Australian Government | MURRAY–DARLING BASIN AUTHORITY

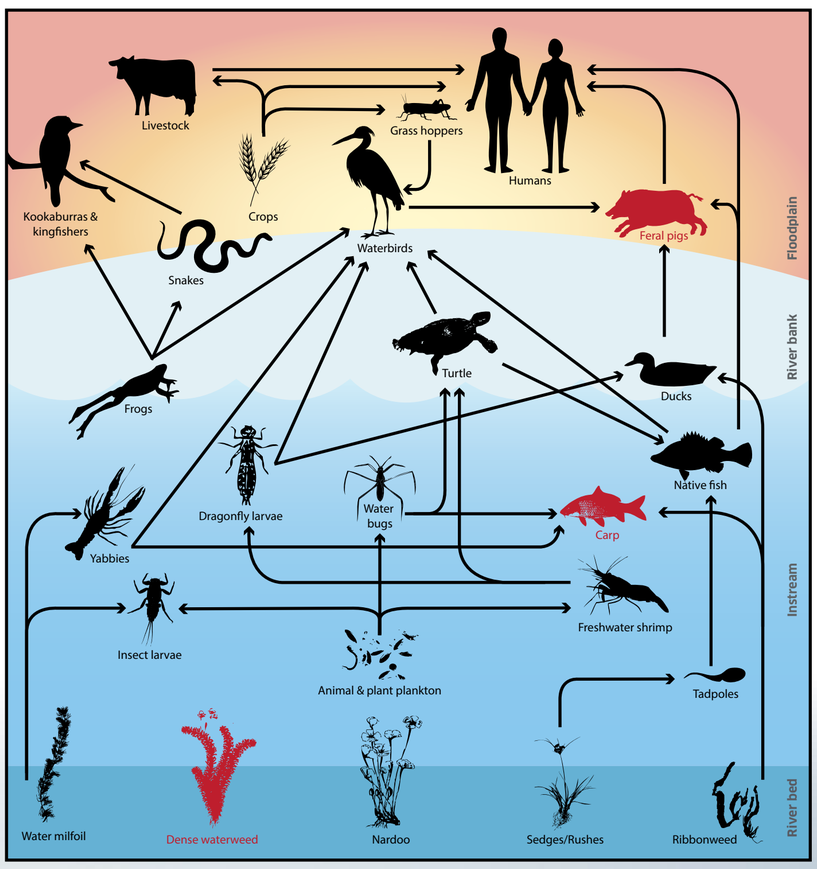
# WETLANDS OF THE Murray–Darling BASIN

**Little Rushy Swamp**

Located in Barmah National Park, part of the Barmah-Millewa Forest on the Victoria-New South Wales border. *Photo: Keith Ward.*

**Murray cod (Goodoo) *Maccullochella peelii***

Endangered. Australias largest freshwater fish; it has been recorded up to 1.8 m and 113.5 kg.




**Food web**

Above is a simplified diagram of a wetland food web. Arrows point from prey to predator. Problematic, non-native species are coloured red.

**Peron's tree frog *Litoria peronii***

Sometimes known as the maniacal cackle frog because of its call. It has destinctive cross-shaped pupils.

**Inundated grasslands, southern Macquarie Marshes**

The vast, open landscape of the Macquarie Marshes, NSW, transforms into stunning wetlands during wet conditions. *Photo: New South Wales OEH*

**Wetlands are essential for many types of native plants and animals, and for humans. They keep the natural environment healthy, and benefit our social, cultural and economic lives. Many wetlands use both surface water – found in rivers, lakes and streams – and water from below ground. Some wetlands depend on this groundwater to survive. Wetlands can be permanent, semi-permanent or seasonal, and their size and structure can change over time.**

## Importance

Wetlands act as sponges, storing water, recycling nutrients, trapping sediment and filtering water. Wetlands also increase the health of nearby aquatic and terrestrial ecosystems.

## Cultural values

Aboriginal people view water as being connected to the land, and also view themselves as an integral part of the land and river systems. Because of this, Aboriginal people feel a strong responsibility for the health of rivers and wetlands.

