowing Frog	
<i>Litoria caerulea</i>	Green Tree Frog	
<i>Litoria latopalmata</i>		
<i>Litoria peronii</i>	Peron's Tree Frog	
<i>Litoria rubella</i>	Desert Tree Frog	
<u>Mammals</u>		
<i>Trichosurus vulpecula</i>	Common Brushtail Possum	
<i>Macropus giganteus</i>	Eastern Grey Kangaroo	
<i>Macropus rufus</i>	Red Kangaroo	
<i>Wallabia bicolor</i>	Swamp Wallaby	
<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheath-tail-bat	Vulnerable (<i>TSC Act 1995</i>)
<i>Mormopterus planiceps</i>	Little Mastiff-bat	
<i>Nyctinomus australis</i>	White-striped Mastiff-bat	
<i>Chalinolobus gouldii</i>	Gould's Wattled Bat	
<i>Nyctophilus geoffroyi</i>	Lesser Long-eared Bat	
<i>Nyctophilus gouldi</i>	Gould's Long-eared Bat	
<i>Scotorepens greyii</i>	Little Broad-nosed Bat	
<i>Vespadelus vulturinus</i>	Little Forest Eptesicus	
<i>Hydromys chrysogaster</i>	Water Rat	
<i>Mus musculus</i>	House Mouse	
<i>Rattus rattus</i>	Black Rat	
<i>Lepus capensis</i>	Brown Hare	
<i>Vulpes vulpes</i>	Fox	
<i>Bos taurus</i>	Cattle (feral)	
<i>Sus scrofa</i>	Pig (feral)	
<u>Reptiles</u>		
<i>Chelodina expansa</i>	Broad-shelled River Turtle	
<i>Chelodina longicollis</i>	Eastern Long-necked Tortoise	
<i>Emydura macquarii</i>	Murray Turtle	
<i>Diplodactylus intermedius</i>	Eastern Spiny-tailed Gecko	
<i>Diplodactylus tessellatus</i>	Tesselated Gecko	
<i>Gehyra dubia</i>		
<i>Gehyra variegata</i>	Tree Dtella	
<i>Heteronotia binoei</i>	Bynoe's Gecko	
<i>Oedura marmorata</i>	Marbled Velvet Gecko	
<i>Delma inornata</i>	Olive Legless Lizard	
<i>Lialis burtonis</i>	Burton's Legless Lizard	
<i>Pygopus nigriceps</i>	Hooded Scaly-foot	
<i>Amphibolurus muricatus</i>	Jacky Lizard	
<i>Amphibolurus nobbi</i>	Nobbi	
<i>Lophognathus gilberti</i>	Gilbert's Dragon	
<i>Pogona barbata</i>	Bearded Dragon	

<i>Tympanocryptis tetraporophora</i>	
<i>Varanus gouldii</i>	Gould's Goanna
<i>Varanus tristis</i>	
<i>Varanus varius</i>	Lace Monitor
<i>Cryptoblepharus carnabyi</i>	Carnaby's Wall Skink
<i>Ctenotus allotropis</i>	
<i>Ctenotus ingrami</i>	
<i>Ctenotus robustus</i>	Striped Skink
<i>Ctenotus strauchii</i>	
<i>Egernia striolata</i>	Tree Skink
<i>Eulamprus quoyii</i>	Eastern Water Skink
<i>Lerista muelleri</i>	
<i>Lerista punctatovittata</i>	
<i>Menetia greyii</i>	Grey's Skink
<i>Morethia boulengeri</i>	Boulenger's Skink
<i>Tiliqua scincoides</i>	Eastern Blue-tongued Lizard
<i>Trachydosaurus rugosus</i>	Shingleback
<i>Ramphotyphlops bituberculatus</i>	
<i>Morelia spilota</i>	Carpet or Diamond Python
<i>Denisonia devisi</i>	De Vis' Banded Snake
<i>Furnia diadema</i>	Red-naped Snake
