# Lachlan Environmental Water Management Plan Summary

# Overview

This document outlines the Lachlan Environmental Water Management Plan by providing:

- The purpose of environmental water ;
- Nationally and regionally important wetlands of the Lachlan River and their watering needs;
- How wetlands are selected for environmental watering;
- The role of the Lachlan Riverine Working Group in delivering this plan;
- What types of environmental water currently exist in the Lachlan; and,
- How the success of the Plan will be measured.

## The purpose of environmental water

Environmental water is used to achieve a number of purposes including:

- Protecting creeks, rivers and wetlands during dry periods;
- Restoring more natural flow patterns and distribution for rivers and wetlands;
- Reducing the impact of in-stream barriers, particularly for fish;
- Improving the health of ecosystems associated with rivers, floodplains and wetlands;
- Improving water quality; and,
- Providing better habitats for native flora and fauna that rely on rivers and wetlands.

Environmental watering also increases the capacity of river systems to withstand or recover from impacts such as drought by:

- Improving the connection between wetlands, floodplains and rivers;
- Restoring plant and animal communities and the way different species interact;
- Enabling plants and animals to breed an replenish local populations;
- Improving carbon and nutrient cycling in riverine systems;
- Recharging groundwater systems;
- Supporting habitat diversity; and,
- Protecting drought refuges.

*Burrawang West Wetlands*

# Important Wetlands of the Lachlan

One of the objectives of the Lachlan Environmental Water Management Plan (LEWMP) is to set priorities for environmental watering. To do this a number of wetlands have been selected as priority areas for environmental water. These wetlands include those recognised at national and regional levels as containing important ecological, cultural or social values. The wetlands selected as priorities for the delivery of environmental water include eight wetlands that have been recognised in the Directory of Important Wetlands in Australia as crucial waterbird habitats or good examples of wetland types associated with lowland rivers.

These wetlands are:

**The Great Cumbung Swamp, Lake Cowal and Wilbertroy Wetlands, Lake Brewster (Ballyrogan), Booligal Wetlands, Lake Merrimajeel/Murrumbidgil Swamp, Cuba Dam, Merrowie Creek - Cuba Dam to Chillichil Swamp, Lachlan Swamp**

