River Murray Act 2003 Annual Report 2008-2009

Prepared for the South Australian Parliament by the Minister for the River Murray

Department of Water, Land and Biodiversity Conservation - September 2009

Government of South Australia

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FOREWORD

Historic changes to the governance of the Murray-Darling Basin took place in 2008-09 with the signing of the *Intergovernmental Agreement on Murray-Darling Basin Reform* on 3 July 2008. This led the way to the establishment of the Murray Darling Basin Authority and its development of a comprehensive Basin Plan that will require full compatibility of all Basin State water allocation plans.

The referral of powers to the Commonwealth in relation to the management of the Murray-Darling Basin was achieved through major changes to State and Territory legislation. These changes were necessary to facilitate the relocation of the Murray-Darling Basin Agreement to the Commonwealth *Water Act 2007*. South Australia was the first State to table the referred text as the basis of all other jurisdictions' legislation.

South Australia achieved its target under The Living Murray program of purchasing 35 GL of water for environmental flows. While the target of 500 GL for all Basin States combined was not reached by the 30 June 2009 deadline, I am confident it will be achieved by the end of 2009. Funding was also provided under the 3 July COAG agreement for the Lower Lakes Pipelines initiative. Townships and irrigators downstream of Jervois are being connected to the reticulated water supply system, making them independent of the Lower Lakes. This has resulted in further water being saved through reduced evaporation from the lakes. These water savings are in addition to the Commonwealth buyback program being undertaken under Water for the Future.

Despite these achievements it is acknowledged that the condition of the River Murray has continued to decline. What was once considered to be the worst drought in over 100 years may now be evidence of a 'step change' in rainfall patterns. Temporary environmental flow regulators have been constructed to mitigate the impact of acid-sulphate soils in the Goolwa Channel and tributaries, and water is being pumped from Lake Alexandrina into the Channel to maintain water levels. The dredging of the Murray Mouth to maximise tidal flushing of the Coorong continues and a proposal to pump hyper-saline water from the southern end of the Coorong into the ocean is being evaluated.

A decision was made to cease the pumping of water from Lake Alexandrina into Lake Albert on 30 June 2009. In the longer term, as extractions from the Murray-Darling Basin are brought to within sustainable limits, it is considered that sufficient water should be available to allow the lakes to be refilled.

Measures to simplify and streamline development approvals, announced in June 2008 under the State Planning Review, will also potentially have a major impact on the *River Murray Act 2003*. A review of the Act was undertaken during 2008-09 in light of these major changes and a summary of recommendations is included in this report.

The *River Murray Act 2003* Annual Report for 2008-09 is presented.

Hon Karlene Maywald MP

MINISTER FOR THE RIVER MURRAY

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1. INTRODUCTION

This report describes the progress the *River Murray Act 2003* ('the Act') has made in providing special protection for the River Murray. This is the sixth annual report and follows the second triennial review completed in September 2008.

Section 10 of the Act requires the Minister responsible for the administration of the Act, on or before 30 September of each year, to prepare a report on the operation of the Act for the preceding financial year. The Minister must cause a copy of the report to be laid before both Houses of Parliament within six sitting days of the report being prepared.

The report must include:

i) information on the implementation of the Act (taking into account the provisions of the Implementation Strategy);

ii) information on the extent to which the objects of the Act and the Objectives for a Healthy River Murray are being achieved; and

iii) report on the following matters for the financial year –

   a. the referral of matters to the Minister under any related operational Act;

   b. the enforcement of the general duty of care; and

   c. action taken by the Minister for an authorised officer under Part 8 of the Act (protection and other orders).

This annual report relates to the period from 1 July 2008 to 30 June 2009 and has been compiled from information provided from within the Department of Water, Land and Biodiversity Conservation (DWLBC) and other relevant agencies. Agencies contributing to the report are listed in Appendix 4.

2. MEETING THE OBJECTS OF THE ACT AND OBJECTIVES FOR A HEALTHY RIVER MURRAY

The Act sets out a list of objects and the Objectives for a Healthy River Murray ('the ORMs'). The objects and ORMs seek to protect the River Murray by ensuring that all reasonable measures are taken to safeguard, restore and enhance the river. A detailed list of the objects and ORMs can be viewed in Appendix 2 and Appendix 3 respectively.

The Act itself provides both the measures and mechanisms to facilitate protection of the river. Any existing or proposed activities should be undertaken in a way that benefits the river while providing for the economic, social and physical wellbeing of communities, and promoting ecologically sustainable development. Through regulations, referrals, authorised officers, compliance tools and policies implemented pursuant to the Act, the River Murray and its environs can be protected from inappropriate or damaging activities and developments.

There were a large number of programs and projects undertaken in the Murray-Darling Basin during 2008-09 that acted to further progress the objects of the Act and the ORMs. Various government agencies (state, local and national), industry groups and community groups have been involved in a broad range of initiatives designed to improve the health of the river. The work being undertaken in the region is significant and a complete list of programs and projects is provided in Appendix 4.

3. IMPLEMENTATION OF THE ACT

The aim of the Act is to enhance and restore the River Murray in South Australia, ensuring that its use and management are sustainable. To achieve this, the Act aims to ensure that activities that may adversely affect the health of the river are undertaken in a way that protects, maintains and improves river health.

The purpose of the Act is to provide coordination of, and fill gaps between the many Acts applicable to the management of the SA Murray-Darling Basin and its resources. The establishment of the referral mechanism has been central to the integration of the river's interest into the existing legislative base.

Implementation of the Act in 2008-09 has concentrated on publishing and marketing *River Murray Act 2003* Referral Policy Guidelines, reviewing the Act in light of the Planning Review and amended Commonwealth *Water Act 2007*, responding to referrals, assessing State Government policy documents against the objects of the Act, compliance matters and continuing to maintain good relations with stakeholders.

3.1 IMPLEMENTATION STRATEGY

Following the release of the *River Murray Act 2003 Implementation Strategy* in June 2006, the Minister has approved the following publications that assist in promoting understanding and implementation of the Act:

- Overview and General Provisions (April 2007)
- Neutral or Beneficial Effect Guidelines (released as pilot April 2007)
- Activity and Special Provisions (released October 2008)

The strategic relationship between these documents is shown in Figure 1:

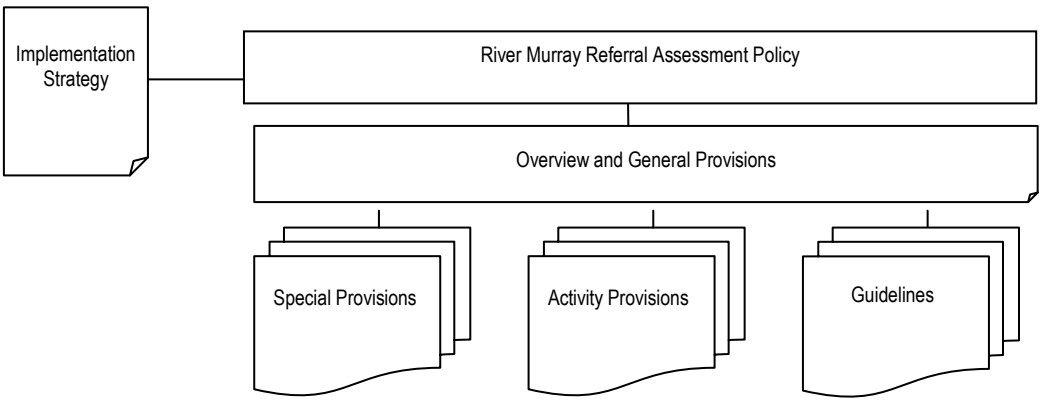


Figure 1: River Murray Referral Assessment Framework

In addition, the Minister also approved the release of the Fact Sheet - Water Licences for Marinas, Canal Estates and other Artificial Water Bodies - in late 2008.

These documents are discussed further in section 3.5 below.

