



Government of  
South Australia

## 2008-2009 River Murray Environmental Watering Program Report





Australian Government



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47 wetlands benefited from an environmental watering program in 2008-09 targeted at restoring and protecting the health of key refuge sites for plants and animals.





## Executive Summary

Forty seven wetlands along the River Murray in South Australia were watered between 2008 and 2009 to maintain their ecological values during the drought. This report presents a summary of the wetlands watered and the outcomes of environmental watering.

The following sources of environmental water were used. The Living Murray – River Murray Increased Flow Account (RMIF), Commonwealth Environmental Water Holder (CEWH), Healthy Rivers Australia, Nature Foundation SA and private donations. Some water saved through wetland disconnection was also reallocated

to key sites. The River Murray Environmental Manager (RMEM) unit oversaw the allocation, delivery and management of these environmental watering projects.

Monitoring of wetland was undertaken by local community groups , the South Australian Murray-Darling Basin Natural Resources Management Board, Department for Environment and Heritage, Department of Water, Land and Biodiversity Conservation and the South Australian Research and Development Institute (SARDI).





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1. Introduction

The Murray-Darling Basin is suffering from the prolonged drought. Flows into South Australia have dramatically declined over the last four years and there has been limited water available for the environment. 47 wetlands benefited from an environmental watering program in 2008-09 targeted at restoring and protecting the health of key refuge sites for plants and animals.

1.1 Why water wetlands?

Australia is experiencing the worst drought since records began in the 1880s. Along the River Murray majestic River red gum trees are dying and many wetlands are drying out. Wetlands can benefit from drying out for short periods of time and have ways of coping with no water, but this drought is exceptional. Some wetlands may not recover from the drought even when water does return. This will affect the biodiversity of the River Murray and its wetlands, threatening the survival of waterbirds, native fish, plants and other life we associate with the River.

The River Murray in SA also supports cities, towns and communities. Water is diverted to irrigate crops and for stock, domestic and other industry uses. This places added pressure on an already stressed river system.

Management of the River is a balancing act. How to meet the needs of the towns, communities and people all dependent on

the River Murray and make sure enough water is available to have a healthy working River? With the long term drought it has become more and more difficult to get the balance right.

To try and ease the stress caused by low River flows during this drought, a number of wetlands along the River Murray received environmental water. Environmental water is water used specifically to maintain the health of river, wetland and estuarine ecosystems. When flows in the River Murray increase and floods return, those ecosystems that have received water are more likely to respond. By watering, drought refuges are created for plant and animal communities including a number of threatened species.

Environmental water prioritisation was based on the following principles (proposed actions had to meet at least one):

- Sustain small, critical refuge areas for native plants and animals
- Maintain critical connectivity between sites
- Protect previous investments in environmental watering

The following criteria were also applied in identifying priorities:

- Criticality (consequence of not acting)
- Environmental benefit (in terms of stated objectives for each site)
- Opportunity (capacity to take advantage of other events)

1.2 What has been done?

Along the River Murray in South Australia, 47 wetlands were watered from July 2008 to June 2009. The South Australian Murray-Darling Basin Natural Resources Management Board (SA MDB NRM Board) coordinated the watering and monitoring program in partnership with landowners, the Commonwealth Government through the Commonwealth Environmental Water Holder, The Living Murray program and the Murray-Darling Basin Authority, SA Department for Environment and Heritage (DEH), SA Department of Water, Land and Biodiversity Conservation (DWLBC), South Australian Research and Development Institute (SARDI) and local community groups.

Each wetland watered in 2008 and 2009 was monitored after the watering took place. Fish, birds, frogs and vegetation within and around the wetlands, and groundwater and surface water levels and quality were measured. State and Commonwealth legislation list species as rare, threatened, vulnerable and endangered. A number of these species have benefited from the environmental watering.

SA River Murray Watering Sites 2008/09





1.3 Where has the water come from?

Water for the environment has come from a number of different sources. These sources of water are separately allocated to the environment and do not impact on the allocations to farmers or cities and towns.

