



# SAVE THE RIVER MURRAY FUND

ANNUAL REPORT 2008-09



**Government of South Australia**

Department of Water, Land and  
Biodiversity Conservation

# SAVE THE RIVER MURRAY FUND

ANNUAL REPORT 2008-09

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South Australian Parliament  
by the Minister for the River Murray  
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For further information about the Save the River Murray Fund, or the achievements listed in this Annual Report, please contact the Department of Water, Land and Biodiversity Conservation on (08) 8463 6800 or visit the website at [www.dwlbc.sa.gov.au](http://www.dwlbc.sa.gov.au)

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# INTRODUCTION

The Save the River Murray Fund (the Fund) was established under the *Waterworks Act 1932* on 24 July 2003. The Fund is held by the Minister for the River Murray and administered by the Department of Water, Land and Biodiversity Conservation (DWLBC) on behalf of the Minister.

The Save the River Murray Levy was introduced on 1 October 2003 under the *Waterworks (Save the River Murray Levy) Amendment Bill 2003*. The levy is charged to all SA Water customers across South Australia, both residential and non-residential, and is indexed annually.

In 2008-09, a total of \$25.3 million was received into the Save the River Murray Fund and \$38 million was expended from the Fund on a range of works and measures to address the declining health of the River Murray in South Australia and increasing community demands for a high security of water of acceptable quality for urban and irrigation purposes. The program, known as the River Murray Improvement Program (RMIP), is integrated within a larger Murray-Darling Basin program of works and measures, the South Australian River Murray Salinity Strategy and the South Australian Environmental Flows for the River Murray Strategy.

The RMIP contributes to the delivery of three high level outcomes:

- Improved environmental health of the River Murray system in South Australia;
- High security of water of acceptable quality for irrigation in South Australia at an appropriate price; and
- High security of water quality for urban water supplies.

It also contributes to a range of targets identified in South Australia's Strategic Plan including:

- Increased environmental flows by 500 gigalitres (GL) in the River Murray by 2009 as the first step towards improving sustainability in the Murray-Darling Basin, with a longer-term target of 1,500 GL by 2018 (T3.10);
- South Australia maintaining a positive balance on the Murray-Darling Basin Authority salinity register (T3.11); and
- South Australia's water resources managed within sustainable limits by 2018 (T3.9).

The Fund contributes to a range of River Murray projects in South Australia and more broadly in the Murray-Darling Basin. The State contributed \$23 million to the Murray-Darling Basin Authority (MDBA) in 2008-09, of which \$4 million was sourced from the Save the River Murray Fund.

During 2008-09, River Murray system inflows were only 1,880 GL, about 21% of the long-term average inflow. This was the third driest year in 118 years of records.

At the start of 2008-09, the total storage volume in Hume, Dartmouth, Lake Victoria and Menindee Lakes was 1,890 GL (20% capacity) and reached a maximum of 2,660 GL (28% capacity) in early October 2008. By the end of the water year (31 May 2009), storages were reduced to only 1,400 GL (15% capacity) including water for Critical Human Water Needs and private carryover for South Australia, New South Wales and Victoria.

South Australian irrigators received an historically low annual allocation of only 18% compared to the previous lowest allocation of 32% in 2007-08.

### Drought Measures funded by MDBA

Funding was provided through the MDBA to support emergency drought management measures required to reduce the risk of greater environmental damage to important River Murray lakes and wetlands.

- Water was pumped from Lake Alexandrina to Lake Albert to maintain the water level in Lake Albert;
- Ongoing dredging at the Murray Mouth has ensured a hydrological link between the Coorong and the sea; and
- The Goolwa Channel Water Level Management Project, jointly funded by MDBA and the Commonwealth Government, has minimised the risk of acidification in the Goolwa Channel and the important wetlands in the Finniss River and Currency Creek estuaries.

### Murray-Darling Basin Reform

On 3 July 2008, the Council of Australian Governments (COAG) signed an Intergovernmental Agreement (IGA) on Murray-Darling Basin Reform that established new governance arrangements for the Murray-Darling Basin. The IGA included arrangements for critical human water needs, comprehensive and consistent water charging and water market arrangements across the Basin, the transition of the Murray-Darling Basin Commission to the new MDBA, and a new Ministerial Council and Basin Officials Committee.