3.2 SWITCHING ON PROVISIONS

Section 9 of the Act gives the Minister the ability to impose conditions on activity authorisations, through the operation of the referral mechanism. The mechanism ensures

that applications for certain prescribed activities under related operational Acts are referred to the Minister for the River Murray as part of the approval process. The referral mechanism for most of the related operational Acts is only activated when regulations are made (with the exception of the *Fisheries Management Act 2007*, *Mining Act 1971* and the *Petroleum Act 2000*, which have the requirement for referral written into the body of the Act itself).

The exemption for the requirement to refer certain dredging activities that was gazetted in December 2006 has continued for the 2007-08 and 2008-09 period.

No new regulations were made in the 2008-09 financial year to require additional referral of development or activity applications under related operational acts.

3.3 DELEGATIONS

Section 12 of the Act allows the Minister to delegate functions or powers under the Act or under any related operational Act to a body or person, for the time being, holding or acting in a specified office or position.

Some of the Minister's functions and powers are delegated to positions within State Government departments and statutory bodies, rather than to specific persons. This provides maximum flexibility for officers acting in positions to which functions or powers have been delegated, as they are able to undertake the functions and powers without further authorisation.

With the exception of native vegetation clearance applications, most delegations were put in place shortly after the Act came into operation and have been amended over time as required. Delegation of native vegetation clearance applications is progressively being instituted through a staff rotation between the Native Vegetation Group and the Natural Resources Management (NRM) Planning Group (both located within DWLBC) as part of the DWLBC graduate program. This will enable changes to the provisions relating to clearing around houses (to reduce bushfire risk) to be passed to the NRM Planning Group for assessment under delegation.

3.4 APPOINTMENT OF AUTHORISED OFFICERS

The Act provides various tools to promote and enforce compliance with the duty of care, including conditions imposed through the statutory referral process and through the regulations. Staff of DWLBC, the Environment Protection Authority (EPA), Primary Industries and Resources (PIRSA) and the SA Murray-Darling Basin and Adelaide and Mount Lofty Ranges NRM Boards, have been appointed as Authorised Officers under the Act.

No training sessions specific to the *River Murray Act 2003* have been held since its inception. However, a five-day course is held every year for officers authorised under the *Natural Resources Management Act 2004.* Eleven new officers undertook this course in 2008-09. The course is facilitated by the University of South Australia in conjunction with DWLBC and includes instruction on the enforcement of provisions of related Acts, including the *River Murray Act 2003*.

Currently there are forty officers authorised within the SA Murray-Darling Basin; seventeen regional officers employed by the SA Murray-Darling Basin NRM Board, twelve state officers from the Investigations Unit of DWLBC and ten casual officers employed to enforce

domestic water restrictions. One DWLBC compliance officer is in the field full time to follow up complaints, check compliance with conditions of statutory approvals and enforce the general duty of care.

The *River Murray Act 2003 Compliance and Enforcement Guidelines* and information sheet (as required under section 14 (10) of the Act) written during 2004-05, remain in force without amendment.

3.5 RAISING AWARENESS

Marinas and other artificial water bodies

In October 2008 an operational policy was developed detailing the legal and technical requirements for water licensing to account for water taken by artificial water bodies, including both initial fill and annual evaporative losses. *Fact Sheet # 91 – Water Licences for Marinas, Canal Estates and other Artificial Water Bodies*, was developed and approved for publication by the Minister in April 2009.

The impact of existing marinas is being considered in relation to the amended Water Allocation Plan for the River Murray Prescribed Watercourse, which is due following the completion of the Basin Plan in 2011. The water allocation plan will need to comply with the Basin Plan.

***Neutral or Beneficial Effect Guidelines* pilot program**

Following the publication of the *Overview and General Provisions* in April 2007, the Minister approved the release of the *Neutral or Beneficial Effect Guidelines* on a six-month trial basis. The trial included an anonymous survey of fifty external stakeholders and an internal test of the guidelines by the NRM Planning Group using real life development proposals.

Fifteen questionnaires were completed of the stakeholder surveys, including two conducted over the telephone and five posted after reminder calls, representing a return rate of 30%. Responses were generally positive with most respondents finding the guidelines reasonably easy to average to understand. Some respondents found the guidelines beneficial to understanding environmental impacts thereby making it easier to foresee and address potential impacts in their proposals. However, it was evident that other respondents were confused about the role of the Minister for the River Murray in the approval process and that further work is needed to explain the referral mechanism to stakeholders.

The NRM Planning Group found the guidelines useful in providing a structured basis on which to assess referred applications and formulate conditions for approval. However, the group has advised that in order to strengthen the Minister's ability to enforce conditions on the approval of development applications in the River Murray protection areas, more specific technical guides are needed. These guides should be based on good science and incorporated into the Act or its regulations in order to give them sufficient legal force. Typical issues that need to be addressed are riverbank erosion and slumping, the construction of access tracks on cliff faces and embankments, the construction of boat ramps and jetties, and the clearance of vegetation around existing and proposed dwellings and other developments.

Activity and Special Provisions

As reported above (section 3.1) the Minister approved the release of four special/activity provisions in October 2008. The provisions relate to Heritage, Coast, Aquaculture, and Wetlands and Floodplains. They build on the *Neutral or Beneficial Effect Guidelines* by

providing detailed information pertinent to those activities or locations. The provisions have been published on the DWLBC internet but have not been printed in hard copy form. It is proposed that they be introduced to Council planners at a roadshow[1] planned for 2009-10.

3.6 MANAGEMENT AGREEMENTS

Section 18 of the Act allows the Minister to enter into management agreements with owners of land within the Murray-Darling Basin. The potential scope for management agreements is very wide. They may relate to:

- conservation or management of water;
- preservation, conservation, management, enhancement or re-establishment of any aspect of the natural resources of the River Murray; or
- any other matter associated with furthering the objects of the Act or the ORMs.

No management agreements under the *River Murray Act 2003* have been drafted to date. However, the Minister's delegate has been party to the drafting of several land management agreements (as provided under section 57 of the Development Act) between local councils and applicants to ensure ongoing compliance with the ORMs.

Draft management agreements were prepared in 2005-06 between the Angas Bremer Irrigators Revegetation Association Incorporated and water licence holders to cement a legal commitment to planting and maintaining vegetation as a condition of their water licences. The agreements were not activated because much of the required tree planting took place on Council owned land and it was considered inappropriate to bind licence holders to an agreement over land not owned by them.

The unbundling of water rights, which commenced on 1 July 2009, now enables conditions relating to tree planting (and similar conditions) to be endorsed on site use approvals rather than water licences. The licence holder and the owner of the land in question will need to co-sign the site use approval for the tree planting and a link will need to be maintained with the water licence to ensure that the licence holder is committed on ongoing maintenance of the trees as long as water is continued to be taken. If the water licence is transferred to another party, the site use approval will also need to be amended in favor of the new party who will be required to co-sign the land use approval with the landowner. Consequently management agreements will not be required to enforce conditions of water licences over land.

[1] Other issues to be addressed at the roadshow include the promotion of the *River Murray Act 2003 Overview and General Provisions* and *Neutral or Beneficial Effect Guidelines*, measures to improve the referral mechanism and implement the requirements of the Planning Review, and changes to water licensing and permitting requirements following the unbundling of water rights that commenced on 1 July 2009.

4. REFERRALS, ENFORCEMENT OF THE GENERAL DUTY OF CARE AND ACTIONS TAKEN

The provisions within the Act for establishing referrals and the general duty of care are important tools in ensuring the protection of the River Murray.

The referral provisions of the Act require bodies administering related operational Acts (see Appendix 1) to take the River Murray into account when preparing plans and undertaking functions. The bodies must also seek input from the Minister for the River Murray before granting approval for certain types of activities in particular locations. Most of the referral provisions require regulations to be made, which in turn set out the types of activities that need to be referred. Few regulations have been made to date. Details of the regulations that have been made can be found in Section 4.1.

The Act also established a duty of care for the river, enforceable by a River Murray Protection Order or Reparation Order. All persons have a general duty of care to take reasonable measures to prevent or minimise harm to the river through actions or activities. A breach of this duty does not constitute an offence but the issuing of a Protection Order or Reparation Order can enforce compliance.