WETLAND	VOL. (ML)	SOURCE OF ENVIRONMENTAL WATER							
		The Living Murray	Living Murray River Murray Increased Flow Account (RMIF)	Commonwealth Environmental Water Holder (CEWH)	Healthy Rivers Australia	Nature Foundation	Private Donation	Senior Officials Group sites	Evaporative water savings from closed wetlands
CHOWILLA SITES									
Pilby Lagoon	190	X							X
Pilby Creek and Bunyip Hole	350								
Pipeclay Billabong	160	X							
Aquadam Punkah Creek	50	X							
Coppermine Waterhole	264	X							
Woolshed Creek	218	X							
Chowilla Island Loop	152	X							
Punkah Island Horseshoe	717	X							
Monoman Depression	49	X							
Punkah Creek Floodrunner	31	X							
Punkah Creek Depression	41	X							
Chowilla Oxbow	207	X							
Monoman Creek Depression	62		X						
Slaney Billabong	86			X					
Lock 6 Depression	20			X					
Brandy Bottle Waterhole	90			X					
Chowilla Horseshoe	90			X					
Gum Flat	1500			X					
BETWEEN CHOWILLA & LOCK 1									
Lake Merreti	3180								X
Nelwart Swamp	106							X	
Winding Creek	56								X
Causeway Lagoon	156								X
Ngak Indau	385								X
Carpark Lagoons Katarapko	200			X					

WETLAND	VOL. (ML)	SOURCE OF ENVIRONMENTAL WATER							
		The Living Murray	Living Murray River Murray Increased Flow Account (RMIF)	Commonwealth Environmental Water Holder (CEWH)	Healthy Rivers Australia	Nature Foundation	Private Donation	Senior Officials Group sites	Evaporative water savings from closed wetlands
BETWEEN CHOWILLA & LOCK 1									
Spectacle Lakes	246								X
Yatco Lagoon	3318							X	
Mussel Lagoon Complex	1394								X
Banrock	1861								X
Overland Corner	500			X					
Akuna Station	32 + 8				X		X		
Jaeschke Lagoon	118							X	
Hart Lagoon	140								X
Schillers Lagoon	1560								X
Markaranka	2236			X					
Hogwash Bend	6.8					X			
Morgan Conservation Park	439								X
Brenda Park Lagoon	875								X
Murbko South	1501							X	
Murbpook Lagoon	1400			X					
LOCK 1 TO WELLINGTON SITES									
Paiwalla Wetland	606			X					
Rocky Gully	11			X					
LOWER LAKES SITES									
Boggy Creek	3 + 1		X		X				
Turveys Drain	4		X						



## 2. Chowilla Floodplain

The Murray-Darling Basin is suffering. It's been 13 years since the last major flood on the Chowilla floodplain. Changes in the River Murray flow regime have caused the health of the Chowilla floodplain to decline.

The Chowilla floodplain is the largest area of remaining riverine forest on the lower River Murray in South Australia and is one of six Living Murray Icon Sites. River red gums, Black box woodland, River coobas and Lignum provide habitat for birds, mammals and invertebrates. Wetlands on the floodplain are home to threatened species such as the Southern bell frog, Australasian shoveler, Freckled duck, Musk duck, Intermediate egret and Glossy ibis. With reduced river flows and less frequent inundation of the floodplain, Chowilla's wetlands are suffering. River red gum trees are dying and Black box, River coobah and Lignum show signs of severe stress.

To halt this decline, since 2004, 24 sites on the Chowilla floodplain have been watered. Most sites have been watered two or three times in that period. Monitoring is showing that repeated watering is essential to maintain tree health. Wetland watering also ensures that drought refuges for a range of species are maintained.

Two of the sites watered on the Chowilla floodplain in 2008/09 were Gum Flat and Coppermine Waterhole.