## Economic values

Wetlands support communities, agriculture and the economy by keeping water clean and surrounding ecosystems healthy. They provide areas for leisure and recreation for local residents and tourists.

## Environmental values

Wetlands provide essential habitats for many different organisms including waterbirds, fish, invertebrates, and plants. They are habitats for many unique species found only in wetlands and provide refuges, food and shelter for animals in surrounding areas.

Native plants and animals have adapted to the natural flooding and drying cycle, which is needed for a healthy wetland.

## Challenges and threats

**Changed river flows:** The regulation of river flows through structures such as dams has changed natural flow patterns and has significantly reduced the amount of water that flows into wetlands.

**Invasive species:** Introduced fish species including common carp *Cyprinus carpio*, goldfish *Carassius auratus* and eastern gambusia *Gambusia holbrooki* ('mosquito fish') compete with, and prey on, native fish.

Introduced animals such as feral pigs, feral cats and foxes are also threats to native animals.

Introduced plants can have major impacts on the natural functions of wetlands, such as *Salvinia molesta* which can spread rapidly and smother large areas of wetland.

**Erosion and sedimentation:** Erosion is a natural process however it can be increased by changing river flows, loss of riverbank vegetation, unrestricted stock access and the impacts of carp.

In channels that are deepened and widened by erosion, larger flows are needed to spill water out of the channel and onto the floodplain.

**Land management:** Proper management of livestock grazing reduces negative impacts, such as erosion of river banks.

**Water quality:** Water quality can be affected by run-off of chemicals and nutrients from upstream sources, and saline groundwater entering through the river bed.

**Climate change:** The impacts of climate change are uncertain. Unnatural climate changes can change water availability and timing of river flows, which will affect wetlands and those who use them.

## Management

Managing wetlands can range from small scale management by local landholders to collaborative government management under international responsibilities.

The Murray–Darling Basin Authority (MDBA) works closely with state governments, local councils, catchment management groups and natural resource managers to look after the Basin's water resources.

## Environmental watering

The natural flow patterns of many rivers in the Murray–Darling Basin have been changed to provide water for towns, farms and industries. This means that water-dependent plants and animals are less likely to survive shocks such as droughts.

Adding water to wetlands and surrounding areas can help restore their health and the important functions they perform such as preventing salinity and protecting water quality. Water that is put aside to be delivered to these important areas is called environmental water.

For more information on environmental watering, visit www.mdba.gov.au/what-we-do/environmental-water

**Eastern spiny tailed gecko**
***Diplodactylus williamsi***

**Banrock Station**

Situated in South Australia's Riverland, Banrock Station supports a commercial winery set amongst a restored local wetland which educates visitors on the importance of wetland care.

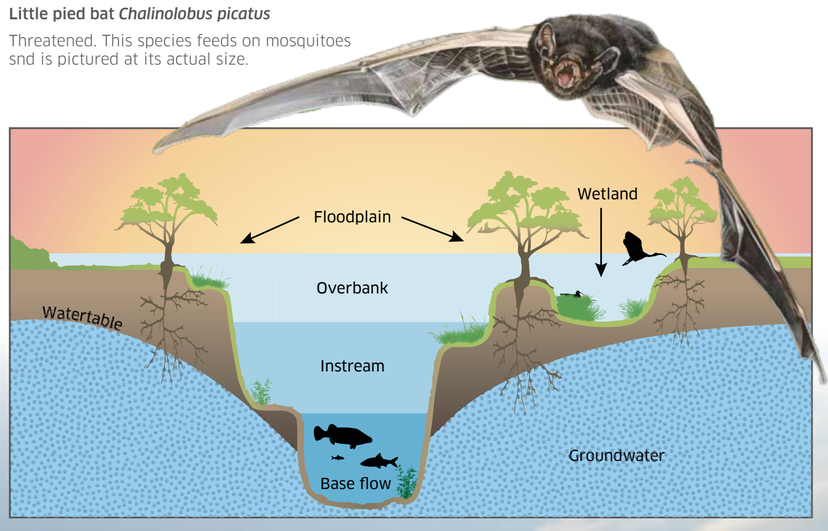
## 5 THINGS YOU CAN DO FOR WETLAND HEALTH