Information on the enforcement of the general duty of care and actions taken during 2008-09 is provided in sections 4.2 and 4.3.

4.1 REFERRAL OF MATTERS UNDER RELATED OPERATIONAL ACTS

The Acts currently requiring referral of proposals to the Minister for the River Murray for comment or direction are the *Development Act 1993*, *Mining Act 1971*, *Petroleum Act 2000, Harbours and Navigation Act 1993* and the *Fisheries Management Act 2007*. The majority of referrals are being generated pursuant to the *Development Regulations 1993.* In December 2006, an exemption for the requirement to refer certain dredging activities to the Minister was gazetted in response to the drought. The number of formal referrals increased during 2008-09 compared to 2007-08. However, compared to previous years, the number of referrals is still relatively low.

4.1.1 DEVELOPMENT ACT 1993

Development applications for prescribed activities within the River Murray protection areas are referred to the Minister for the River Murray. The Minister may direct the relevant authority to refuse the application or may impose conditions of approval if the application is to be approved by the relevant authority.

Development Applications

During 2008-09, five hundred and thirty five mandatory referrals under Schedule 8 of the Development Regulations were assessed against the objects of the Act and the ORMs. In addition, forty one emergency drought dredging applications, although formally exempt under the Notice of Exemption, were still referred informally to the Minister for the River Murray to ensure compliance with the objects of the Act and the ORMs. Referral fees were not charged for these exempted applications.

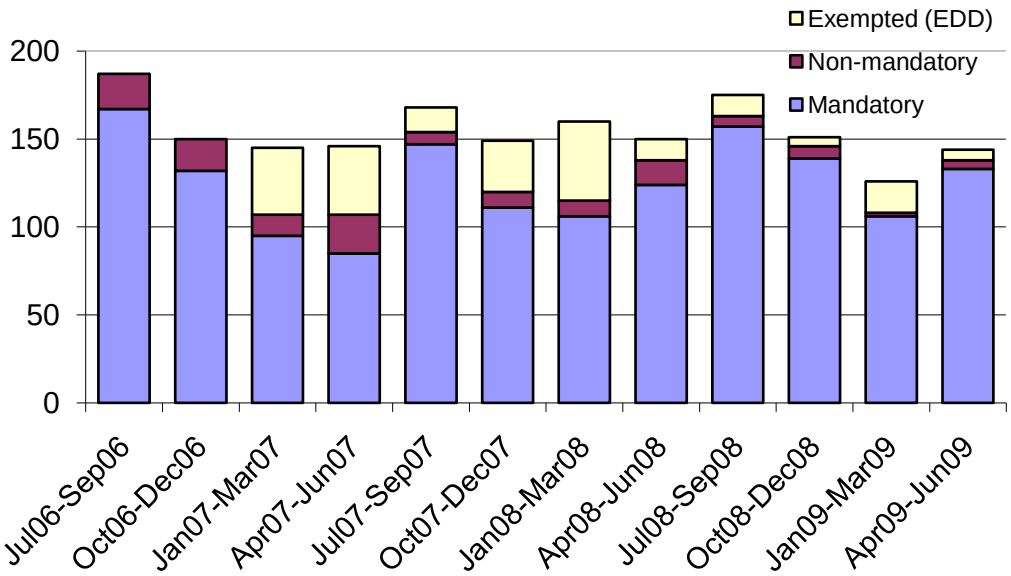
Of the total five hundred and seventy six mandatory *and* exempted applications approximately two hundred and sixty (45%) were for dwellings, sheds, garages and outbuildings and one hundred and forty five (25%) were land divisions. The remaining referrals (30% - including the emergency dredging) related to land use, river use, water use, alteration to the landscape and/or impacts upon riparian zones, vegetation or biodiversity. Almost all mandatory referrals had conditions imposed on them by the Minister.

When an application has been referred for assessment against the objects of the Act and ORMs, additional information from an applicant can be requested by the referral agency. A request for further information effectively 'stops the clock' on the period prescribed for a response from the referral agency.

The Minister's delegate negotiated formally with fifty-nine applicants, stopping the clock for further information. For 20% - 30% of applicants, additional information was sought informally via telephone discussions, site visits or email, negating the need to stop the clock. Five hundred and fourteen (96%) of the mandatory referrals were responded to within required statutory timeframes (8 weeks).

In addition to the mandatory and exempted mandatory referrals, twenty non-mandatory referrals were made to the Minister for the River Murray, for additional activities within a River Murray protection area or the broader SA Murray-Darling Basin. In these cases, recommendations were provided to the referring body for consideration in their decision making process.

Figure 2. Number of Mandatory/ Exempted (EDD) / Non Mandatory Referrals 2006-07, 2007-08 and 2008-09.



Development Plan Amendments

Under section 24(3) of the *Development Act 1993,* if a proposed amendment to a Development Plan relates to any part of the Murray Darling Basin the Minister

for Planning must consult with and have regard to the views of the Minister for the River Murray.

DWLBC also receives Development Plan amendment proposals at several stages of the planning process directly from Planning SA[2]. The NRM Planning Group assesses the proposed amendments on behalf of the Minister and the Department simultaneously. If recommendations on behalf of the Department and the Minister are divergent, the group can request a separate referral on behalf of the Minister after State agency consultation has concluded.

During 2008-09, nine Development Plan amendments and six statements of intent relating to **l**and within the Murray-Darling Basin were assessed on behalf of the Minister. DWLBC responded to each of these referrals with comments and recommendations.

4.1.2 MINING ACT 1971

Under the *Mining Act 1971* applications, including renewals, within a River Murray protection area must be referred to the Minister for the River Murray for:

- exploration licences,
- mining leases;
- miscellaneous purpose licences;
- retention leases; and
- authorisations to use declared equipment;

Twenty-seven referrals were assessed for a variety of exploration licenses, declared equipment use and mining leases during 2008-09.

4.1.3 PETROLEUM ACT 2000

Under the *Petroleum Act 2000*, statements of environmental objectives, including a revised statement that applies to any part of the Murray-Darling Basin, must be referred to the Minister for the River Murray.

During 2008-09, no referrals under the *Petroleum Act 2000* were made.

4.1.4 CONSEQUENTIAL AMENDMENTS FROM *MARINE PARKS ACT 2007*

Consequential amendments to the *Mining Act 1993* and *Petroleum Act 2000* have resulted from the adoption of the *Marine Parks Act 2007*. Formerly applications under these Acts required referral to the Minister for the River Murray where they were within a River Murray protection area. The Acts have been amended to require that applications *adjacent to and within a specially protected area* must now be referred. The River Murray protection areas are no longer specifically referred to in the Acts, but are included in the definition of a specially protected area along with marine parks and the Adelaide Dolphin Sanctuary.

[2] Section 26 of the Development Act provides that the Minister for Planning may refer a DPA to any government Department or agency that in the Minister's opinion has a direct interest in the matter.

PIRSA Minerals is examining various options for the referrals of its applications, including:

Maintain the current procedure

If the intent of the consequential amendments was to simplify the legislation with the incorporation of the provisions relating to the Adelaide Dolphin Sanctuary, which formerly required referral of any application *within and adjacent* to the Sanctuary to 'the Minister for the Adelaide Dolphin Sanctuary', this would suggest that the current procedures should be maintained with regard to the River Murray protection areas, i.e. only applications *within* the protection areas should be referred.

Include adjoining locations that could be impacted by the proposal

Mining proposals, even if not physically within a protection area, have the potential to have an impact that is beyond the cadastral boundaries of the site. It is possible, for example, that impacts of mine dewatering on underground water resources connected to a River Murray protection area might need to be referred. Issues related to mineral processing, transportation, waste stockpiling and spillage as well as mine rehabilitation might also need to be considered when deciding whether a proposal needs to be referred, notwithstanding that the proposal location might be some distance from the protection area boundary.

Development Act interpretation of adjoining land

The *Development Act 1993* could provide a precedent for interpreting the amended legislation. It defines 'adjacent land' in section 4(1) as 'unless the contrary intention appears adjacent land in relation to other land, (adjacent land) means land that abuts the other land; or that is no more than 60 metres from the other land and is directly separated from the other land only by a road, street, footpath, railway or thoroughfare, watercourse; reserve or other similar open space.