2.1 Gum Flat

Watering overview

**Volume of water**  
1500ML

**Source of water**  
Commonwealth Environmental Water Holder

**Start of watering**  
5 May 2009

**End of watering**  
30 June 2009

**Watering method**  
Pumped

Gum Flat is a large floodplain wetland ringed mostly by Black box trees with River red gums and Lignum. The Black Box trees provide refuge, breeding holes and crevices for birds, lizards and small mammals - different to those found in River red gum forests. There are mature trees with hollows as well as young saplings at this wetland which was last watered in 2006.

Why water Gum Flat?

Gum Flat wetland is under severe drought stress and many mature River red gums have died at the site. Of the remaining trees, more than half are in poor condition with less than 50% of their original crown intact. Of the monitored Black box trees, a quarter have less than 25% of their crown cover intact.

In 2006 the wetland was watered and within two months just over half of the monitored Black box trees responded positively and showed an improvement in health.

The aim of re-watering Gum Flat was to maintain the improvement in tree health achieved by the 2006 watering, support other wetland vegetation and maintain diversity at the site.

Watering the wetland freshens the soil profile and the groundwater, further improving conditions for the trees and other vegetation. Gum Flat has the potential to recover from droughts if water can be applied every few years.

Monitoring outcomes

Monitoring undertaken at the Chowilla sites included amphibians, waterbirds, Lignum and understorey vegetation.

The vegetation response at Chowilla watering sites is being analysed statistically using a standard method developed for The Living Murray program. River red gum, Black box and River cooba have shown a positive response to the watering with River cooba saplings observed at Gum Flat.

The maximum number of species recorded in a single survey was 14 at Gum Flat in July and the maximum number of birds recorded in a single survey was 871 birds. The most commonly recorded bird was the grey teal with 650 recorded in July. One EPBC listed species, the White-bellied sea eagle and one state listed species, the Australian shoveler were recorded.

The nationally threatened Southern Bell Frog was recorded at this site.







BEFORE



AFTER

## 2.2 Coppermine Waterhole

### Watering overview

**Volume of water used**  
264ML

**Source of water**  
The Living Murray

**Start of watering**  
18 November 2008

**End of watering**  
2 December 2008

**Watering method**  
Pumped

Coppermine Waterhole is part of the Coppermine Complex – a large floodplain depression on the Chowilla floodplain. Mature and regenerating River red gums fringe the wetland and Lignum creates a dense understorey. Coppermine Waterhole was previously watered in February 2005 and October 2006.

When Coppermine is flooded it supports aquatic vegetation and frogs and provides refuge for up to 17 species of waterbirds. In 2006 the watering event triggered a large number of Southern bell frogs to breed. This frog is a nationally listed species under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999. Other frogs recorded in 2006 included Perons tree frog, Long thumbed frog and the Eastern sign bearing frog.



### Why water Coppermine Waterhole?

Monitoring at Coppermine Waterhole in 2006 revealed that Lignum at the wetland was in poor condition with approximately 60% of the Lignum plants surveyed having no apparent living stems. River red gums were also showing signs of drought stress. The aim of the third 2008 environmental watering at Coppermine Waterhole was to restore the health of Lignum and River red gums.

### Monitoring outcomes

River red gums at Coppermine Waterhole have responded positively with increased canopy growth and new shoots on woody sections of the trees. The calls of seven frog species were heard: Southern bell frog, Eastern sign bearing frog, Banjo frog, Long thumbed frog, Spotted grass frog, Perons tree frog and Painted burrowing frog. Twenty species of waterbirds were recorded including the Australian shoveler, a threatened species in SA.





### 3. From Chowilla to Lock 1

Between the Chowilla floodplain and Lock 1, 22 wetlands were watered in 2008 and 2009. These included a number of wetlands with existing structures and others where new structures to block water flow were constructed to achieve water savings for critical human needs.

Providing water to these wetlands was crucial to avoid long term degradation. Other wetlands, located above the river pool level that had not been flooded for a significant length of time, also received crucial environmental water.

The diverse range of wetlands below the Chowilla floodplain have an important role as refuge sites for birds, mammals, invertebrates, reptiles and fish. With the lack of flooding flows in the River over many years wetlands have been disconnected from fresh river water input. These wetlands are vital to the survival of a wide range of species.