In late 2008, the Basin States (SA, NSW, Vic, Qld) passed legislation to refer powers to enable the Australian Government to amend the *Water Act 2007* (Cwth) and new governance arrangements subsequently came into effect on 15 December 2008.

Under the new governance arrangements the Authority has two roles:

- To develop and oversee implementation of a whole of Basin Plan; and
- To assume responsibility for functions of the Murray-Darling Basin Commission and for implementing the decisions made by the new Ministerial Council and the Basin Officials Committee.

### Salinity Levels

The weir pools between Locks 1 to 5 were maintained at normal supply levels for most of the year. Salinities remained generally low from the border to Lock 1. The situation below Lock 1 was quite different, with water levels in the Lower Lakes dropping and salinity levels remaining elevated – levels in both lakes ranged between 4,800 EC to 30,000 EC depending on the location.

Frequent, ongoing monitoring of water quality is in place, with the EPA publishing results fortnightly. At the end of June 2009, the salinity at Mannum was 592 EC and at Murray Bridge was 668 EC.

While these figures are still within the acceptable range, the ongoing dry conditions and low system inflows mean less water is available to provide dilution benefit and flushing of salt from the system.

South Australia continues to work with the MDBA to assess management options. A key initiative is the MDBA River Murray System Operations Review, which aims to refine the way the river system is operated to protect the system and provide quality water for all uses.

# 01

## RETURNING WATER TO THE RIVER

As part of the Murray-Darling Basin Ministerial Council's Living Murray Initiative, Basin jurisdictions which are signatories to the 2004 Intergovernmental Agreement Addressing Overallocation and Achieving Environmental Objectives in the Murray-Darling Basin committed to water recovery (volumetric) and financial targets. South Australia had a financial target of \$65 million to invest in local and interstate water recovery measures and a volumetric target of 35 GL to be recovered from within South Australia. The overall Basin target was 500 GL, to be recovered by June 2009.

### **The Living Murray Water Recovery within South Australia**

South Australia was the first jurisdiction to secure its share of 35GL towards the national volumetric target of returning 500 GL of water to the river for environmental flows.

The total volume of 35 GL consisted of purchases from willing sellers in South Australia and government owned licences. Funds contributed by South Australians through the Save the River Murray Levy have enabled permanent licences to be purchased, reducing the total volume of water extracted from the system.

South Australia was the first jurisdiction to have water listed on The Living Murray – Environmental Water Register. South Australia's initial listing of 13 GL of water was made available for environmental purposes from 1 July 2007.

During the current extreme drought, water on the Environmental Register has been vital in providing critical environmental watering in the Murray-Darling Basin, including South Australia's Chowilla Floodplain.

In addition to investing in water recovery measures within South Australia, investment continued in water recovery projects put forward by other Murray-Darling Basin jurisdictions. Investment in these upstream water recovery measures will benefit and contribute to improvements for South Australia.

These projects, together with others across the Murray-Darling Basin, will collectively enable the volumetric target of 500 GL to be achieved.





### SA River Murray Environmental Manager

South Australia's Environmental Flows for the River Murray strategy released in 2005 established the function of the River Murray Environmental Manager (RMEM). The function was assigned to the South Australian Murray-Darling Basin Natural Resources Management Board (SA MDB NRM Board). The SA MDB NRM Board, through the RMEM, has the lead role to coordinate the delivery, allocation and management of River Murray environmental water and to develop policy on environmental water. The RMEM is also South Australia's Living Murray Icon Site Manager and has ongoing responsibility for Living Murray Icon Site management and project implementation.

As the drought continued for the 2008-09 watering year, the RMEM used the River Murray Environmental Watering Plan and Annual Watering Plan to develop a list of priority sites for environmental watering, based on the following criteria:

- sustain small critical refuge areas for native plants and animals;
- maintain critical connectivity between sites; and
- protect previous investment in environmental watering.