4.1.5 HARBOURS AND NAVIGATION ACT 1993

River events that require a licence under the *Harbours and Navigation Act 1993* and involve activities as specified in the regulations, must be referred to the Minister for the River Murray.

Fourteen aquatic activity licenses were referred during 2008-09.

4.1.6 FISHERIES MANAGEMENT ACT 2007

Activities that require a licence or a permit or an exemption from a license or a permit under the *Fisheries Management Act 2007* must consult with the Minister for the River Murray.

Thirteen exemptions from the requirement of needing a permit were referred during 2008-09.

4.1.7 CONSEQUENTIAL AMENDMENTS FROM WATER ACT 2007

In September 2008 the *Murray Darling Basin Act 1993* was repealed and replaced with the *Murray Darling Basin Act 2008* as a result of amendments to the (Commonwealth) *Water Act 2007*.

Previously, the Murray-Darling Basin Agreement was a schedule to the relevant legislation for each State. With the change to the legislation, the Agreement is now a schedule to the *Water Act 2007* and has been removed from the individual State and Territory Acts. The new *Murray Darling Basin Act 2008* also has added or amended:

- provisions relating to the Basin Officials Committee (a new entity created by the *Water Act 2007*) (Part 2 of the *Murray Darling Basin Act 2008*)
- the status of the Minister for the River Murray (to act on behalf of the State as a contracting government under the Agreement) (s9)
- the requirement for a copy of the annual report of the Murray-Darling Basin Authority to be laid before the South Australian Parliament (s17) and
- increased powers of delegation by the Minister for the River Murray to a body or person in relation to the Agreement (s18).

Consequential amendments also resulted to the *River Murray Act 2003* as a result of the changes, including:

- reference to the *Water Act 2007* instead of the *Murray Darling Basin Act 1993* for the purposes of defining the Murray Darling Basin and the Agreement (s3(1))
- reference to the *Murray Darling Basin Act 2008* instead of the *Murray Darling Basin Act 1993* generally in the *River Murray Act 2003*
- increased powers to the Minister for the River Murray to include furthering the objects of the *Murray Darling Basin Act 2008* and the Basin Plan (s9(5))
- changes to the powers of the Minster for the River Murray in relation to carrying out projects i.e. including projects relevant to the implementation or operation of the Murray-Darling Basin Agreement, any resolution of the Ministerial Council under the Agreement or the Basin Plan (s9(6)) and
- changes to provisions relating to the development of related policies and consideration of activities (statutory instruments and authorisations) requiring the Minister for the River Murray to take into account the operation of the Murray-Darling Basin Agreement, any resolution of the Ministerial Council under the Agreement or the Basin Plan (s22(4)).

It is too early to predict whether these amendments will have a major impact on the administration of the *River Murray Act 2003* due to the differences between the *River Murray Act 2003* and the *Water Act 2007* in their focus. It is more likely that the *Water Act 2007* and in particular the Basin Plan will affect the *Natural Resources Management Act* 2004 in terms of water allocation plan policies rather than the *River Murray Act 2003* in terms of development approval. However, it remains a possibility that land use planning could be impacted to a

greater extent by Commonwealth policies, particularly if the health of the river continues to decline even further and more drastic changes are required. Potential triggers include major blue-green algae outbreaks, increases in salinity that make River Murray water a danger to human and animal health, soil acidification and riverbank or cliff slumping.

4.2 ENFORCEMENT OF THE GENERAL DUTY OF CARE

The general duty of care states, 'a person must take all reasonable measures to prevent or minimise any harm to the River Murray through his or her actions or activities'. Harm includes risk of harm, future harm and anything declared by regulation to be harm. Harm need not be permanent but must be more than transient or tenuous in nature, for example the deposition of material on the floodplain whether from excavated channels or to create an artificial beach. A written or verbal warning may be appropriate if the problem can be quickly corrected in a short time and the detrimental effect on the river will be minor. A compliance order may be used to enforce a breach of duty of care (see section 4.3).

A compliance officer was employed full time during 2008-09. In addition to enforcing the general duty of care principle, the officer was involved in educating and raising awareness amongst stakeholders, councils, and State Government agencies that have a vested interest in the welfare of the River Murray.

4.3 ACTIONS TAKEN UNDER PART 8 OF THE ACT – PROTECTION AND OTHER ORDERS

River Murray protection orders may be issued to secure compliance with the general duty of care, a condition of a statutory authorisation or any other requirement. An order may require a person to stop or not initiate a particular activity, to only carry on an activity at a particular time, to take specified action within a certain timeframe, to undertake tests or monitoring or prepare a plan or report. If urgent action is required, an authorised officer may issue an emergency protection order. It is an offence not to comply with a protection order.

A reparation order may be issued if the Minister is satisfied a person has caused harm to the River Murray by contravening the general duty of care, a condition of a statutory authorisation or any other requirement. A reparation order may require a person to take particular action to make good any damage or make payments to enable action to be so taken. The order may include other requirements to prevent or mitigate further harm to the river. An authorised officer may also issue an emergency reparation order.

During 2008-09 there were a significant number of matters reported, many of these attributable to the prevailing decline in river flows. Eighty matters were reported relating to activities that were likely to cause harm to the river. However, as a result of negotiating with the parties responsible for causing the harm, repairs were undertaken on a voluntary basis without the need for a River Murray order being issued. The role of the River Murray Compliance Officer has now become significant with local councils officers, Government officials and the general public aware that they have a contact where issues relating to the river may be able to be resolved. Most issues relate to development matters, destruction of native vegetation and harm to the riverbank.

The River Murray Compliance Officer attended a number of community meetings and responded to questions relating to concerns of river residents, largely drought conditions and lower water levels. The Compliance Officer acts as a conduit between local councils

and State agencies and has organised meetings with such groups to highlight and resolve problems that have occurred. Such matters investigated during 2008-09 are described under the following headings:

Sand dumping

In the past small sand deposits occurred in isolated locations along the river. Low water levels have resulted in an increased number of landholders depositing sand to shore up riverbanks or create artificial beaches, in some cases truckloads of sand being deposited, some of which was sourced from Branched Broomrape containment areas. This activity breaches the Environment Protection (Water Quality) Policy and could also be a breach of the *Development Act 1993*. The activity has the potential to cause harm to the river, especially when water levels rise and mobilise the sand. Rehabilitation is difficult or impossible to achieve. Officers administering the *River Murray Act 2003* actively supported a program initiated by the EPA to educate river residents and warn them of potential penalties. Expiation notices have been issued where there have been continuing offences. The practice has now abated.

The River Murray Compliance Officer was the first point of contact for sand dumping incidents. The officer facilitated the identification of appropriate legislative and departmental personnel to deal with the issue.

Emergency dredging

Dredging was removed from the requirement to refer development applications to the Minister for the River Murray in a move to assist those adversely affected by the drought. However this activity has caused concern in some cases where material extracted from the river was deposited and left on the flood plain. This was a contravention of the exemption from referral under the emergency dredging provisions. Subsequent compliance action required deposited material to be removed.

Development / planning issues

Unprecedented low river levels have contributed to some residents extending boat ramps, jetties and moorings without submitting development applications. Many of these activities failed to comply with approved specifications and pose a risk of harm to the river and to the public. Liaison with councils and relevant agencies occurred to ensure that residents were aware of their obligations.

Houseboat relocation

Despite the inherent risks to water quality, a program was initiated to allow houseboats to be moored on the main course of the river where access to a marina was limited or prevented due to low water levels. Complaints were received that this has resulted in the destruction of native vegetation and riverbank erosion. The problem continues to be closely monitored. Emergency houseboat moorings have been constructed to alleviate the problem (see Appendix 4 – Emergency moorings for River Murray Houseboats, under ORM 4.1).