<i>Hemiaspis damelii</i>	Grey Snake
<i>Pseudechis australis</i>	Mulga Snake
<i>Pseudechis gattatus</i>	Spotted Black Snake
<i>Pseudechis porphyriacus</i>	Red-bellied Black Snake
<i>Pseudonaja textilis</i>	Eastern Brown Snake
<i>Simoselaps australis</i>	Coral Snake
<i>Suta spectabilis</i>	
<i>Suta suta</i>	Curl Snake
<i>Vermicella annulata</i>	Bandy Bandy

Birds

<i>Dromaius novaehollandiae</i>	Emu	
<i>Coturnix pectoralis</i>	Stubble Quail	
<i>Turnix pyrrhothorax</i>	Red-chested Button-quail	
<i>Turnix velox</i>	Little Button-quail	
<i>Pelecanus conspicillatus</i>	Australian Pelican	
<i>Anhinga melanogaster</i>	Darter	
<i>Phalacrocorax carbo</i>	Great Cormorant	
<i>Phalacrocorax melanoleucos</i>	Little Pied Cormorant	
<i>Phalacrocorax sulcirostris</i>	Little Black Cormorant	
<i>Phalacrocorax varius</i>	Pied Cormorant	
<i>Podiceps cristatus</i>	Great Crested Grebe	
<i>Poliocephalus poliocephalus</i>	Hoary-headed Grebe	
<i>Tachybaptus novaehollandiae</i>	Australasian Grebe	
<i>Anseranas semipalmata</i>	Magpie Goose	Vulnerable (<i>TSC Act 1995</i>)
<i>Nettapus pulchellus</i>	Green Pigmy Goose	
<i>Nettapus coromandelianus</i>	Cotton Pigmy Goose	Endangered (<i>TSC Act 1995</i>)
<i>Cygnus atratus</i>	Black Swan	
<i>Anas castanea</i>	Chestnut Teal	
<i>Anas gracilis</i>	Grey Teal	
<i>Anas rhynchotis</i>	Australian Shoveler	
<i>Anas superciliosa</i>	Pacific Black Duck	
<i>Aythya australis</i>	Hardhead	
<i>Biziura lobata</i>	Musk Duck	
<i>Chenonetta jubata</i>	Australian Wood Duck	
<i>Dendrocygna eytoni</i>	Plumed Whistling-Duck	

<i>Dendrocygna arcuata</i>	Wandering Whistling Duck	
<i>Malacorhynchus membranaceus</i>	Pink-eared Duck	
<i>Oxyura australis</i>	Blue-billed Duck	Vulnerable (<i>TSC Act 1995</i>)
<i>Stictonetta naevosa</i>	Freckled Duck	Vulnerable (<i>TSC Act 1995</i>)
<i>Tadorna tadornoides</i>	Australian Shelduck	
<i>Fulica atra</i>	Eurasian Coot	
<i>Gallinula tenebrosa</i>	Dusky Moorhen	
<i>Gallinula ventralis</i>	Black-tailed Native-hen	
<i>Gallirallus philippensis</i>	Buff-banded Rail	
<i>Porphyrio porphyrio</i>	Purple Swamphen	
<i>Porzana fluminea</i>	Australian Spotted Crake	
<i>Porzana pusilla</i>	Baillon's Crake	
<i>Porzana tabuensis</i>	Spotless Crake	
<i>Rallus pectoralis</i>	Lewin's Rail	
<i>Ardea alba</i>	Great Egret	
<i>Ardea ibis</i>	Cattle Egret	
<i>Ardea intermedia</i>	Intermediate Egret	
<i>Ardea pacifica</i>	Pacific Heron	
<i>Botaurus poiciloptilus</i>	Australasian Bittern	Vulnerable (<i>TSC Act 1995</i>)
<i>Ardea garzetta</i>	Little Egret	
<i>Egretta novaehollandiae</i>	White-faced Heron	
<i>Ixobrychus minutus</i>	Little Bittern	