The RMEM also worked closely with the MDBA through the Environmental Watering Group and with the Commonwealth Environmental Water Holder (CEWH) to achieve a successful watering outcome at selected sites. The RMEM continued to work in partnership with two accredited non-government organisations: Nature Foundation SA and Healthy Rivers Australia to ensure water delivery for key projects.

The RMEM worked with Greening Australia, Fosters Limited, CSIRO, The Carbon Store Pty Ltd and Canopy to measure the carbon stored in vegetation on the Markaranka floodplain and the potential for linking maintenance of this vegetation through environmental watering to the issue of carbon credits.

### Key Achievements

- South Australia was the first jurisdiction to meet its Living Murray obligations and targets.
- Environmental water was successfully delivered to 47 sites.
- Ongoing cooperative working relationships with The Living Murray and the CEWH were maintained.



## CASE STUDY 01

# PAIWALLA WETLAND REFUGE

Paiwalla Wetland is one of the few remaining wetlands containing water between Lock 1 (at Blanchetown) and the barrages at the Murray Mouth. The Wetlands Habitats Trust, owner and operator of Paiwalla Wetland, has been highly supportive and active in the conservation of the site.

In March 2009, 475 megalitres of Commonwealth environmental water were granted to prevent decline of the wetland's values and provide a refuge for the significant and abundant flora and fauna which utilize it. A further 150 megalitres were provided in June 2009 to fill the wetland. The water was delivered to the upstream end of the wetland via pumps, as low river levels have made the metered pipe inlet unusable.



Regular monitoring undertaken since has shown significant positive changes within the wetland. Low turbidity levels (high water clarity) were recorded following pumping and have continued in the 6 months since watering, allowing extensive germination of submerged aquatic plants such as species of Water Milfoil (*Myriophyllum sp*). The additional pumping in June 2009 resulted in the production of seed in these species, as it maintained suitable water levels and water quality.

44 water-bird species have been recorded since pumping in March 2009, including 8 species of State significance. Of the 9 duck species recorded, the most notable has been the Musk Duck (*Biziura lobata*), State listed as vulnerable, which has had multiple breeding events.

Four species of fish have been recorded within the wetland since March 2009, and six frog species have been identified, including the Southern Bell Frog (*Litoria raniformis*), listed vulnerable under the EPBC Act 2000. There have been confirmed breeding events in four of the frog species.

Another positive outcome of pumping has been the total exclusion of all exotic species.



# 02

## SECURING WATER RIGHTS

Securing the water rights of the River Murray and Murray-Darling Basin is important for licence water users and the wider South Australian community in economic, social and cultural terms.

### **River Murray Prescribed Watercourse Water Allocation Planning, Licensing and Compliance**

Implementation of the River Murray Water Allocation Plan, the *Natural Resource Management Act 2004* and the *River Murray Act 2003* continued as a significant program of the South Australia Government in 2008-09, ensuring that, as far as possible, given the impact of continued drought across the Murray-Darling Basin, the water security of all River Murray water users was protected, and transfer of these rights, where appropriate, occurred efficiently. Programs associated with the administration of the River Murray salinity zoning policy, and support of South Australia's Murray-Darling Basin salinity reporting obligations, ensured that effective water allocation transfers, water use monitoring and reporting, and implementation of South Australia's metered water use policy continued to be the major focus.

Preliminary work commenced on preparation of the River Murray Water Allocation Plan amendment process being managed by the SA MDB NRM Board.

With continuation of the extreme low inflow conditions across the Murray-Darling Basin and associated impacts, administering water restrictions and water conservation programs for all water users, as well as increased compliance and monitoring programs, were a major priority for 2008-09.

### **Eastern Mount Lofty Ranges Catchment**

Water resources in the Eastern Mount Lofty Ranges were prescribed on 8 September 2005 and the area is under a Notice of Prohibition until October 2011. The SA MDB NRM Board is in the process of developing a Water Allocation Plan (WAP) for the area; extensive scientific investigation into the capacity of the resources; plus community and industry consultation are being undertaken as part of this process. It is anticipated that the WAP will be adopted in mid 2010.

### Angus Bremer/Mallee/Marne Saunders Water Allocation Planning, Licensing and Compliance

The primary focus for 2008-09 was on the provision of efficient water licensing and trading approvals, water use monitoring and reporting, in support of the SA MDB NRM Board in reviewing WAPs.