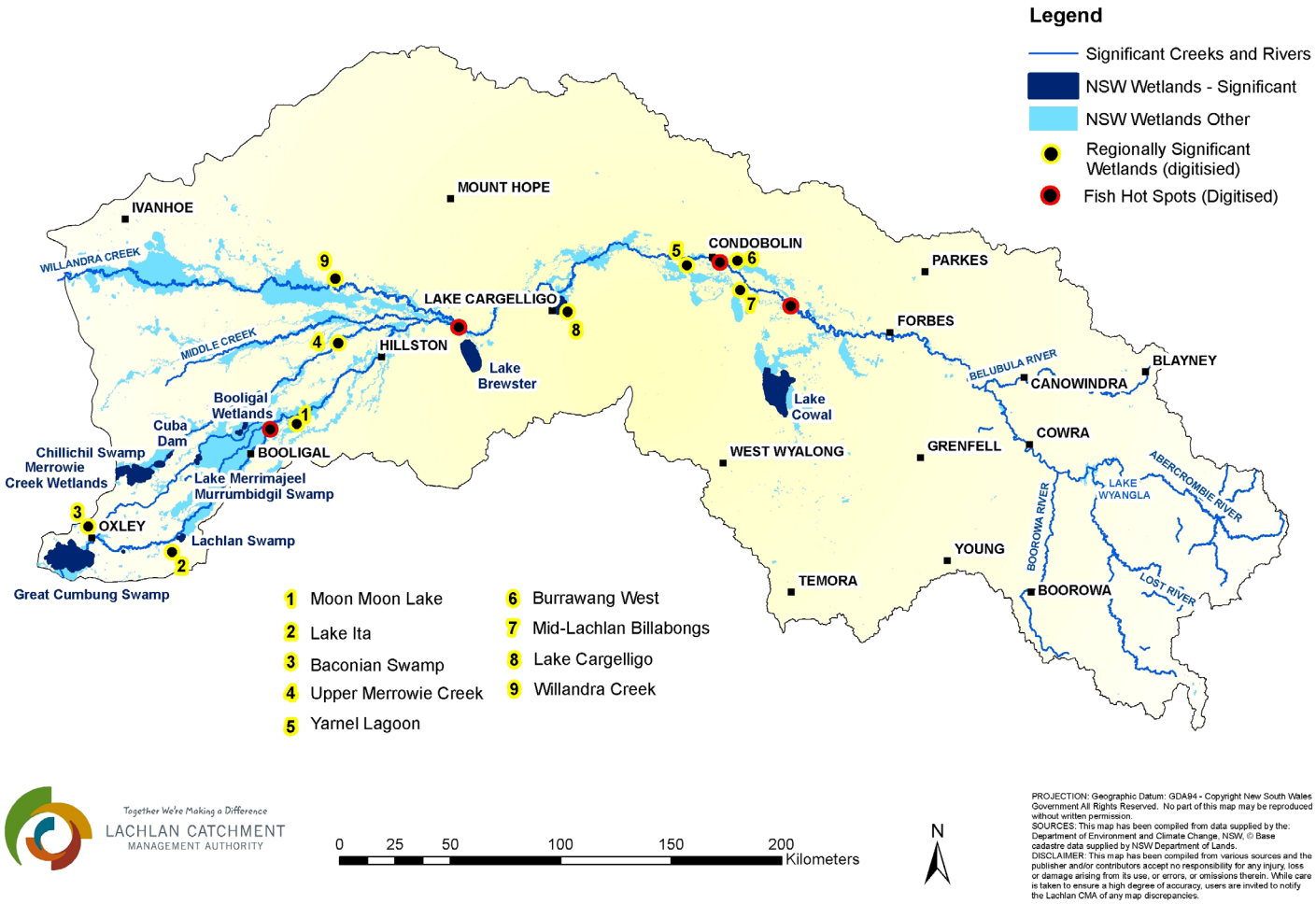
Nine regionally significant wetlands in the Lachlan have also been included as representative areas contributing to the Lachlan landscape.

These regionally significant wetlands are:

**Lake Cargelligo, Lake Ita, Burrawang West Lagoon, Willandra Creek, Moon Moon Swamp, Yarnel Lagoon, Baconian Swamp, Upper Merrowie Creek, Mid Lachlan Floodplains and Billabongs**

In-stream habitat is also considered important as drought refuge and fish habitat. These fish “hotspots” indicated below.

# Wetlands and Fish Hot Spots

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# Why are these wetlands significant?

The riverine assets and values of the Lachlan Catchment are defined for the purposes of this Plan as the ecological components, processes and sites of significance known to contribute to the essential character of the Lachlan Catchment. They have been identified from a number of sources and studies focused on the ecological, cultural and social systems of the Lachlan.

The riverine ecological assets identified for the Lachlan Catchment include:

- Riparian zones
- Waterbirds and waterbird habitat
- Native fish and native fish habitat
- Frogs and frog habitat
- Woodland birds
- Semi-permanent wetland vegetation
  - River red gum forest and woodland
  - Common reed grassland
  - Water couch grassland
  - Lignum shrubland
  - Black box woodlands
  - River cooba, coolibah woodlands, myall woodlands
  - Gilgai depressions
  - Mudflats
  - Chain of ponds – swampy meadows
- The endangered aquatic ecological community

The values and benefits of the features which have the greatest influence on determining water requirements are described below.