Illegal taking of water

Due to the extreme conditions relating to the taking of water from the river, the River Murray Compliance Officer has been involved in the investigation of a number of matters where irrigators have been involved in water theft. In 2007-08 some water meters were deliberately tampered with and offenders prosecuted. However, after the meters were re-sealed the practice now seems to have ceased. The situation continues to be closely monitored.

Restrictions on domestic water use also apply to the River Murray (the same restrictions that generally apply throughout South Australia in relation to garden water times, refilling swimming pools, car washing etc). DWLBC employs ten casual staff to police domestic water restrictions (i.e. water taken at shack sites and other residential locations along the river). A number of cautions/expiations were issued during 2008-09.

Riverbank Slumping

The River Murray Compliance Officer has been involved in locating and advising on areas where riverbank slumping has occurred or is at risk of occurring and attended meetings as a member of the Stakeholders Group.

4.4 REVIEW OF THE RIVER MURRAY ACT 2003 IN LIGHT OF THE PLANNING REVIEW

During 2008 the State Government undertook a major review of the planning system with a view to simplifying the approvals process and reducing assessment times. Recommendations from the review fall into the following categories:

- A 're-invigorated' planning strategy, incorporating a 30-year plan for Adelaide that promotes transit-oriented development using structure plans to bypass local Council approval
- Streamlined development assessment incorporating a new Residential Code to speed up planning approvals, more exempt development, development requiring building approval only, merit-based assessment, reduced stop the clock provisions, electronic lodgement and assessment and improved private certification
- An overhaul of land supply management, incorporating an improved approach to native vegetation through better upfront strategic planning and removing multiple referrals.

The recommendations of the Planning Review impact on the 'stop the clock provisions' of the *River Murray Act 2003*, provided under section 22(6), that allow the Minister to take extra time to assess applications when they require consultation with agencies responsible for administering the related operational Acts. It is also possible that a greater number of exempt or merit-based developments will no longer require referral to the Minister (because they will no longer require development approval). This will mean that the Minister will no longer have an opportunity to review such proposals. While the impact of such developments may be small, their cumulative impact, if they become prolific and are not regulated, could be considerable. Consequently it was considered that the referral

mechanism of the *River Murray Act 2003* needed to be assessed in light of the Planning Review.

The Policy Division of DWLBC undertook review during 2008-09. The project aims were to determine the:

- implications of the Planning Review
- current constraints to the effectiveness of the Act
- extent to which other legislation and policy contributes to the achievement of the objects of the *River Murray Act 2003* and the ORMs
- extent to which the referral mechanism currently contributes to the achievement of the objects of the *River Murray Act 2003* and the ORMs, and to
- identify future options for the *River Murray Act 2003*.

The main conclusions were:

4.4.1 The referral mechanism under Schedule 8 of the Development Regulations appears to be effective in promoting the ORMs and Objects of the Act. However, it is mainly achieved through a process of negotiation with proponents rather than an 'arm's length' review of the development proposal. Whilst this approach might be good in engendering good rapport with proponents, there is a concern that DWLBC planners are duplicating the assessment conducted by local government planners. Equally, there is a concern that the policies developed to enable a more objective and thorough analysis of the potential impacts of the proposal on the ORMS and Objects (see section 3.1) are not being used, or are ineffective. Proposals are rarely refused outright and conditions negotiated with proponents are mostly generic, implying that further education of local council planners could provide a similar outcome.

4.4.2 The referral of development and activity proposals under other related Acts works well in achieving a streamlined approach to responding to development proposals. The one-stop-shop approach appears to work well. However, responses to the survey carried out of the Neutral or Beneficial Effect Guidelines (see section 3.5) indicate that more effort is needed to promote a better understanding of the referral process to proponents and the community in general.

4.4.3 At present the only Acts that have regulations requiring referral to the Minister for the River Murray are the *Development Act 1993*, *Petroleum Act 2000*, *Harbours and Navigation Act 1993*, *Fisheries Management Act 2007* and any *Mining Act 1971*. However, there is probably no need to extend this requirement to other related operational Acts because the one-stop-shop mechanism that operates under Schedule 8 of the Development Regulations already effectively requires the Minister to pass on applications to the agencies responsible for those Acts to ensure that any requirements under that legislation are considered[3].

[3] Furthermore, the Department for Environment and Heritage directs people requiring approval for developments under the Crown Lands Act (e.g. jetties, landings etc) to first seek development approval, thereby ensuring that the proposal is referred to the Minister for the River Murray. Native Vegetation Act applications are assessed within DWLBC, with a sharing of the workload between the Native Vegetation Group and the NRM Planning Group.

4.4.4 There is currently no documented process (apart from an administrative procedure manual) for how an assessment decision is arrived at. An assessment report could rectify this and is being considered. The NRM Planning Group has advised that technical guides (see section 3.5 above) are needed to provide a more rigorous basis to formulating conditions to approval of applications, or alternatively as a basis for recommending refusal with confidence that the decision could be defended in the Environmental Resources and Development Court. This echoes Council requests for better access to DWLBC for specific technical advice.

4.4.5 Placing conditions of approval on development approvals is of little use if these decisions are not enforced. Several local councils have advised that the capacity of local government to enforce compliance is severely limited due to funding constraints. While under the *River Murray Act 2003* DWLBC has at its disposal a range of orders available for the enforcement of the general duty of care, these orders are not regularly engaged, or used as a last resort. The option of management agreements has not been employed since inception of the Act.

4.4.6 There is strategic value to retaining referral of land division and change of use applications, but the provisions of the *Natural Resources Management Act 2004* could equally cover these applications. While there is merit in the proposal to use structure plans in areas where development is likely to be focussed, it is important to understand that the Minister for the River Murray would have not specific powers in relation to such instruments. However, it could be expected that structure plans could be available for comment after they are completed as part of the rezoning process.

4.4.7 If the number of exempt or merit based development increases substantially, the use of structure plans should be explored as a means of addressing the potential cumulative impacts. For example, Councils, NRM Boards and State Government agencies could work closely together to develop detailed structure plans that guide development along the river. Where major new developments are envisaged and land divisions are proposed to accommodate such developments, structure plans could be required to ensure that the impacts of these developments are ameliorated. Potential conflicts could be resolved in advance, for example: items or places of Aboriginal or European heritage (where their identification does not cause harm), stands of native vegetation, significant trees, wetlands, areas prone to flooding, slumping or waterlogging, significant cliff faces, and so on.

5. SUMMARY

As has been stated in previous annual reports, the assessment of a causal link between the operation of the *River Murray Act 2003* and positive outcomes for river health is a challenge due to the long time lag that exists between those actions and outcomes. There is also an issue of scale that makes it difficult to assess any interaction between development activity at a local level and the broader issues facing the Murray-Darling Basin as a region. Nevertheless, the following positive attributes of the referral mechanism deserve highlighting:

- The referral of development proposals, strategic policies and statutory instruments continues to operate efficiently, with all relevant agencies working well together in a cooperative manner;
- The one-stop-shop assessment of development proposals continues to provide an integrated and comprehensive means of reducing the potential for any harm to occur to the river and its environs, and
- The majority of problems identified are addressed through amicable negotiation between the Minister's delegate and the proponents.

Major changes have occurred to the management of the Murray-Darling Basin over the past year, particularly in relation to the referral or powers to the Commonwealth of the Murray-Darling Basin Agreement, the commencement of the Basin Plan, and emergency measures that have commenced in the Lower Lakes. Together with the review of the planning system in South Australia, this creates an imperative to reassess the operation of the Act. An internal review of the operation of Act has been completed and a number of conclusions have been reached. In particular:

- There is a need to ensure that decisions are made more objectively and are clearly documented, referral policies and guidelines are used more effectively and technical guides are prepared to address specific needs;
- There is a need to better address compliance with conditions as well as illegal development activities; and
- A more long term, strategic approach is needed to land use planning to ensure that the cumulative impact of development is addressed and the overriding needs of the Basin as a whole are addressed.

During 2008-09, a great number of projects and policies have been commenced, completed or are ongoing that are aimed at addressing the many trials facing the river. These are listed in Appendix 4.