Watering these wetlands has provided a temporary break from the drought. The wetlands will need ongoing watering to maintain their health and to support their important role as islands of life along a River that is under enormous stress.

Two of the sites in this stretch of the River Murray that received water in 2008/09 were Murbpook Lagoon and Overland Corner.



3.1 Murbpook Lagoon

Watering overview

**Volume of water**  
1400ML

**Source of water**  
Commonwealth Environmental Water Holder

**Start of watering**  
21 June 2009

**End of watering**  
29 June 2009

**Watering method**  
Pumped

Murbpook Lagoon is located on private land between Locks 1 and 2 on the River Murray. It is a relatively shallow wetland with a permanent connection to the River Murray. In 2004, however, the Lagoon was disconnected from the main River channel and the wetland dried out.

When inundated, Murbpook Lagoon is a wetland with large areas of open water, fringing vegetation and open woodland. A baseline survey, undertaken in 2004 as the wetland was drying out, recorded a total of 20 species of waterbirds (610 individuals). Community observations indicate that many more bird species use the Lagoon than were recorded.

Species of conservation significance recorded at Murbpook Lagoon include

Southern bell frog, Carpet python, Australian shoveler, Regent parrot, Prickly bottlebrush, Purple love-grass, Spiny lignum and Annual groundsel. Thirteen migratory bird species have been recorded including Australian shelduck, Australian shoveler, Black swan, Black-fronted dotterel, Black-winged stilt, Caspian tern, Grey teal and Pacific black duck.

The community and landholders are particularly interested in the management of Murbpook Lagoon. The wetland has significant indigenous cultural values. There are two Aboriginal canoe trees located on the edge of the wetland.

Why water Murbpook Lagoon?

The primary aims of watering Murbpook Lagoon were to reduce the risk of wetland bed salinisation and to protect the health of River red gum, River coobah trees and Lignum that surround the site. The South Australian Murray-Darling Basin Natural Resources Management Board has put in place an intensive monitoring program looking at groundwater, surface water, tree health, photo points, quantitative vegetation, fish, frogs and birds. The monitoring program involves the Riverland West Local Action Planning Association and the landholders.

Monitoring outcomes

Water quality and groundwater monitoring were undertaken. Prior to watering, the groundwater was flowing towards the wetland, increasing the risk of salinisation of the wetland bed. Since watering at Murbpook Lagoon, the groundwater closest to the wetland has responded quickly, and has increased in level corresponding to the increase in the surface water level within the Lagoon. The data indicates that the salinity gradients are moving away from the wetland bed towards the River and that salinity levels have reduced.

Vegetation has responded well to the watering with Lignum producing leaves and flowers. River red gums have epicormic growth.

Three rare water bird species: the Australasian shoveler, Musk duck and a flock of about 70 Blue-billed duck have been recorded at the wetland since the watering. Regent parrot and Whistling kite were also recorded. Australian shelduck were observed with chicks.

Spotted grass frogs and Eastern sign bearing froglets were recorded in large numbers during a survey in August 2009 along with a few Eastern banjo frogs. A later survey found Peron’s tree frog and Southern bell frog. Tadpoles were recorded.

Five fish species were recorded with Carp gudgeon dominating. Macroinvertebrates including damselfly nymphs, boatmen, shrimp and water fleas were recorded.



BEFORE



AFTER





BEFORE



AFTER

## 3.2 Overland Corner

### Watering overview

#### Volume of water used

500ML

#### Source of water

Commonwealth Environmental Water Holder

#### Start of watering

31 May 2009

#### End of watering

24 June 2009

#### Watering method

Pumped

Overland Corner is a complex of wetlands on the River Murray floodplain between Locks 2 and 3, 14 kilometres northwest of Barmera. The wetland consists of a complex shoreline with connecting creek lines and depressions and many hidden areas. Habitat types include areas of: open water, shallow water, exposed wet and dry mud, fringing River red gums, perching trees and logs and emergent and submerged vegetation. The main wetland of the complex is a large area of water with one small permanent connection to the River Murray.