**Riparian** areas include the bed and banks of rivers and tributaries, as well as wetlands. Riparian areas play an important role in ecological functions such as filtering sediments and pollutants, slowing run-off and providing wildlife habitat. They are the last line of defence for aquatic ecosystems from terrestrial inputs. Some of the functions that healthy riparian zones provide include supporting a diversity of aquatic habitats through root structures or snags; stabilising banks; filtering sediment and nutrients; providing food for terrestrial and aquatic animals; and historical, cultural and spiritual significance. In the mid-Lachlan, riparian vegetation is dominated by yellow box, river red gums and river oak, while the lower Lachlan is dominated by river red gums. Riparian vegetation relies on frequent, watering to remain healthy.

**Waterbirds** are a valued component of the Lachlan Catchment, making up a large proportion of the native faunal biomass in lower Catchment. Large-scale waterbird breeding events (>40 000 nests) in the lower Lachlan indicate that the whole ecological system is functioning. Waterbirds tend to have preferred locations and vegetation for shelter and nest sites. Most waterbird breeding sites are located in semi-permanent wetland vegetation, requiring regular and prolonged flooding. There is a broad knowledge with regard to the flow size, timing and duration required for different sized breeding events, food requirements and what happens to both adult and young birds after breeding.

*Nesting at Lake Brewster*

Of the waterbirds that breed in the Lachlan, colonial nesting species are prominent, and have been the most studied. Some species that have been recorded breeding in the Lachlan are included under International Agreements, including the great egret, intermediate egret, little egret, Nankeen night heron, Pacific heron, glossy ibis, black swan, Australian pelican, Australian white ibis, straw-necked ibis, little pied cormorant and little black cormorant.

**Native fish** habitats have been impacted by river regulation by reducing the flow conditions upon which many native fish depend. The changed flow patterns and degraded riparian zones have increased bank erosion and sedimentation within channels, filling pools and smothering habitats, including macrophytes, woody debris and gravel substrates. Constant mid to low flows reduce ecosystem productivity by removing the boom (wet) and bust (dry) cues that trigger and sustain aquatic cycles. Other threats include increased pollutants, competition with introduced species and structures in the river restricting movement. Some structures threaten fish directly, as research suggests that larval and juvenile fish are extracted from the river by pumping. Weirs with an undershot design are also known to cause high mortality in larval and juvenile fish.

As fish cannot disperse to other catchments, like waterbirds, or become dormant, like plants or frogs, as habitats dry out, they are dependant on permanent water remaining in river and creek channels to a much greater extent than other species. A number of important fish habitats have been identified in the Lachlan including the Lachlan River around Warroo Bridge, the Lachlan River and Goobang Creek near Condobolin, the Lachlan River and Mountain Creek near Brewster Weir and the Lachlan River between Gonowlia and Booligal Weirs.

**Semi-permanent wetland vegetation** provide essential habitats for invertebrates, plants, fish and birds. Wetlands also increase the productivity of associated aquatic and terrestrial ecosystems, provided connectivity with these systems is maintained. The benefits of healthy wetlands include:

- Flood mitigation by spreading flood peaks, storing floodwaters and releasing them gradually;
- Drought refuge for wildlife and grazing for stock;
- Groundwater replenishment;
- Improving water quality by absorbing, recycling and releasing nutrients and trapping sediment;
- Providing breeding sites for native fish, birds, plants and invertebrates;
- Recreation and tourism; and,
- Enhanced scenic and aesthetic values.

Semi-permanent wetland vegetation types in the mid to lower Lachlan require regular, frequent and prolonged flooding. Some have specific legislative protection, and some plants, such as river red gum, river cooba, cumbungi and nardoo have iconic Aboriginal cultural values. Wetland types which exist throughout the Lachlan are listed below.

**River red gum forest and woodland** is widespread in Australia and occurs most commonly in narrow bands fringing watercourses. In the Lachlan it forms extensive floodplain forests and woodlands and is a distinctive and important part of their character. The community is listed as vulnerable with approximately 50% of its pre-European extent remaining in western NSW. It provides waterbird nesting sites and habitat for many animals including woodland birds.