Increased demand for the use of aquifer storage and recovery in the Angus Bremer Prescribed Wells Area has continued, as water users reliant on the River Murray seek alternative avenues to access and store while drought impacts continue.

Water resources of the Marne and Saunders Rivers were prescribed on 20 March 2003 and the area is currently under a notice of prohibition controlling new or additional use. During 2005, additional areas of the Murray Mallee, including the Hundreds of Peake, Roby and Sherlock, were also prescribed.

Existing users of the water resources are authorised to continue to take water at their existing levels of use, and the SA MDB NRM Board, following extensive community and industry consultation and investigations into the sustainable capacity of the water resource, is developing a WAP for the areas.

### Water Trade

Continued low inflow across the Murray-Darling Basin resulted in record low allocations made to South Australian River Murray irrigators. Implementation of government programs to support permanent plantings and revised requirements for the provision of water for critical human water needs in 2009-10 saw temporary water allocation transfers reach record volumes during 2008-09, although the total number of individual transfers was 20% lower in 2007-08.

A summary of water allocation transfer activity in 2008-09 and comparison with 2007-08 is detailed in the table below.

	2007-08		2008-09	
	No.	Volume (GL)	No.	Volume (GL)
<b>Trade into SA</b>				
NSW	1967	100.0	2262	320.3
VIC	1692	47.5	300	22.5
<b>Trade from SA</b>				
NSW	6	0.3	10	0.3
VIC	30	2.0	63	4.7
<b>Trade within SA</b>				
Permanent	180	15.9	233	49.9*
Temporary	762	259.8	789	409.61*

\* In implementing government water purchase programs during 2008-09, water allocations were often purchased in numerous small parcels from willing sellers, and then subsequently transferred as large bulk transfers to individual government water licences for administrative implementation and transparency, resulting in increases in overall trade volumes reported.

### Murray-Darling Basin Cap on Diversions

The Murray-Darling Basin Ministerial Council Cap on Diversions became permanent in New South Wales, Victoria and South Australia from 1 July 1997. The States will allocate differing amounts of water each year, depending upon a range of factors including rainfall, inflows, water sharing arrangements and trade rules. Diversion limits are defined on an annual basis for each of the different Cap Valleys, and the States are required to ensure that diversions remain below the annual Cap for the respective valley.

The 2007-08 Independent Audit Report of water use against the annual Cap targets found that water use in all the Cap Valleys in South Australia remained below the trade-adjusted annual Cap targets. The report (published in March 2009) suggested South Australia advance a number of measures to improve its Cap performance in future years. Consequently, a priority was placed on implementing the recommendations of the Independent Audit Group.