Overland Corner supports populations of the nationally vulnerable Southern bell frog and Regent parrot. Other species of conservation significance found at the wetland include the Australian shoveler, Freckled duck and the Great (Large) egret. Plants of conservation significance recorded at Overland Corner include the Dwarf daisy, Grass daisy and Spreading goodenia, all categorised as rare in South Australia. Due to the diversity of species the wetland supports, Overland Corner is an important drought refuge.

The community and landowners of the site (public and private landowners,

including the National Trust) are actively involved in management and monitoring. The wetland is used for camping, house-boating and recreation and is an important community site.

The wetland was first watered in 2004 and in 2006 received approximately 500ML of water as part of the River Red Gum Rescue Project along the River Murray.

### Why water Overland Corner?

Watering Overland Corner will support the health of the wetland and its role as a drought refuge. Previous watering freshened the groundwater lens below the wetland bed. Watering Overland Corner again will help to prevent further salinisation of the wetland. The SA MDBNRM Board has monitored extensively at Overland Corner since 2002, including ground and surface water levels and quality; frogs, fish, birds and vegetation

### Ecological outcomes

Inundation of temporary wetlands is important for triggering a good frog calling and breeding response. Spring frog surveys undertaken at Overland Corner recorded 7 species and an abundance of frogs including large numbers of the nationally vulnerable Southern bell frog. Other frog species recorded were the Eastern sign bearing froglet, Eastern banjo frog, Spotted grass grog, Painted frog, Southern bell frog, Peron's tree frog and Long thumb frog. Frog breeding has been extensive within the southern wetland area, with high abundance and diversity of tadpoles recorded in November. Abundant Southern bell frog tadpoles have been recorded.

Regeneration of aquatic vegetation has

been significant since re-wetting providing excellent habitat for wetland fauna.

Observations include:

- a dense covering over the wetland bed of native water milfoil, providing habitat and a food source for a range of wetland fauna;
- regeneration of Myriophyllum from seed and it covers the entire wetland bed providing habitat and a food source to tadpoles, macroinvertebrates, ducks and swans;
- extensive new growth over large areas of Tangled lignum with a strong flowering response. This is a preferred habitat plant for Southern bell frogs and other species;
- new growth on many River red gums and recruitment with seedlings observed;
- regeneration of emergent and fringing species such as Spiny sedge.

28 water dependent and wetland associated bird species have been recorded at the wetland post watering in 2009. Of these 17 are conservation listed species. Regent parrots have been observed at the wetland several times since the 2009 watering event and Black swans and Australian wood ducks were recorded breeding. Between August and October 09 there has been a change in species assemblage and an increase in overall bird abundance. This is probably due to an increase in habitat types and an increase in food abundance.

3 small bodied native fish species: Carp gudgeon, Flat head gudgeon and Australian smelt were detected. Abundant juvenile Smelt were observed suggesting a breeding event had occurred. The presence of fish suggests that pumps may not be a barrier to small bodied fish and that a fish community can be established by pumping water into wetlands.





#### 4. A community approach – Markaranka Wetland

By working together we are able to do more – more watering, protect more wetlands and spread the word about the importance of the River Murray and its wetlands to more people.

At Markaranka wetland complex, the SA MDB NRM Board worked in partnership with Fosters Ltd to water Markaranka wetland and develop a long term floodplain management plan for the site.

The partnership between Fosters Ltd and the SAMDB NRM Board lead to another co-investment project with Greening Australia in a study at Markaranka to measure the potential link between environmental watering and the issue of carbon credits as part of an emissions trading scheme. This was a valuable study of carbon stored on the floodplain that will be further explored and will inform future policy directions.



4.1 Markaranka wetland

Watering overview

**Volume of water**  
2236ML

**Source of water**  
Commonwealth Environmental Water Holder

**Start of watering**  
13 May 2009

**End of watering**  
23 June 2009

**Watering method**  
Pumped

The Markaranka wetland complex is north-west of Waikerie, between Lock 1 and Lock 2 on the River Murray. In 2006 the Markaranka wetlands were watered through the River Red Gum Rescue project. The water remained in the wetland for more than 12 months and stimulated the breeding of Southern bell frog.