*Cumbung Swamp*

**Common reed grassland** ('reedbeds') are a distinctive part of the character of the Great Cumbung Swamp, as it provides habitats for fish, birds and invertebrates and is also a major drought refuge. Common reed tolerates a range of flood frequencies from permanent inundation to infrequent flooding. If large stands are lost they can be difficult to restore and this may be a critical factor for the Cumbung . Common reed is habitat for many waterbirds, providing nest platforms for large breeding colonies of Ibis.

**Lignum shrubland** occurs throughout the mid to lower Lachlan as either an understorey plant or the dominant plant species. Lignum provides valuable waterbird breeding habitat especially for ibis and is listed as a vulnerable community in NSW. Surface soil drying between flood cycles is important to maintain healthy lignum.

*Lignum in the Ootha region*

**Black box woodlands** are considered to be a vulnerable plant community in NSW. There has been decline in its distribution due mostly to clearing for agriculture. Black box woodland is found on flat to slightly undulating landscapes on alluvial soils in within rainfall ranges of between 250 to 450mm a year. In most areas black box woodland is bordered by red gum or grassland ecosystems.

**The Lower Lachlan Endangered Aquatic Ecological Community** - The entire aquatic ecological community of the lower Lachlan is listed as an endangered ecological community in NSW under the provisions of the NSW Fisheries Management Act 1994. Historically, this area has supported a diverse aquatic community comprising at least 19 native fish species, 10 crustacean species, 8 mollusc species, 2 sponge species and many insects. River regulation, land management practices (e.g. riparian clearing) and species introductions, however, have resulted in substantial modifications to aquatic habitats in the lower Lachlan and the abundance and distribution of many aquatic species have exhibited considerable reductions. In particular, 4 native fish species and 1 snail are listed in the schedules of the NSW Threatened Species Conservation Act 1995 as either endangered, vulnerable or with endangered populations in the western region.

# Selection for Environmental Watering

## How wetlands are selected for environmental watering

Annual watering plans are developed each year to outline priorities for each water year based on likely available environmental water and environmental needs on a catchment-wide basis. To accommodate changes in available water that may occur during the year, a number of scenarios are developed. These include different water regimes which may occur under drought, average or wet conditions.

Each scenario evaluates how the nationally, regionally significant wetlands and other important wetland habitats may be included in the annual watering plan under these various climatic conditions. Decisions on which wetlands might receive licenced environmental water, and when they may receive it, is based on:

- Time since last watering;
- Environmental assets supported by the wetland and their watering requirements;
- Volumes available for watering, i.e. Is there sufficient water available to achieve the environmental objectives;
- Efficiency of delivery, i.e. Whether the water can reach the target and/or whether other operational flows are also being delivered to the same target;
- Degree of environmental need, i.e. Bird breeding completion or averting fish kills may take precedence over other environmental needs; and,
- Land management practices undertaken within the wetland area.