<i>Nycticorax caledonicus</i>	Nankeen Night Heron	
<i>Platalea flavipes</i>	Yellow-billed Spoonbill	
<i>Platalea regia</i>	Royal Spoonbill	
<i>Plegadis falcinellus</i>	Glossy Ibis	
<i>Threskiornis molucca</i>	Australian White Ibis	
<i>Threskiornis spinicollis</i>	Straw-necked Ibis	
<i>Ephippiorhynchus asiaticus</i>	Black-necked Stork	Endangered (<i>TSC Act 1995</i>)
<i>Grus rubicundus</i>	Brolga	Vulnerable (<i>TSC Act 1995</i>)
<i>Ardeotis australis</i>	Australian Bustard	Endangered (<i>TSC Act 1995</i>)
<i>Actitis hypoleucos</i>	Common Sandpiper	
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	
<i>Calidris ferruginea</i>	Curlew Sandpiper	
<i>Calidris ruficollis</i>	Red-necked Stint	
<i>Gallinago hardwickii</i>	Latham's Snipe	
<i>Limosa lapponica</i>	Bar-tailed Godwit	
<i>Limosa limosa</i>	Black-tailed Godwit	Vulnerable (<i>TSC Act 1995</i>)
<i>Tringa glareola</i>	Wood Sandpiper	
<i>Tringa nebularia</i>	Common Greenshank	
<i>Tringa stagnatilis</i>	Marsh Sandpiper	
<i>Rostratula benghalensis</i>	Painted Snipe	Vulnerable (<i>TSC Act 1995</i>)
<i>Himantopus himantopus</i>	Black-winged Stilt	
<i>Recurvirostra novaehollandiae</i>	Red-necked Avocet	
<i>Charadrius ruficapillus</i>	Red-capped Plover	
<i>Elsayornis melanops</i>	Black-fronted Dotterel	
<i>Erythrogonys cinctus</i>	Red-kneed Dotterel	
<i>Vanellus tricolor</i>	Banded Lapwing	
<i>Stiltia isabella</i>	Australian Pratincole	
<i>Chlidonias hybridus</i>	Whiskered Tern	
<i>Larus novaehollandiae</i>	Silver Gull	
<i>Sterna caspia</i>	Caspian Tern	
<i>Sterna nilotica</i>	Gull-billed Tern	
<i>Accipiter cirrhocephalus</i>	Collared Sparrowhawk	
<i>Accipiter fasciatus</i>	Brown Goshawk	
<i>Aquila audax</i>	Wedge-tailed Eagle	
<i>Circus approximans</i>	Swamp Harrier	

<i>Circus assimilis</i>	Spotted Harrier	
<i>Elanus axillaris</i>	Black-shouldered Kite	
<i>Elanus scriptus</i>	Letter-winged Kite	
<i>Haliaeetus leucogaster</i>	White-bellied Sea-eagle	
<i>Haliastur sphenurus</i>	Whistling Kite	
<i>Hieraaetus morphnoides</i>	Little Eagle	
<i>Lophoictinia isura</i>	Square-tailed Kite	Vulnerable (<i>TSC Act 1995</i>)
<i>Milvus migrans</i>	Black Kite	
<i>Pandion haliaetus</i>	Osprey	Vulnerable (<i>TSC Act 1995</i>)
<i>Falco berigora</i>	Brown Falcon	
<i>Falco cenchroides</i>	Nankeen Kestrel	
<i>Falco longipennis</i>	Australian Hobby	
<i>Falco peregrinus</i>	Peregrine Falcon	
<i>Falco subniger</i>	Black Falcon	
<i>Columba livia</i>	Rock Dove	
<i>Geopelia cuneata</i>	Diamond Dove	
<i>Geopelia humeralis</i>	Bar-shouldered Dove	
<i>Geopelia striata</i>	Peaceful Dove	
<i>Ocyphaps lophotes</i>	Crested Pigeon	