APPENDIX 1 – RELATED OPERATIONAL ACTS

The *River Murray Act 2003* amended the following related operational Acts to require alignment with *River Murray Act 2003* objects and objectives. Those that have specific provisions requiring referral of certain applications are shown in bold:

Aquaculture Act 2001
Coast Protection Act 1972
Crown Lands Act 1929
Development Act 1993
Environment Protection Act 1993
Fisheries Management Act 2007
Harbors and Navigation Act 1993
Heritage Places Act 1993
Historic Shipwrecks Act 1981
Irrigation Act 1994
Mining Act 1971
Murray-Darling Basin Act 2008
National Parks and Wildlife Act 1972
Native Vegetation Act 1991
Natural Resource Management Act 2004
Opal Mining Act 1995
Petroleum Act 2000
South Eastern Water Conservation and Drainage Act 1992

APPENDIX 2 – OBJECTS OF THE *RIVER MURRAY ACT 2003*

The objects of the Act are:

i. to ensure that all reasonable and practicable measures are taken to protect, restore and enhance the River Murray in recognition of its critical importance to the South Australian community and its unique value from environmental, economic and social perspectives and to give special acknowledgement to the need to ensure that the use and management of the River Murray sustains the physical, economic and social well being of the people of the state and facilitates the economic development of the state; and

ii. to provide mechanisms to ensure that any development or activities that may affect the River Murray are undertaken in a way that provides the greatest benefit to, or protection of, the River Murray while at the same time providing for the economic, social and physical well being of the community; and

iii. to provide a mechanism so that development and activities that are unacceptable in view of their adverse effects on the River Murray are prevented from proceeding, regulated or brought to an end; and

iv. to promote the principles of ecologically sustainable development in relation to the use and management of the River Murray; and

v. to ensure that proper weight is given to the significance and well being of the River Murray when legislative plans and strategies are being developed and implemented; and

vi. to respect the interests and aspirations of Indigenous peoples with an association with the River Murray and to give due recognition to the ability of those Indigenous people to make a significant contribution to the promotion of the principles of ecologically sustainable development in relation to the use and management of the River Murray; and

vii. to respect the interests and views of other people within the community with an association with the River Murray and to give due recognition to the ability of those people to make a significant contribution to the promotion of the principles of ecologically sustainable development in relation to the use and management of the River Murray, and

viii. otherwise to ensure the future health, and to recognise the importance, of the River Murray.

APPENDIX 3 – OBJECTIVES FOR A HEALTHY RIVER MURRAY (THE ORMS)

OBJECTIVES FOR A HEALTHY RIVER MURRAY (ORMS)

River Health Objectives

There are four river health objectives collectively covering the issues of:

- maintenance, protection and restoration of key habitats and ecological processes;
- protection and restoration of River Murray environments, particularly high-value floodplains and wetlands of national and international importance;
- prevention of native plant and animal extinctions; and
- avoiding and overcoming barriers to the migration of native animal species.

Environmental Flow Objectives

Three environmental flow objectives address the matters of:

- reinstatement and maintenance of ecologically significant elements of the River Murray system natural flow regime;
- keeping open the Murray mouth in order to maintain navigation and fish passage and to enhance the health of the River Murray system and Coorong; and
- significantly improving connectivity between and within the environments constituted by the River Murray system.

Water Quality Objectives

The four water quality objectives seek to:

- improve water quality within the River Murray system to a level that sustains the ecological processes, environmental values and productive capacity of the system;
- minimise the impact of salinity on the ecological processes and productive capacity of the River Murray system;
- manage nutrient levels within the River Murray system so as to prevent or reduce the occurrence of algal blooms, and to minimise other nutrient related impacts;
- minimise the impact of potential pollutants, such as sediment and pesticides, on the environments within the River Murray system.

Human Dimension Objectives

The human dimension objectives aim to:

- implement a responsive and adaptable approach to the management of the River Murray System, taking into account ecological outcomes, community interests and new information as it comes to hand;
- promote the health and proper management of the River Murray system by gathering, considering and disseminating the community's knowledge and understanding of the system;
- take into account the interests of the community by recognising indigenous and other cultural and historical relationships with the River Murray environs, and by

ensuring appropriate participation in processes associated with the management of the system;

recognise the importance of a healthy river to the economic, social and cultural prosperity of communities along the length of the river, and the community more generally.

APPENDIX 4 – PROGRAMS AND PROJECTS

The following agencies have provided information in relation to programs and projects described below:

Department for Environment and Heritage (DEH)
Department of Planning and Local Government (DPLG)
Department of the Premier and Cabinet (Aboriginal Affairs and Reconciliation Division)
Department of Primary Industries and Resources (PIRSA)
Department of Trade and Economic Development (DTED)
Department for Transport, Energy and Infrastructure (DTEI)
Department of Water, Land and Biodiversity Conservation (DWLBC)
Environment Protection Authority (EPA)
Murray Darling Basin Authority
Murray Darling Basin Commission
SA Water
SA Murray-Darling Basin Natural Resources Management Board
South Australian Tourism Commission (SATC)
South Australian Research and Development Institute (SARDI)

The South Australian Government supports a wide range of programs that directly contribute to or complement the Objects of the Act and the ORMs. These programs are listed below against the relevant ORM. Programs have not been listed against the Objects of the Act, as the ORMs provide a more detailed breakdown and encompass programs that relate to the objects.

1.1 The key habitat features in the River Murray system are to be maintained, protected and restored in order to enhance ecological processes

- **Chowilla Fish Ecology Project**

  The Chowilla Fish Ecology Project is a collaborative research project of the South Australian Research and Development Institute (SARDI) and the SA Murray-Darling Basin Natural Resources Management Board funded through The Living Murray Environmental Works and Measures Program of the Murray Darling Basin Authority.

  The project continues to investigate a number of aspects of the ecology of fish and fish assemblages in the Chowilla Anabranch system and adjacent River Murray. Specific investigations carried out during 2008-09 included the spawning and movement of Murray Cod, the impact of experimentally altering flow regime on behaviour of golden Perch and Murray Cod, and impact of The Living Murray condition monitoring at approximately 20 sites in the system.

  These investigations are informing the management and delivery of environmental water and associated infrastructure at the Chowilla Icon Site.

- **Conservation park management plans**

  In 2008-09, the Minister for Environment and Conservation adopted a management plan for Ngaut Ngaut Conservation Park. Draft management plans are in preparation for other reserves within the Basin, including Billiatt Conservation Park; Billiatt Wilderness Protection Area; Karte Conservation Park; Peebinga Conservation Park; Danggali Conservation Park; Danggali Wilderness Protection Area; Chowilla Regional Reserve; and Chowilla Game Reserve.

- **Coorong & Lower Lakes Ramsar On-ground Works**

  The SA Murray-Darling Basin Natural Resources Management Board has provided funding for important research in the Lower Lakes and Coorong. One project involves undertaking a study of the distribution, settlement cues and potential management strategies for the invasive polychaete tubeworm. The Board is currently seeking funding to continue and expand this research.

  The Board is providing funding for a research project of the University of Adelaide focusing on the use of diatoms (microscopic algae) to predict historic salinity, pH and flow conditions in the Lower Lakes over the last 6,000 years. This project will provide some answers to the debate around whether the Lower Lakes were predominantly fresh or estuarine throughout recent history.

  The Board is responsible for ecological monitoring within the Coorong, Lower Lakes and Murray Mouth Icon Site, under The Living Murray program. Monitoring methodologies are outlined in a newly developed condition monitoring plan, which is designed to inform progress against a set of 17 ecological targets, to measure the change in condition of the site.

  Current monitoring programs include threatened fish monitoring in the Lower Lakes; aquatic vegetation monitoring in the Lower Lakes; a complete census of waterbirds in the Lakes and Coorong plus monthly bird counts at a variety of sites; benthic invertebrate and mudflat monitoring in the Lower Lakes and Coorong; large-bodied fish monitoring in the Coorong; Ruppia monitoring in the Coorong and grazing trials in the Lower Lakes. The Board has also recently funded an ecological monitoring program in the tributaries of the Lower Lakes (i.e. Finniss, Tookayerta and Currency), to determine current condition and impacts of drought.