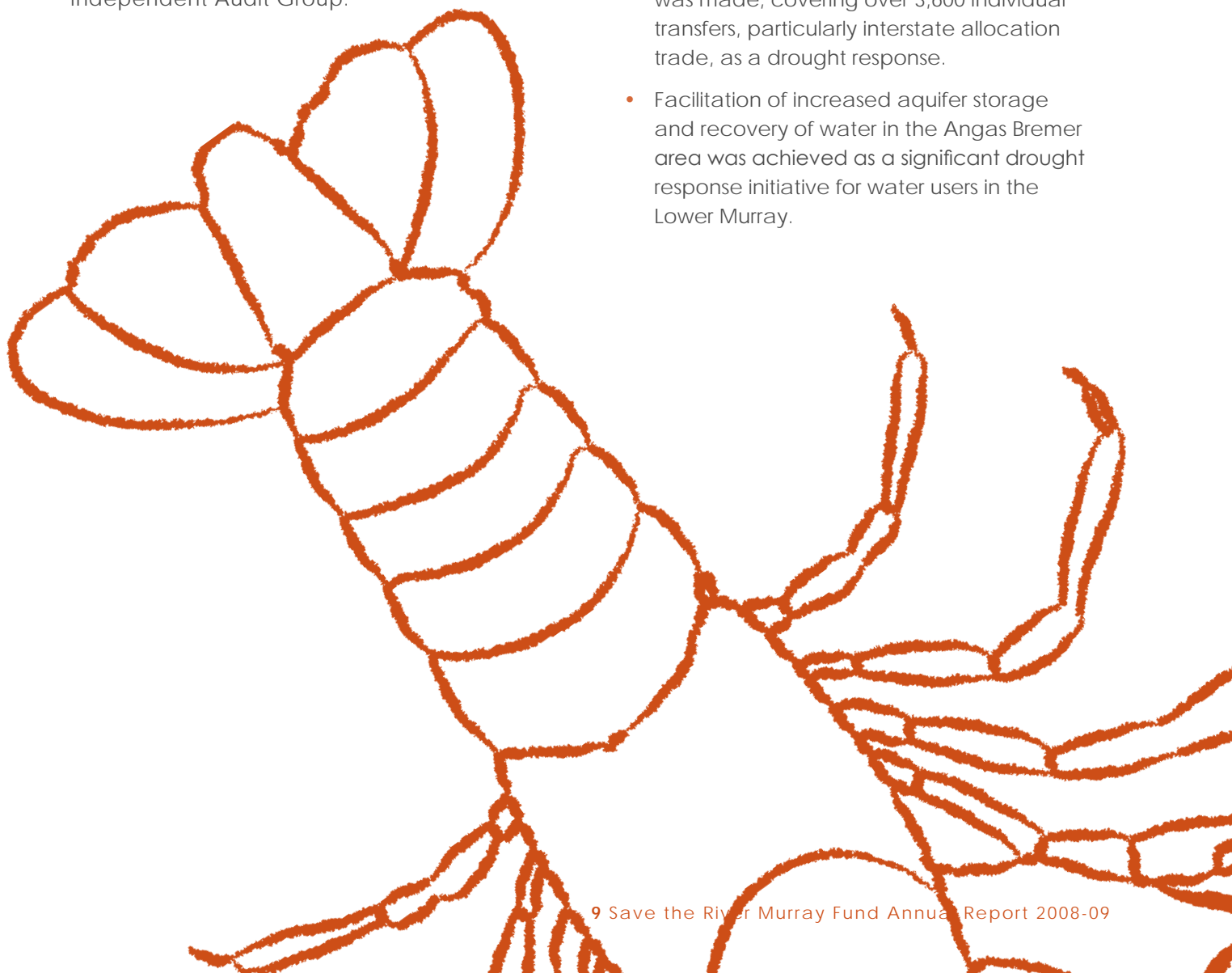
### Separation of Water Rights

The IGA on the National Water Initiative made on 25 June 2004 required that water access entitlements and water allocations be managed separately from land ownership and separate from the required site approvals for taking and using that water. Amendments to the *Natural Resources Management Act 2004* to operate a new separated water rights system in South Australia has been enacted.

Separation of water rights will be enacted by 1 July 2009, and includes amending the current water allocation plan, making the necessary Regulations and translating all existing licences and authorisations to new regulatory instruments.

### Key Achievements

- Separation of water rights for the River Murray Prescribed Watercourse operating environment was implemented.
- Facilitation of expanded water trading was made, covering over 3,600 individual transfers, particularly interstate allocation trade, as a drought response.
- Facilitation of increased aquifer storage and recovery of water in the Angas Bremer area was achieved as a significant drought response initiative for water users in the Lower Murray.



## CASE STUDY 02

# SEPARATION OF WATER RIGHTS

From 1 July 2009, new legislation enables the unbundling of existing water licences in South Australia to enable water trading and doing business in the water market to become quicker, easier and less expensive. Instead of a single water licence that allows licence holders to take and use water in approved ways, the new system separates these rights and permissions into the following individual instruments:

### **Water Access Entitlement**

This is the ongoing right to a specified share of the water resource, and is set out in a water licence. The water right is expressed in 'unit shares' and is an asset that can be sold or transferred permanently or for a limited period.

### **Water Allocation**

This reflects the right to take a specific volume of water for a given time period, not exceeding 12 months. The right specifies the actual volume of water able to be used. The actual volume may vary from year to year, depending on how much water is available. This, too, is an asset that can be sold.