<i>Phaps chalcoptera</i>	Common Bronzewing	
<i>Cacatua leadbeateri</i>	Major Mitchell's Cockatoo	Vulnerable (<i>TSC Act 1995</i>)
<i>Cacatua galerita</i>	Sulphur-crested Cockatoo	
<i>Cacatua roseicapilla</i>	Galah	
<i>Calyptorhynchus lathami</i>	Glossy Black-Cockatoo	Vulnerable (<i>TSC Act 1995</i>)
<i>Nymphicus hollandicus</i>	Cockatiel	
<i>Platycercus adscitus</i>	Pale-headed Rosella	
<i>Aprosmictus erythropterus</i>	Red-winged Parrot	
<i>Barnardius zonarius barnardi</i>	Mallee Ringneck	
<i>Melopsittacus undulatus</i>	Budgerigar	
<i>Neophema pulchella</i>	Turquoise Parrot	Vulnerable (<i>TSC Act 1995</i>)
<i>Neophema chrysostoma</i>	Blue-winged Parrot	
<i>Northiella haematogaster</i>	Blue Bonnet	
<i>Psephotus haematonotus</i>	Red-rumped Parrot	
<i>Psephotus varius</i>	Mulga Parrot	
<i>Cacomantis flabelliformis</i>	Fan-tailed Cuckoo	
<i>Chrysococcyx basalis</i>	Horsfield's Bronze-Cuckoo	
<i>Chrysococcyx lucidus</i>	Shining Bronze-Cuckoo	
<i>Cuculus pallidus</i>	Pallid Cuckoo	
<i>Ninox novaeseelandiae</i>	Southern Boobook	
<i>Tyto alba</i>	Barn Owl	
<i>Podargus strigoides</i>	Tawny Frogmouth	
<i>Aegotheles cristatus</i>	Australian Owlet-nightjar	
<i>Apus pacificus</i>	Fork-tailed Swift	
<i>Hirundapus caudacutus</i>	White-throated Needletail	
<i>Dacelo novaeguineae</i>	Laughing Kookaburra	
<i>Todiramphus pyrrhopygia</i>	Red-backed Kingfisher	
<i>Todiramphus sanctus</i>	Sacred Kingfisher	
<i>Merops ornatus</i>	Rainbow Bee-eater	
<i>Climacteris picumnus</i>	Brown Treecreeper	
<i>Malurus cyaneus</i>	Superb Fairy-wren	
<i>Malurus lamberti</i>	Variegated Fairy-wren	
<i>Malurus leucopterus</i>	White-winged Fairy-wren	
<i>Pardalotus punctatus</i>	Spotted Pardalote	
<i>Pardalotus striatus</i>	Striated Pardalote	
<i>Smicronis brevirostris</i>	Weebill	
<i>Gerygone fusca</i>	Western Gerygone	
<i>Acanthiza apicalis</i>	Inland Thornbill	

<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill
<i>Acanthiza nana</i>	Yellow Thornbill
<i>Acanthiza reguloides</i>	Buff-rumped Thornbill
<i>Acanthiza uropygialis</i>	Chestnut-rumped Thornbill
<i>Aphelocephala leucopsis</i>	Southern Whiteface
<i>Acanthagenys rufogularis</i>	Spiny-cheeked Honey-eater
<i>Certhionyx niger</i>	Black Honeyeater
<i>Entomyzon cyanotis</i>	Blue-faced Honeyeater
<i>Lichenostomus penicillatus</i>	White-plumed Honeyeater
<i>Lichenostomus virescens</i>	Singing Honeyeater
<i>Manorina flavigula</i>	Yellow-throated Miner
<i>Manorina melanocephala</i>	Noisy Miner
<i>Melithreptus gularis</i>	Black-chinned Honeyeater
<i>Philemon citreogularis</i>	Little Friarbird