  The Board is coordinating a water quality monitoring project in the Lower Lakes and tributaries to provide early warning on acidification of this region (see ORM 4.1 below for more detail).

- **Emergency interventions in Lower Lakes to address acidification**

  Emergency interventions have been implemented by DEH in the Lower Lakes in order to protect the remaining ecological character of the site. This has included aerial seeding of lake beds exposed by falling water levels to generate a cover crop to reduce wind erosion and to incorporate organic carbon for bioremediation purposes to counter acidification. Ultra fine limestone was placed across the mouth of Currency Creek and at locations in the lower Finniss River to neutralise acidifying water bodies. Ultra-fine limestone was also delivered directly to acidified water by crop dusting aircraft.

- **Fish Habitat Assessment Project in the lower River Murray**

  This project aims to assess the various types of habitats available for fish along the Lower Murray in South Australia and to identify fish assemblage composition and/or species association that is specific to these habitat types. The outcomes will aid in conservation planning potentially assisting in strategic decisions for future drought recovery or delivery of environmental flows and restoration works. A draft report for this project is being reviewed by SARDI and the final report and database will be available by the end of the June 2009. The project is a collaboration of SARDI, PIRSA Fisheries, the SA Murray-Darling Basin Natural Resources Management Board and DEH.

- **Interstate Exchange on Pest Risks**

  The SA Murray-Darling Basin Natural Resources Management Board supports a tri-State task force responsible for the early detection and control of any new outbreaks of the pest weed sagittaria. The Board has continued to liaise with the adjoining border roadside quarantine check stations. Any reports of interstate machinery or equipment that has the potential of transporting pests or diseases are reported and routine follow up inspections instigated.

  The Board has also commenced a detailed surveillance and mapping program for feral pig infestations along the River Murray corridor in the Riverland region and will develop a strategic plan for feral pig eradication.

- **Lock 1 Carp Disposal Project**

  In November 2007, the Lock 1 Fishway was completed as a part of the Sea-to-Hume Dam Fishway Program (see 1.4 below) incorporating a carp separation cage. Field assessment trials from November 2007 to April 2008 demonstrated that the cage successfully removed approximately 870 kilograms of carp per day from Lock 1, while benefiting native fish through improved fish passage.

- **Marina Strategy**

  During 2008-09 the Department of Planning and Local Government (DPLG) released for public consultation the draft *Houseboat, Mooring and Marina Strategy for the River Murray in South Australia*. As a result of the feedback received, DPLG is preparing Guidelines for Marina Developments along the River Murray in South Australia and DWLBC will develop a strategy to deal with Houseboat activity along the River Murray.

- **Ngaut Ngaut Conservation Park**

  It was observed in the Ngaut Ngaut Conservation Park that cracks were developing at the base of the cliffs, and especially where boats are moored for tourists to disembark. A geotechnical investigation concluded that it is unlikely that a collapse is immanent. The Aboriginal custodians will continue to monitor the cracks with technical support from DWLBC. DWLBC is investigating the possibility of conducting a seismic survey of the cliff area and a further electromagnetic survey of the riverbed to ascertain the likelihood of a collapse.

- **Open Space Program**

  Through its Open Space Program DPLG is working with interested local councils along the River Murray to increase and improve opportunities for open space.

DPLG also has an on-going grant program for conservation and/or recreation projects on public land, including land located within townships.

- **Pike River Conservation Park enlarged**

  In June 2009 the Mundic Forest Reserve was added to the Pike River Conservation Park, increasing the size of the Conservation Park by 62ha. The land will become part of the *River Murray – Coorong NatureLink* corridor being established to help local ecosystems adapt to climate change.

- **Referrals**

  The Development Assessment Commission (DAC) is required, under the *Development Act 1993*, to refer various applications to the Minister for the River Murray and take into account any comments and directions of the Minister in determining these applications. In addition, where DAC is the approval authority, it undertakes a compliance and enforcement function to ensure development is undertaken in accordance with approvals and to take action where development is undertaken without approval.

- **River Murray Environmental Watering Plan and Prioritisation Framework**

  The River Murray Environmental Manager has developed a draft environmental watering plan and is undertaking broader consultation. It outlines the overarching strategy for environmental water allocation for the River Murray in South Australia.

  The River Murray Floodplain Prioritisation Project and the Wetland Prioritisation Project have been completed and together constitute a framework to guide the allocation of resources for floodplain and wetland management. A project is underway to prioritise in-channel features for management to improve fish habitat. A decision matrix was developed to identify key fish refugia which would benefit from the delivery of environmental water.

  2.3 GL of water was made available through The Living Murray program (established by the Murray-Darling Basin Ministerial Council) to water 12 wetlands in the Chowilla region and 2 wetlands below Lock 1. In addition, the Commonwealth Environmental Water Holder provided 5.2 GL for key Chowilla sites, Overland Corner, Markaranka, Banrock, Paiwalla and Rocky Gully. Savings made from wetland closures were used to re-wet 20 regulated and non-regulated sites. This water was delivered to prevent irreversible ecological damage to these sites.

  Private water donations were used at Boggy Creek, Hogwash Bend and Akuna for environmental watering purposes.

- **State Biosecurity Strategy**

  The SA Murray-Darling Basin Natural Resources Management Board has continued to support the development of an interagency biosecurity strategy for South Australia to deal with invasive species management including weeds, vertebrate pests, insects and pathogens. The strategy includes consideration of the national AusBIOSEC intergovernmental arrangements. Objectives include risk management, capabilities, communication and awareness, monitoring and surveillance, management of data, planning processes, science-based decision making, social and community pest impacts, funding and resources.

1.2 The environments constituted by the River Murray system, with particular reference to high-value floodplains and wetlands of national and international importance, are to be protected and restored

- **Aboriginal Involvement in management of priority wetlands**

  A number of projects have been established in 2009 to increase the engagement of the Aboriginal community in wetland management. Learning on Country projects have been established at Calperum Station and Gerard, which employ and train Aboriginal community members to undertake conservation and land management activities. This includes work on the Riverland Ramsar site (Calperum) and Katfish Reach (Gerard).

  The Aboriginal community of Gerard is also participating in a wetland baseline survey of the Redbanks wetland at Gerard. It is hoped that this will lead to the improved management of the wetlands and an increased involvement of the Aboriginal community in wetland management and monitoring.

- **Chowilla Icon Site Understorey Vegetation Monitoring at Red Gum Watering Sites**

  The Living Murray program funded SARDI to undertake a series of understorey vegetation surveys before and after wetlands were flooded. The aim of the project was to determine the change in vegetation communities brought about by flooding and assess relevant Living Murray targets.

- **Chowilla Icon Site Floodplain Vegetation Condition Monitoring**

  The Living Murray program also funded SARDI to undertake a series of vegetation surveys across the Chowilla Floodplain in 2006, 2007, 2008 and 2009. The aim of the project was to monitor changes in the vegetation community on the Chowilla Floodplain and to use this information to determine whether the targets outlined in the Chowilla management plan are being met and the success of any interventions such as engineered flooding. Surveys are planned 2010 and beyond.

- **Collaborative Research Program for the Coorong, Lower Lakes and Murray Mouth (CLLAMM) Ecology**

  The CSIRO National Flagship Program *Water for a Healthy Country* in partnership with the University of Adelaide, Flinders University, Australian Water Quality Centre, DEH, DWLBC, SARDI and the SA Murray-Darling Basin Natural Resources Management Board funds this $2.2 million project. The project aims to develop system understanding, models and tools for assessing the effectiveness of interventions to improve ecological function of the Coorong, Lower Lakes and Murray Mouth ecosystems.

  In addition, SARDI has also successfully attracted research funding from the Fisheries Research and Development Corporation (FRDC) to study flow related fish and fisheries ecology in the Coorong.

  The relationship between river flows and fisheries production is being investigated by correlating the discharge across barrages with 25 years of catch

and effort data for four commercial estuarine species: black bream, flounder, mulloway and yellow-eye mullet.