### **Water Resource Works Approval**

This is a permission to construct, operate and maintain works (such as a pump, well or dam) to take water at a particular location in a certain way. It is not transferable to another location. The requirement to meter the amount of water taken from the resource is linked to this approval.

### **Site Use Approval**

This is a permission to use water at a particular location in a particular way. It is not transferable to another location.

The new system will be applied to the River Murray Prescribed Watercourse from 1 July 2009. It is intended that the separation of water rights be rolled out across the other prescribed water resource areas in the State up to 2015.

# 03

## PROTECTING THE RIVER

The Save the River Murray Fund contributes to numerous projects designed to protect the River Murray from detrimental impacts.

### Murray-Darling Basin Policy Program

The program leads and coordinates strategic policy development for management of Murray-Darling Basin water resources and supports South Australia's interface with the MDBA and other jurisdictions on Murray-Darling Basin issues. In particular, a key focus for the program is supporting South Australia's input to the development of the Basin Plan, and reviews of River Murray System operations and the Murray-Darling Basin Agreement to ensure improved water security and environmental outcomes for the River Murray System and South Australia.

Key activities of the Murray Darling-Basin Policy Program included:

- Supporting the successful negotiation of special water sharing arrangements for 2009-10 to enable scarce River Murray water to be shared amongst NSW, Vic and SA to meet critical human water needs and restricted irrigation needs under the current drought;
- Supporting the development and passage of the historic *Water Act 2008* to refer powers relating to water management in the Murray-Darling Basin to the Commonwealth Parliament, and the development and passage of a new *Murray-Darling Basin Act 2008* to repeal the *Murray-Darling Basin Act 1993* and give effect to the new Murray-Darling Basin governance arrangements;

- Providing policy input and coordination to the development and negotiation of a climate responsive annual metropolitan Adelaide cap on diversions; and
- Providing the State's input to salinity policy initiatives, particularly the development of the MDBA Water Quality and Salinity Management Plan.

### Risks to Shared Resources

The Murray-Darling Basin Risks Strategy was released in early 2008. It provided a framework for assessing and responding to current and potential risks to the shared water resources of the Murray-Darling Basin. Jurisdictions subsequently agreed to implement the Risks Strategy by submitting independently audited annual risk assessment reports. South Australia's 2008 'Assessment of Risks in the South Australian Murray-Darling Basin' was provided to the newly formed MDBA and the Independent Audit Group on 6 February 2009.

A Final South Australian Risk Report was prepared for the MDBA in June 2009, which outlined current and proposed jurisdictional activities and projects that relate to risks to shared water resources.



## Salinity Management

Salt is a natural part of the Australian landscape and its rivers, particularly in the lower parts of the Murray-Darling Basin. However, river regulation and greatly reduced flows, particularly in the last decade, have resulted in little discharge of salt to the sea. Much of the salt along the River Murray in South Australia remains in the floodplains.

In 2008-09, South Australia continued to work in partnership with the MDBA to address the potential risk from mobilisation of the salt accumulated in floodplains. Further investigations into the processes and scenarios under which the accumulated salt is mobilised, assessment of the extent of the risks associated with increased salt loads to the river (resulting in 'spikes' in salinity) and options to mitigate the risks are required. They are linked to the River Murray System Operations Review being conducted by the MDBA, in which South Australia is actively participating.

Engineering works to reduce the inflow of saline groundwater into the River Murray have historically focused on river improvements to water quality to provide environmental benefits and underpin sustainable irrigation. The proposed Pike River Salt Interception Scheme (SIS) aims to integrate solutions for floodplain degradation, sustainable water supply for irrigation, stock and domestic water users, as well as salinity management for the region and the floodplain.

During 2008-09, a number of investigations were undertaken to improve the baseline understanding of the Pike River system and an Investment Plan is due for completion in October 2009. The scheme comprises 59 highland production bores and 28.5km of collection and disposal pipeline, which is estimated to intercept 167.6 tonnes of salt per day. A proposal has been submitted to the MDBA for approval to construct the Pike SIS.

Construction work on the Murtho SIS has commenced and when completed will provide an estimated benefit of 20.2 EC (99.4 tonnes of salt intercepted per day).

Construction of the Waikerie Lock 2 SIS has progressed and is expected to deliver a benefit of 9.4 EC.