1. **Save water:** Fresh water is limited and precious. Using less water means that more is available to keep rivers healthy.
2. **Keep rivers and creeks clean:** Prevent litter and chemicals getting into our rivers so that plants, animals and downstream areas stay healthy.
3. **Control pests:** Do your bit to control introduced animals and invasive weeds to prevent the damage from spreading.
4. **Volunteer:** There are many ways you can improve river health and restore local habitats.
5. **Experience:** Learn more about wetlands to help everyone understand their importance and the challenges facing these unique areas.

Visit www.environment.nsw.gov.au/wetlands/RiversAndWetlands.htm to get involved.

**Little pied bat *Chalinolobus picatus***

Threatened. This species feeds on mosquitoes snd is pictured at its actual size.




**Wetland cross section**

The cross section above shows the different levels of river flows in a wetland. The wetland parts shown above will vary in shape and size depending on local conditions.

The Murray–Darling Basin has over 30,000 wetlands.

Scarred trees and canoe trees are sometimes found around wetland areas. They are glimpses into the lives of Aboriginal Australians, who remove the bark to mark significant sites and create canoes and shelters.

**Nardoo *Marsilea drummondi*** Common in shallow lagoons and damp ground. Aboriginal people prepared the fruits for food.

**Intermediate egret chicks**
In the 2010 floods, more than 50,000 pairs of intermediate egrets and 70,000 pairs of straw-necked ibis nested in colonies within the Marshes. *Photo: Debbie Love, NSW OEH.*

# THE macquariemarshes WETLAND SYSTEM

## Macquarie Marshes at a glance

**Name:** Macquarie Marshes

**State:** NSW

**Size:** 20,000–200,000 ha

**Catchment:** Macquarie

**Route to the sea:**
Macquarie Catchment→ Barwon River→ Darling River→ Murray River→ Southern Ocean

**Closest towns:**
Quambone, Carinda, Walgett, Warren, Nyngan, Coonamble

**Local Government Area:** Warren, Coonamble, Walgett

**Nearest capital city:**
Sydney, NSW, >8 hours ~650 km

## Macquarie Marshes

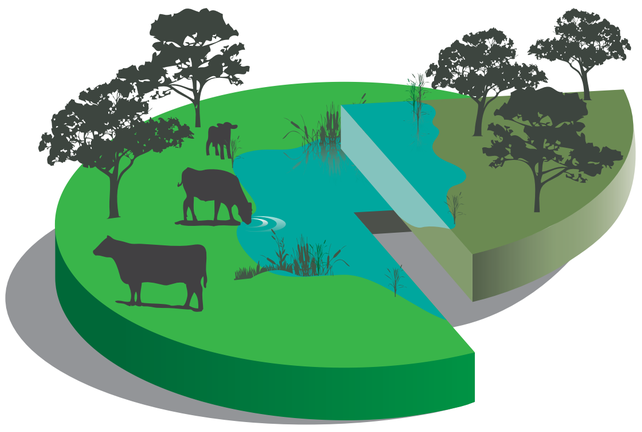
Known as "the Marshes", this large, semi-permanent wetland filters the water of the Macquarie River in central northern New South Wales. The Macquarie Marshes Nature Reserve and State Conservation Area cover 21,927 hectares, with the area of marsh expanding up to 200,000 hectares. The Marshes contain a range of wetland types from water couch grasslands, reedbeds and river red gum forest, to less frequently filled wetlands of coolabah and black box woodland.

## Aboriginal cultural values

The Marshes are the core of the traditional country of the Wailwan people. Aboriginal people have lived in the Macquarie Marshes area for tens of thousands of years. The area is rich in natural food sources including a plentiful supply of fish, waterbirds and kangaroos.

Aboriginal cultural values are related to both the long history of interactions with the Marshes and the interests and aspirations of today's communities who have custodial relationships with the area.

Aboriginal people have maintained their connection to the land and waters.



Nearly 90% of the wetland is privately owned.
The remaining 10% is managed for conservation in areas such as national parks.