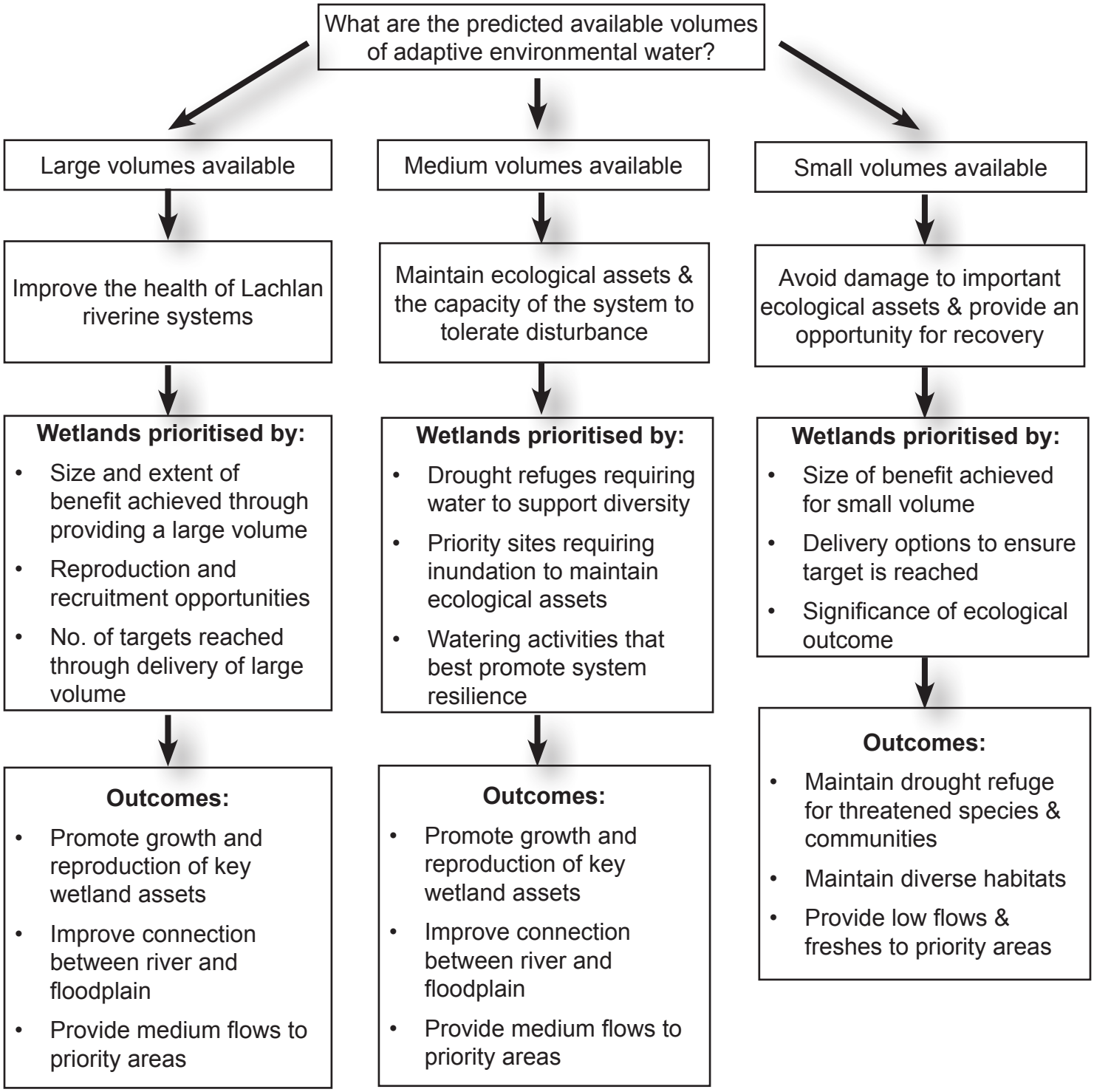
An assessment considering all of these criteria is not only undertaken as part of the Annual Watering Plan but also as part of the longer term catchment strategy for investment in better environmental outcomes.

Environmental watering objectives and water requirements of the ecological components found in many lower Lachlan wetlands are outlined in the table below. The decision-making process which prioritises wetlands by assessing how the delivery of licenced environmental water may meet objectives under different climate scenarios is illustrated in the accompanying flow chart.

## Environmental watering objectives and water requirements for major ecological components of Lachlan wetlands

| Watering Objectives | Timing | Inundation duration | Preferred flooding frequency |
|---|---|---|---|
| Maintain and restore red gum forest | June - November | 4-7 months | Every 1 to 3 years |
| Maintain and restore black box woodland | June - November | 2-4 months | Every 3 to 5 years |
| Maintain and restore lignum | Less - seasonal | 3-8 months | Every 2 to 8 years |
| Maintain and restore the reed bed | Less - seasonal | 3-10 months | Every 1 to 4 years |
| Provide flows to support moderate-large colonial waterbird breeding events | June - November | 4-6 months | Every 3 to 4 years |
| Maintain and restore open water lagoons | June - November | 4-12 months | Every 1 to 3 years |
| Maintain drought refuges for fish and waterbird habitat | Less - seasonal | Permanent | |