Mature River red gum trees surround Markaranka wetland complex. They

provide important habitat for birds, lizards and mammals.

Frogs responded well during previous watering events at Markaranka. Surveys at the site recorded six species, including the Banjo frog, Spotted grass frog, Peron's tree frog, Eastern sign bearing frog, Common frog and the nationally listed Southern bell frog.

Why water Markaranka again in 2009?

The River red gum trees at Markaranka showed signs of stress from the drought and without flooding many could eventually die. With no water for germination, the trees were unable to establish the 'next generation' of young River red gums. The drought is also affecting other vegetation including the aquatic plants at the wetland.

The aim of the 2009 watering at Markaranka wetland was to provide water for River red gums and aquatic vegetation and to encourage breeding of the Southern bell frog and other frog species.

Ecological outcomes

The River red gums on the edge of the wetland have new epicormic growth. Spiny sedge is also responding. Six frog species have been recorded since the watering. Early monitoring recorded the Spotted grass frog and the Eastern sign bearing froglet in high abundance along with the Long thumbed frog. There were relatively high abundances recorded (more than 50). The watering has prompted regeneration and flowering of Tangled lignum plant that provides excellent habitat for wildlife including the endangered Southern bell frog.

Seventeen species of birds have been observed at the site following watering including the Musk duck and the Blue-billed duck which are rare in SA, the Freckled duck which is vulnerable in SA and the Regent parrot which is a nationally vulnerable species and Whistling kite.

Carp gudgeon, Flathead gudgeon and Australian smelt were caught during the fish survey as well as three Eastern long necked tortoises.



BEFORE



AFTER





## 5. Below Lock 1

On the 200 kilometre stretch of River Murray between Lock 1 and Wellington there are 75 wetlands. Only two currently have water. The species that use these wetlands have an even greater need for drought refuges.

Paiwalla is one of the sites below Lock 1 watered in 2008 and 2009. It is an extremely important site for many plants, fish, birds and mammals that currently have very restricted other habitat options.



5.1 Paiwalla Wetland

Watering overview

**Volume of water**  
606ML

**Source of water**  
Commonwealth Environmental  
Water Holder

**Watering method**  
Pumped

**Start of first watering**  
25 March 2009

**End of first watering**  
3 June 2009

**Start of second watering**  
21 June 2009

**End of second watering**  
22 June 2009

With major habitat shrinkage occurring below Lock 1 due to a lack of River Murray flow and subsequent drawdown of the river water level, Paiwalla is providing an important service to the region as a refuge site. The Wetland Habitats Trust has restored the wetland from irrigated dairy pasture into valuable habitat for birds, fish, frogs and other native wildlife. It is especially important for the small, native fish, the Flathead gudgeon.

At least 23 species of waterbirds use Paiwalla wetland. The vulnerable Painted snipe uses the shallow water within the vast beds of rushes during spring and summer.

The wetland is a nesting ground for the Broad-shelled tortoise, a threatened species in SA that lays its eggs during autumn in the wetland fringes. The success of the tortoise breeding events benefits from the ongoing fox-baiting undertaken by the Wetland Habitats Trust.

The site is important to the local Ngarrindjeri people and contains camping sites, middens, scar tree and other sites of cultural significance.

Why water Paiwalla Wetland?

Paiwalla was watered to improve water quality, protect the area from the risk of acid sulfate soils and to maintain it as a drought refuge for native fish and waterbirds on the Lower Murray.

Ecological outcomes

Monitoring included groundwater depth and surface water quality measurements every three months. Four photo points were monitored quarterly. Small native fish were monitored twice a year and waterbirds monthly. Frog calls and invertebrate numbers were recorded occasionally. Aquatic vegetation was monitored at four locations at the wetland.

Monitoring recorded a change in the water quality. Salinity and turbidity decreased to levels suitable for fish and aquatic macroinvertebrates. Groundwater at Paiwalla generally reflects the fluctuations in the water levels within the wetland itself. As the water levels in the wetland dropped following the watering in February 2008, groundwater levels also decreased. Following the pumping event in March 2009 groundwater levels increased as the surface water levels rose.