In Loxton, all 27 floodplain bores and the Cliff Toe Drain are in operation, intercepting 50 tonnes of salt per day. Run of River salinity surveys indicate that there is now only a residual salt load still entering the River in the Loxton area. Investigations have continued to further enhance this project.

## Surface and Groundwater Modelling

Good technical scientific information is necessary to inform critical decisions on drought, water security, infrastructure development and interstate negotiations in the MDBA. A key component of this information is hydrological modelling, including that of water levels, flows and salinity in the River Murray wetlands and lower lakes.

Consistent with the MDBA's principle of continual improvement to groundwater models, the Morgan to Tailem Bend groundwater model was extended to Wellington.

The groundwater models from the border to Wellington enable calculations of salinity impacts to the river and this informs future policy directions for salinity management, including investment in new and existing salt interception infrastructure.

Hydrologic modelling was undertaken to predict salt loads at various low flow river levels to input into the River Murray model 'Big Mod'.

Groundwater scenario modelling of salt loads was undertaken for the river reach below Lock 1 to Murray Bridge to predict maximum and minimum salt loads at varying River Murray water levels. An assessment brief was undertaken to analyse the relative salt inputs above Lock 1 to Lock 4 from salt interception schemes, water irrigation efficiency improvement and floodplains.



## Riverbank Collapse

Between early February and July 2009, there were 15 reported incidents of riverbank collapses. These affected around 1,070 metres of riverbank and involved some losses of property to the River Murray.

DWLBC is coordinating both the incident response and project work to assess the causes and management options available. Actions that have been undertaken include:

- Fencing-off of incident sites;
- Removal of navigation hazards;
- Establishment of a 24 hour telephone hotline for public reporting;
- Monitoring identified high-risk sites below Lock 1;
- A communication strategy in place, incorporating media releases in all relevant newspapers, distribution of pamphlets to land owners in high-risk areas and public awareness presentations. A weekly monitoring program is undertaken to observe and record changes at key locations; and
- Technical specialists including geotechnical engineers engaged to provide a risk profile of areas identified as high risk. This work will recommend future on-going management options.

In some circumstances, trees have been removed where they have been identified as contributing to potential riverbank collapses. DWLBC has established a process to fast-track clearance approvals for this removal.

## River Murray Act

The *River Murray Act 2003* was introduced to ensure that development and activity proposals which may affect the health of the river are undertaken in a way that protects, maintains and improves river health.

The State Planning Review and the referral of powers in relation to the Murray-Darling Basin Agreement to the Commonwealth precipitated a comprehensive review of the Act during 2008-09. A number of options for improving efficiency and reducing double handling of development assessment have been canvassed in the 'River Murray Act Annual Report' for 2008-09.

During 2008-09, there were 80 compliance matters reported, up from 61 in 2007-08. Most matters were addressed through negotiation. The River Murray Compliance Officer has continued to attend community meetings to provide information to residents about illegal sand dumping, dumping of dredged material on the floodplain, the dangers associated with riverbank slumping due to lower river levels, and the need to seek approval to extend boat ramps and modify jetties and moorings in response to lower river levels.

## Riverland Drainage Disposal Systems and Waste Disposal Stations

### Saline Drainage Disposal Basins

There are 17 disposal basins in the Riverland which accept saline water from the former government irrigation areas.

The primary role of the basins is to control the impact of drainage waters from irrigation practices on the salinity levels of the River Murray, with the resulting salt load only released back to the River at times of high flow, when the additional water in the River can accommodate it.

A review was undertaken of the basins, with recommendations being developed for their future use and management.

### **River Vessel Waste Disposal Stations (RVWDS)**

There are thirteen RVWDS sited along 650 km of the River Murray in South Australia to take both toilet/black-water (sewage) and rubbish from river vessels free of charge.

An upgrade program for the RVWDS is under way and is expected to be completed by 2013-14. Works include upgrading structures that were built in the 1970's, increasing the pump-out capacity to accept grey water, and upgrading the waste water treatment facilities to remove any impacts on the River Murray.