**Prioritisation framework for the annual delivery of licenced environmental water under different climate scenarios**



# Lachlan Riverine Working Group

The Lachlan Riverine Working Group (LRWG) was formed to coordinate the appropriate distribution of Environmental Flows, both planned and licenced, based on achieving desired outcomes and appropriate water management. The role of the LRWG includes:

- Identifying issues relating to the allocation, accounting and management of environmental water ;
- Providing input to water delivery strategies that will integrate the management of environmental flows and river operations;
- Reviewing river operations and policies in relation to management of the environmental water allowances;
- Providing advice on other matters relevant to the sustainable management of high value wetlands and other water-dependent ecosystems; and,
- Communicating with the public and stakeholder groups through the media or other means on issues relating to environmental flows.

The membership of the Lachlan Riverine Working Group includes the Lachlan Catchment Management Authority, which provides administrative support and inter-agency liaison, NSW Department of Environment, Climate Change and Water, the NSW Office of Water, Infrastructure and Industry (Fisheries), State Water Corporation, Aboriginal, conservation and community representatives. To remain independent, the Commonwealth Environmental Water Holder has an observation role within the Lachlan Riverine Working Group.

## Types of Environmental Water

The Water Sharing Plan provides a number of environmental water allowances including translucent flows which are triggered under certain conditions. It also provides water for environmental contingencies such as completing bird breeding events and a water quality allowance in case of high salinity or blue-green algal concentrations in the river downstream of the storages.

The Commonwealth Environmental Water Holder currently holds approximately 390ML HS and 82,000ML GS in the Lachlan Valley. The 2009-10 criteria for the use of Commonwealth environmental water consider the ecological significance of the asset such as the presence of threatened species and ecological communities, listed migratory species and recognition by international agreements.

The NSW Department of Environment, Climate Change and Water currently holds approximately 25,000ML GS through Riverbank. Riverbank, developed under the existing NSW Environmental Trust, is part of the National Water Initiative.

A number of Lachlan wetlands have been targeted by RiverBank. The criteria for selection include:

- Having a recognisable conservation value (e.g. Directory of Important Wetlands in Australia, supporting an endangered ecological community or regional significance);
- Having an ecological character influenced by relatively small volumes, similar to the volumes that RiverBank may be able to supply, possibly with other flows;
- Being in a condition that will respond to achievable flows;
- Providing opportunities to build on other land and water management initiatives to enhance associated environmental outcomes.

## Measuring Environmental Watering Success

To measure the success of the LEWMP, it is necessary to monitor and evaluate ecological responses to its implementation. This informs managers how well the Plan is achieving targets and provides a tool to determine if the Plan needs to change. There is also a requirement to inform State and Commonwealth agencies and also the Basin Plan, of how the Lachlan is meeting its environmental watering objectives and targets.

This can be achieved through strong links and effective communication between researchers, managers, policy makers and the community. A research/monitoring/evaluation/reporting plan will be developed as part of the implementation program and ensure that all monitoring and reporting requirements are met.

The timing, frequency and volume of environmental water delivery must be monitored and documented to determine if it is meeting its intended purpose and reaches its targets. The monitoring program also needs to measure the effectiveness of management against the Plan objectives. This could include:

- Changes in the extent of semi-permanent wetland vegetation;
- The proportions of healthy and stressed semi-permanent wetland vegetation;
- Fish spawning and recruitment of native fish populations; and,
- The diversity and density of waterbirds and aquatic invertebrates

The LRWG will document and assess how well the Annual Watering Plan delivers outcomes. This assessment would guide the next Annual Watering Plan and the LEWMP over time. The findings of the assessment would also be made available on the LEWMP web site.

Larger- scale, longer term studies would also be undertaken to provide perspective of how the Lachlan system is responding to environmental water.