Exotic fish species (European carp, Gambusia and Redfin) were excluded from Paiwalla during watering in February 2008 and March 2009. Fish counts undertaken before watering in 2009, revealed a high number of native species. Small-bodied native fish (predominantly the Flathead gudgeon) flourished. This species is common throughout the Lower Murray but is a useful species for colonising areas and providing food for higher predators such as birds, tortoises and other fish. Following the June watering, Carp gudgeon was dominant with other non-fish species recorded such as yabbie and tortoises. Freshwater shrimp and prawn were abundant. Aquatic worms and high numbers of dragonfly and Mayfly nymphs were also captured.

Two tortoise species were recorded: the Long necked tortoise and the Broad shell tortoise.

Twenty-six waterbird species were recorded following watering with six of these listed as significant within South Australia. Little bittern was observed and Grey teal, Black swan and Blue-billed duck have been breeding.

Water levels decreased by 0.3m by October 2009 and this exposed mudflats and attracted waders including the Wood sandpiper and Sharp tailed sandpiper

Frog numbers responded to the watering with six frog species and abundant tadpoles seen during monitoring. These included the vulnerable Southern bell frog and the Brown tree frog. High abundances of Peron’s tree frog were observed within the dense bed of Water milfoil. Abundant tadpoles were caught in November 2009 confirming successful breeding events following the June watering.

There have been significant improvements in the diversity, abundance and health of vegetation since the watering in February 2008. For the first time since its first environmental watering in 2003, Paiwalla has extensive beds of aquatic plants, predominantly Water milfoil. Getting more aquatic plants established is one of the key targets in the wetland management plan. This flourishing aquatic vegetation provides nesting for swans, and food and habitat for frogs, fish and invertebrates. Waterwort and Duckweed have germinated and seed production has been observed.



BEFORE



AFTER





## 6. Protecting the Murray hardyhead – wetlands of the Lower Lakes

With the water in the Lower Lakes dropping to extremely low levels, wetlands that were once connected to the Lakes are now isolated and dwindling fast. These wetlands are pockets of life and home to small, threatened native fish including the Murray hardyhead and Southern pygmy perch.

The Murray hardyhead is a small native fish that is listed as vulnerable under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999, endangered (Provisional) under the South Australian National Parks and Wildlife Act 1972 and protected under the South Australian Fisheries Management Act 2007. The fish lived in the sheltered edges of Lake Alexandrina and adjacent wetlands. Recent monitoring of Murray hardyhead populations has shown a drastic decline in numbers over the past two years due to a lack of habitat. At many sites the fish are no longer breeding.

To help maintain Murray hardyhead numbers and to trigger breeding, environmental water was pumped into Turveys Drain and Boggy Creek – two wetlands of the Lower Lakes. The project is a collaboration between the South Australian Murray-Darling Basin Natural Resources Management Board and the South Australian Department for Environment and Heritage.

It is vital to preserve the Lower Lakes and nearby wetlands to encourage native fish breeding and survival. Rescued threatened fish are being held in captivity but this is only a temporary step to save a species, not a long-term solution.



6.1 Turveys Drain

Watering overview

Volume of water used  
4ML

Source of water  
The Living Murray – RMIF Account

Start of watering  
1 June 2009

End of watering  
29 June 2009

Watering method  
Pumped

Turveys Drain is one of a very few sites in the Lower Murray providing important habitat for fish during the drought. Turveys Drain is a Lower Murray refuge site for two fish species: the Murray hardyhead and Southern pygmy perch. It is refuge for other fish species of conservation concern such as the Tamar goby and Dwarf flat headed gudgeon.

Turveys Drain is an artificial wetland, initially built as a short irrigation channel

running off from the north of Lake Alexandrina. It is an important site for a number of wetland species. The current land owners actively manage the wetland.

Why water Turveys Drain wetland?