## Socio-economic values

Over 80 percent of the Marshes is privately owned and supports agricultural production including grazing, with some areas of dryland and irrigated farming. Cattle grazing occurs mainly in wetter areas with surrounding drier land also supporting sheep grazing. Ecotourism and kangaroo harvesting also contribute to the local community.

## European heritage values

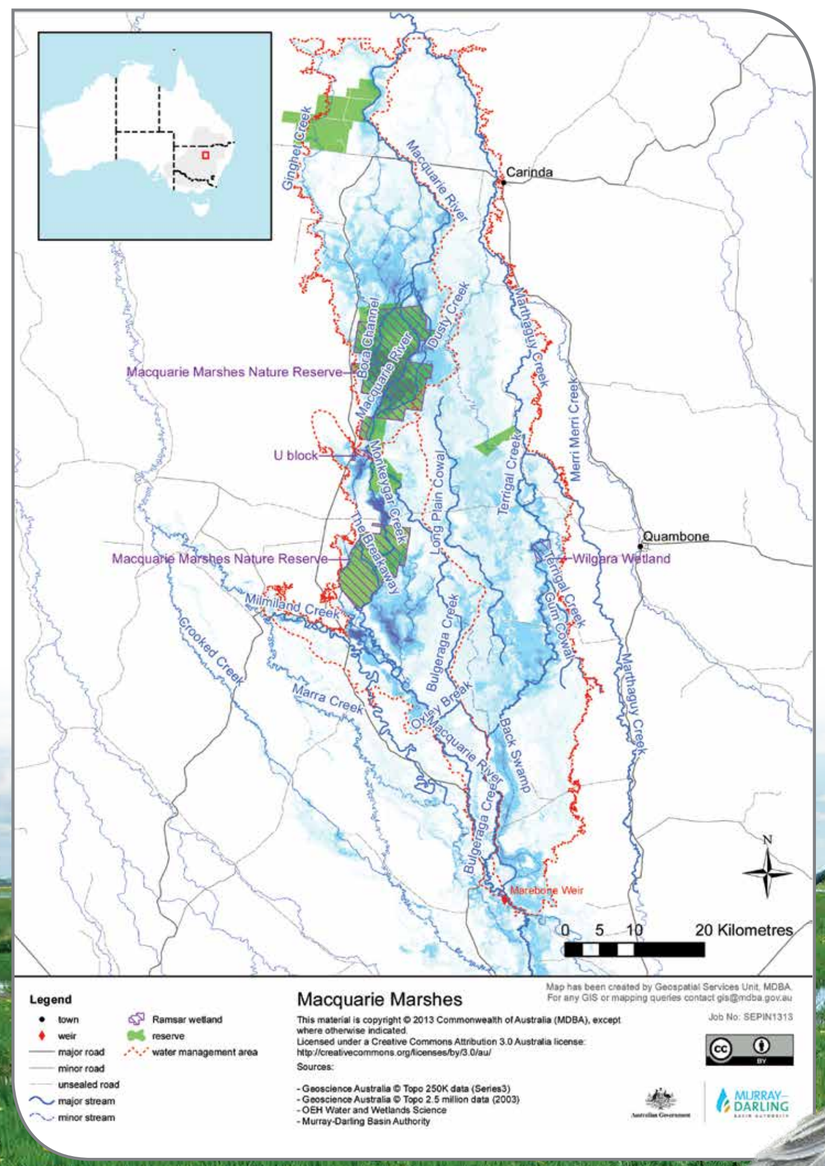
John Oxley led an expedition to the Marshes in 1817 and again in 1818, and is believed to be the first non-Aboriginal person to visit the area. George Gibson was the first European to settle in the Marshes on the 'Willamgambone' run around 1844. There are some examples of historical structures at Willie Retreat.

## Environmental values

The Marshes contain havens of native vegetation, from wetland grasses and reeds to large river red gums, *Eucalyptus camaldulensis*.

In 1986 the Macquarie Marshes Nature Reserve was listed under the Ramsar Convention as a 'Wetland of International Importance' for its significance as a floodplain wetland in a semi-arid landscape. Further areas of private land were added in 2000 (Wilgara Wetland) and 2012 ('U-block').