<i>Plectorhyncha lanceolata</i>	Striped Honeyeater
<i>Epthianura albifrons</i>	White-fronted Chat
<i>Epthianura aurifrons</i>	Orange Chat
<i>Epthianura tricolor</i>	Crimson Chat
<i>Pomatostomus ruficeps</i>	Chestnut-crowned Babbler
<i>Pomatostomus superciliosus</i>	White-browed Babbler
<i>Pomatostomus temporalis</i>	Grey-crowned Babbler
<i>Eopsaltria australis</i>	Eastern Yellow Robin
<i>Melanodryas cucullata</i>	Hooded Robin
<i>Petroica goodenovii</i>	Red-capped Robin
<i>Microeca fascinans</i>	Jacky Winter
<i>Falcunculus frontatus</i>	Crested Shrike-tit
<i>Oreoica gutturalis</i>	Crested Bellbird
<i>Colluricincla harmonica</i>	Grey Shrike-thrush
<i>Pachycephala pectoralis</i>	Golden Whistler
<i>Pachycephala rufiventris</i>	Rufous Whistler
<i>Rhipidura fuliginosa</i>	Grey Fantail
<i>Rhipidura leucophrys</i>	Willie Wagtail
<i>Myiagra inquieta</i>	Restless Flycatcher
<i>Grallina cyanoleuca</i>	Magpie-lark
<i>Oriolus sagittatus</i>	Olive-backed Oriole
<i>Chlamydera maculata</i>	Spotted Bowerbird
<i>Coracina maxima</i>	Ground Cuckoo-shrike
<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike
<i>Coracina papuensis</i>	White-bellied Cuckoo-shrike
<i>Lalage sueurii</i>	White-winged Triller
<i>Artamus cinereus</i>	Black-faced Woodswallow
<i>Artamus cyanopterus</i>	Dusky Woodswallow
<i>Artamus leucorhynchus</i>	White-breasted Woodswallow
<i>Artamus personatus</i>	Masked Woodswallow
<i>Artamus superciliosus</i>	White-browed Woodswallow
<i>Cracticus nigrogularis</i>	Pied Butcherbird
<i>Cracticus torquatus</i>	Grey Butcherbird
<i>Gymnorhina tibicen</i>	Australian Magpie
<i>Corvus bennetti</i>	Little Crow
<i>Corvus coronoides</i>	Australian Raven
<i>Corvus mellori</i>	Little Raven
<i>Corcorax melanorhamphos</i>	White-winged Chough
<i>Struthidea cinerea</i>	Apostlebird
<i>Hirundo ariel</i>	Fairy Martin
<i>Hirundo neoxena</i>	Welcome Swallow
<i>Hirundo nigricans</i>	Tree Martin
<i>Anthus novaeseelandiae</i>	Richard's Pipit

<i>Mirafra javanica</i>	Singing Bushlark
<i>Acrocephalus stentoreus</i>	Clamorous Reed-Warbler
<i>Cincloramphus cruralis</i>	Brown Songlark
<i>Cincloramphus mathewsi</i>	Rufous Songlark
<i>Cisticola exilis</i>	Golden-headed Cisticola
<i>Megalurus gramineus</i>	Little Grassbird
<i>Megalurus timoriensis</i>	Tawny Grassbird
<i>Passer domesticus</i>	House Sparrow
<i>Neochmia modesta</i>	Plum-headed Finch
<i>Stagonopleura guttata</i>	Diamond Firetail
<i>Taeniopygia bichenovii</i>	Double-barred Finch
<i>Taeniopygia guttata</i>	Zebra Finch
<i>Dicaeum hirundinaceum</i>	Mistletoebird
<i>Zosterops lateralis</i>	Silveryeye
<i>Sturnus vulgaris</i>	Common Starling