With water levels so low in Lake Alexandrina, there is a significant threat of the wetland drying out. As an important site for key fish species as well as frogs, aquatic invertebrates, birds and aquatic vegetation in the Lower Murray, it is important to maintain this drought refuge.

The watering aimed to improve water quality at the site. This could trigger fish to breed and encourage the growth of aquatic vegetation such as Hornwort, Sea-club rush, Bulrush and River club rush.

For the past two years, an extensive monitoring of fish, water quality and levels and vegetation health has been undertaken every three months.

Ecological outcomes

Increasing the water level in Turveys Drain has improved the connectivity between vegetation, such as Phragmites and Typha, and the water’s edge. This creates more habitat for small fish. Monitoring has detected an increase in aquatic vegetation such as Water milfoil and Hornwort and this will further increase habitat value.

Surface water salinity in the wetland is relatively fresh at 6 420 EC. Murray hardyhead and Southern pygmy perch generally breed when the surface water salinity is approximately 6 000 EC. If the salinity increases above 20 000 EC, the Murray hardyhead will survive but will not breed. The Southern pygmy perch, however, struggles to survive in higher salinity levels.

Environmental watering has generated other benefits at Turveys Drain. Waterbirds and frogs are using the wetland. With more water and the growth of plants, the wetland seed bank will be replenished.



AFTER





BEFORE



AFTER

## 6.2 Boggy Creek

### Watering overview

**Volume of water used**  
1ML

**Source of water**  
Healthy Rivers Australia

**Start of watering**  
1 February 2009

**End of watering**  
1 March 2009

**Watering method**  
Pumped

**Volume of water used**  
3ML

**Source of water**  
The Living Murray – RMIF Account

**Watering method**  
Pumped

**End of watering**  
21 June 2009

**Watering method**  
29 June 2009

**Watering method**  
Pumped

Boggy Creek is a freshwater creek system located at the eastern end of Hindmarsh Island near the mouth of the River Murray in Lake Alexandrina. Although disconnected from the Lake, it provides a crucial refuge habitat for a population of approximately 200 Murray hardyhead.

Water quality and water levels in the wetland decreased after it became disconnected from Lake Alexandrina. The wetland was at risk of completely drying out by February 2009. Murray hardyheads were rescued from the Creek and were held in a nearby facility until watering at the wetland started. In March, the fish were released back into Boggy Creek once the water quality of the wetland had improved.

At the entrance of Boggy Creek, a constructed earthen bank enhanced the watering event. A small pump and piping pushed water into the Creek. Fine mesh placed over the pump stopped exotic fish and fish larvae, such as European carp and Redfin, from entering the wetland during watering. The pump and pipes used at Boggy Creek can be re-used in future watering events.

### Why water Boggy Creek?

The aim of watering Boggy Creek wetland was to maintain surface water levels in a small section of the wetland to provide habitat for the Murray hardyhead and to encourage breeding through improved water quality. Watering was also aimed at stimulating growth of aquatic vegetation and replenishing the existing seed banks at the wetland.

Boggy Creek has aquatic vegetation and invertebrates that provide food and habitat for fish. Vegetation found at the site includes Cumbungi, Ruppia, Water milfoil, Common reed and various species of water plants.

Other fauna species found previously at Boggy Creek include the Common froglet, Brown tree frog, Spotted grass frog and Eastern banjo frog. Waterbirds may also be attracted to the wetland.

### Ecological outcomes

Early monitoring has recorded the growth of Ruppia, water plants and rejuvenation of Bulrush and Common reed. Before watering began, fringing vegetation was isolated from the wetland. That vegetation is now inundated and likely to be important habitat for Murray hardyheads. The vegetation provides protection from predators and a physical structure for breeding. Following the watering, aquatic invertebrates have increased at Boggy Creek, providing a food-source for fish and frogs. Frogs heard calling at the site included the Spotted grass frog, Common froglet, Eastern banjo frog and Brown tree frog, indicating a breeding response for these species. The Long-necked fresh water tortoise, that prefers slow moving weedy rivers and streams, has also been seen at Boggy Creek.