The Australian and NSW governments maintain the ecological characteristics for which the Marshes are listed. Visit www.environment.nsw.gov.au/wetlands/MacquarieMarshesRamsar.htm for more information.




**Map of the Macquarie Marshes**
Location and frequently inundated areas of the Macquarie Marshes. The darker blue shading shows areas that are more frequently inundated with water.

## Challenges and threats:

The effects of human settlement and development, combined with natural cycles such as drought, make it a complex task to maintain and restore the important features of the Marshes.

**Altered river flows:** The construction of Burrendong Dam (1960s) and Windamere Dam (1980s) has allowed humans to control river flows. River water is shared between urban areas, irrigated agriculture, mining, industries, rural stock use, households and the environment.

This has changed the timing and rate of river flows entering the Marshes, reducing the health of the system and its ability to resist shocks like the "millennium" drought from 1995–2009.

**Plant and animal pests:** The invasion of exotic species, such as noogoora burr *Xanthium occidentale,* Bathurst burr *Xanthium spinosum* and lippia *Phyla nodiflora var. nodiflora* can impact wetland areas that have dried under changed flows or drought conditions. During droughts, other species also become problematic in dry wetlands – such as black roly poly *Sclerolaena muricata* and buckbush *Salsola kali*.

Common carp, *Cyprinus carpio,* threaten native fish and frogs by eating water plants and frog eggs. A *Carp Reduction Strategy* was written for the Marshes in 2010, and two carp separation cages (traps) have been installed to reduce their numbers in the area.

**Erosion and sedimentation:** Channel erosion can cause high sediment loads to enter the river and lead to a build up of sediment in parts of the Marshes, changing the structure of the wetland.

Erosion can increase the size of river channels, which reduces the amount of water that can flood out to the surrounding wetland.

**Land management:** The Marshes support a mixture of grazing, conservation, and small areas of cropping. Responsible land use is important to minimise impacts on the Marshes.

**Climate change:** Scientific predictions suggest less surface water will be available in future and there will be a change from evenly-distributed rainfall to more summer-dominant rainfall in the catchment.
Visit www.seaci.org for more information.

***Cyclorana* species**
Burrowing frogs are common in the Marshes

## Management

Co-operation and partnerships are vital to increasing the health of the Marshes for wildlife and local communities.

Extra water delivered for plants and animals is managed by the NSW government, with water provided from the Water Sharing Plan and water licences purchased by the NSW and Australian governments. Use of environmental water is advised by the Environmental Flows Reference Group, a formal group of landholders, non-government organisations (industry, environmental) and government agencies.

Visit www.environment.nsw.gov.au/environmentalwater/envwatermacquarie.htm for more information on the management of the Macquarie Marshes.

**Monitoring:** A range of scientific techniques are used to manage the Marshes including:

- remote sensing wetland inundation
- monitoring wetland vegetation
- monitoring waterbirds
- collecting flow data
- university and government research

Several threatened bird species breed in the Marshes including magpie geese, brolgas, freckled ducks, Australian painted snipes and Australasian bitterns. Cormorants, ducks, grebes, spoonbills and herons also breed in large numbers during larger river flows into the Marshes.

**Macquarie Marshes**
Water couch meadows at Willancorah, Macquarie Marshes, 2010. *Photo: Tracy Fulford.*

**Brolga *Grus rubicundus***
The graceful brolga is one of only two crane species in Australia

| Water birds | Woodland birds | Kangaroos & wallabies | Turtles | Lizards | Snakes | Rats & small marsupials | Frogs | Possums & gliders | Fish | Aquatic macroinvertebrates | Echidna | Plants* | Bats |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 77 | 156 | 5 | 3 | 40 | 19 | 9 | 15 | 3 | 12 | 112 | 1 | 216 | 19 |

The tiles above represent the diverse numbers of native species found in the Macquarie Marshes area.

*Plant number does not include species of fungi

**Nardoo *Marsilea drummondi*** Common in shallow lagoons and damp ground.