In addition to these upgrades, drought response works were completed at Swan Reach, Mannum and Murray Bridge RVWDS to allow continued operation at water levels significantly below normal pool level.

A new modern floating pontoon was installed at Swan Reach and the water-based facilities at Murray Bridge were upgraded.

The Goolwa RVWDS was taken out of service and an alternative service was provided for the small number of vessels still operating in this reach of the River. A replacement RVWDS at Goolwa is programmed for the following financial year.

### **Lower Murray Embankments**

The principal role of the embankments is to protect reclaimed floodplains and wetlands currently used for agricultural purposes. The embankments also provide for recreational activities such as walking, cycling and fishing.

Routine inspections of government-owned embankments have found a significant increase in the incidence and extent of cracking. Cracks have been caused by low river water levels and subsequent drying of embankment soils.

Several government-owned embankments are affected by severe cracking (up to 200m long, 0.5m wide, and more than 2m deep), and have been marked as 'not trafficable'. Public warning signs have been erected on the entrances and side roads of affected embankments, warning that severe cracking has occurred. About 5 kilometres of severely cracked levee banks have been successfully repaired. Ongoing monitoring and mitigation options are being developed.

### **Water Quality Improvement**

The Environment Protection Authority (EPA)'s primary focus for the River Murray is to identify and manage the activities that present a risk to water quality.

In 2008-09, the following activities were undertaken:

- Monitoring continued for the Lower Murray Reclaimed Irrigation Area (LMRIA) rehabilitation project including on-site inspections of the on-farm Environmental Improvement Management Program;
- Implementation of the National Water Quality Management Strategy in cooperation with the SA MDB NRM Board;
- Continued implementation of the EPA Code of Practice for Vessels and Facility Management; and
- Reviewing and developing strategies for the management of sand dumping in the River Murray.

## Wetland Watering and Refill Strategy

Twenty-seven regulated wetlands were disconnected from the river channel to achieve evaporative water savings in late 2006 to early 2007. An additional six sites (SOG sites) were also temporarily disconnected from the main River Murray channel as a Basin-wide contingency measure to achieve evaporative water savings and to prevent saline water draining into the river should weir pools begin to fall.

All managed and temporary wetlands that were closed as part of the drought were prioritised for refill in 2008-09. The prioritisation strategy was developed based on the ecological values of and threats to the wetlands, utilising monitoring data collected through the Wetland Program and local knowledge of the wetland.

The Refill Prioritisation Strategy Criteria included:

- Presence of significant species (i.e. endangered);
- Other significant species/habitat (i.e. River red gums);
- Uniqueness of wetland;
- Groundwater conditions;
- Evidence of salinisation;
- Decline of tree health; and
- Past drying events.

## Lake Bonney Refill

Lake Bonney was one of the sites temporarily disconnected from the river channel in South Australia during 2007-08 to assist in achieving evaporative water savings.

Refill triggers were established for disconnected sites, based on water quality and ecological parameters. Lake Bonney's critical trigger relates specifically to a salinity level of an annual average of 20,000 EC.

Modelling indicates that, without freshwater inflows, the salinity trigger may be reached in 2009 and the minimum volume of 26 GL is required to keep salinity levels below the trigger.

This partial refill of 26 GL involves the installation of temporary culverts, fitted with meters and regulators, through the existing embankment to ensure maximum flexibility and cost effectiveness in managing flows both in and out of the Lake. The culverts will be fitted with a carp separation cage to enable the carp to be removed from the Lake. Any native fish caught in the cages will be released upstream of the regulators. All of these structures are temporary and can be reused at other sites when removed.

A fish research program will also be undertaken to provide information about the population extent of key large-bodied fish in Lake Bonney, movement patterns, species diversity, population, size and sex of captured fish and the effectiveness of the carp cages.

## Key Achievements

- Community involvement in the management of Lake Bonney.
- Partial re-fill of community managed wetlands.
- Upgrade of drought related access works undertaken to the River Vessel Waste Disposal Stations.
- Tubeworm-encrusted tortoises rescued by community volunteers and rehabilitated from the Lower Lakes and Goolwa Channel.
- Construction work commenced on the Murtho SIS (SIS) and construction continued on the Waikerie Lock 2 SIS.