Other remaining work for the project includes reporting on the study result of spawning and recruitment dynamics and potential effect of key environmental parameters for the five key species: black bream, congolli, greenback flounder, Tamar goby and yelloweye mullet. The entire project is scheduled for completion at the end of September 2009.

SARDI Aquatic Sciences has also engaged Rural Solutions SA to develop a survey for Ngarrindjeri elders to capture information on native fishes and significant drought and flood events in the Coorong pre-European flows.

- **Community wetland management**

  The SA Murray-Darling Basin Natural Resources Management Board provides advice and support to community groups and Local Area Planning (LAP) Associations for wetland management projects around the Lower Lakes. The Board offers assistance in community monitoring, wetland management and planning, associated legislative requirements and on-ground works. Wetland planning involves the development of wetland management plans, provision of advice on best management practices and community engagement. The Board also provides funding for on-ground works and wetland planning to groups through a devolved grant process.

  To date wetland management plans have been developed for Hindmarsh Island, Teringie, Waltowa and Narrung wetlands. The community groups that participate in wetland management include the Coorong Districts LAP Association, Goolwa to Wellington LAP Association, Narrung Wetland Group, Raukkan Natural Resources Management, Hindmarsh Island Landcare Group and Milang Snipe Sanctuary Group. Examples of on-ground works the Board has funded include water control structures, box culvert structures and carp screens that aid the hydrological management of the sites.

  The Department for Environment and Heritage (DEH) implemented wetland management plans for 14 wetlands located within National Parks and Wildlife Reserves and Crown Land along the River Murray from Chowilla to Morgan. All sites except Little Duck Lagoon received water during 2008-2009 (Duck Lagoon was watered using an allocation provided by private donors).

- **Coorong and Lower Lakes Ramsar on-ground works**

  This project was undertaken in partnership with LAP groups. On-ground works such as reed establishment, fencing, revegetation, erosion control, and threat abatement were undertaken around the Ramsar site. A survey has been recently conducted so as to accurately identify infestation levels of priority pest plants that are invading the exposed areas of the Lower Lakes as water levels fall. Control strategies will be prepared and implementation will follow as resources are provided

- **Floodplains**

  The Pike River floodplain and Katarapko floodplain are undergoing extensive investigations into the achievement of greater ecological outcomes from the management of environmental water delivery using regulators.

- **Katarapko Eckert Creeks Demonstration Reach for Native Fish (Katfish Reach)**

  In partnership with PIRSA, DEH, DWLBC, Rural Solutions SA, Friends of Parks Inc and Banrock Station a project steering group comprising community and government representatives continued to support the Katfish Reach Demonstration Project during 2008-09. An implementation plan was completed followed by the development of an investment proposal. The project proposes a number of floodplain, waterway and wetland hydrological and fish passage and habitat management options. It is estimated that an investment of approximately $28 million over four years is required to deliver the proposed project outcomes.

  Demonstration reaches are an integrated action designed to improve river health and therefore native fish populations over a significant reach of river in South Australia. The site near Berri was identified during 2006-07 as a site for integrated action to restore native fish populations and the health of the system that they rely upon. The total area of the proposed demonstration reach is nearly 9,000 hectares. While the majority of the site lies within the River Murray National Park (Katarapko), or on Crown land, it also includes land held by the Gerard Aboriginal Reserve and a number of small private holdings.

- **Lower Lakes, Coorong and Murray Mouth (LLC&MM) Icon Site**

  Extensive research was carried out by DEH during the year to investigate ways to address the hyper saline condition of the south lagoon of the Coorong. One option being considered is pumping hyper saline water from the lagoon out to sea, combined with improvements to the drainage of surface water from the Lower South East back into the lagoon, emulating pre-European conditions.

- **Perpetual Lease Accelerated Freeholding Project**

  The Perpetual Lease Accelerated Freeholding Project is administered by DEH. It seeks to return (where possible) high conservation value wetland areas to the Crown to facilitate future improved management regimes. 103 new fixed waterfront boundaries 50m or greater in width have now been established under this project with 17 left to be finalised over the coming 12 months.

- **Publication – Wetland Fishes of the SA Murray.**

  A new paper describing regional patterns in the distribution, diversity and relative abundance of wetland fish of the River Murray in South Australia has been accepted for publication in the Transaction of the Royal Society of South Australia. The paper provides detailed information on species distribution, diversity and relative abundance of wetland fish.

- **2008 River Murray Wetlands Baseline Survey**

  SARDI was contracted by the Riverland West Local Action Planning (LAP) Committee to undertake a baseline vegetation survey at Penfolds Lagoon. The aim of the project was to gather baseline information on the vegetation

communities of the wetland to assist community groups to manage these wetlands and determine if there were any species of conservation significance that require protection.

- **Riverland Ramsar Site Management Plan**

  The Commonwealth Department of Environment, Water and the Arts has accepted the Riverland Ramsar Wetland Ecological Character Description (ECD) after being reviewed by the Ramsar Wetland Expert Panel. The ECD describes the ecological condition of the site at the time of listing (1987) and any changes since then.

- **Vegetation Condition Monitoring**

  SARDI was contracted under The Living Murray program through the SA Murray-Darling Basin Natural Resources Management Board to undertake vegetation condition monitoring of Lakes Alexandrina and Albert. The aim of the project is to determine whether The Living Murray vegetation targets for the system are being met.

  SARDI was also engaged by the Board to investigate the impacts of low water levels on the understorey vegetation and tree condition in wetlands downstream of Lock 1.

- **Waikerie Salt Interception Scheme Vegetation Monitoring Framework.**

  SARDI was contracted by the Riverland West LAP Committee to develop a floodplain vegetation monitoring and tree condition-monitoring program for Markaranka Flat and undertake the initial round of monitoring. The aim of the monitoring program was to evaluate the impacts of the expansion of the Waikerie salt interception scheme on wetland and floodplain vegetation.

1.3 The extinction of native species of animal and vegetation associated with the River Murray system is to be prevented

- **Carp exclusion screens**

  This project, funded by the former Murray Darling Basin Commission, addresses several high priority knowledge gaps and actions identified at the 2005 workshop Native Fish and Wetlands in the Murray-Darling Basin. Two optimised mesh designs for carp exclusion screens have been developed. Field trials confirmed that the optimised designs are superior to a majority of screen designs currently in use across the Murray Darling Basin, and that they will effectively exclude adult carp whilst allowing the passage of small-bodied native fishes and the juveniles of large-bodied native fishes.

  The optimised design will be incorporated into the development of operational strategies to govern the future design, use and management of carp exclusion screens and other carp management options within the Basin.

- **Conservation review of South Australia's native freshwater fish**

  A list of South Australian threatened freshwater fish prepared by the DEH Threatened Species Schedule Subcommittee (TSSS) in 2003 revealed that over half of the State's 58 native freshwater fish species were threatened. In addition,

a large proportion of the listed species were considered highly threatened, requiring urgent attention to prevent their loss from the state.

The seriousness of the situation resulted in the TSSS investigating strategies to increase awareness about the plight of freshwater fish in SA. The preparation of an Action Plan was considered one of the most appropriate ways to address the varied and often specific issues relating to freshwater fish conservation, particularly as such a plan would provide valuable background information and also strategies for the recovery.

This project draws on previous work by collating and interpreting species information (e.g. distribution) into species based action statements, as well as providing an overarching structure (e.g. background to fish and aquaculture habitats, broad threatening processes, regional and species priorities). The plan is in the final stages of being released.

- **Creating a basin wide refugia network**

  The Murray Darling Basin Authority Native Fish Strategy funded two projects addressing the implications of drought on native fish:
  - the protection of drought refugia for native fish in the Murray Darling Basin and
  - ecosystem resilience and importance of drought refugia for native fish communities/populations.

  SARDI is the lead agency for both projects.

- **Environmental watering**

  The SA Murray-Darling Basin Natural Resources Management Board is working with DEH to identify high priority fish refugia for environmental water delivery to prevent local extinctions of threatened native fish. Rocky Gully, Boggy Creek and Turveys Dam were provided with water to assist the survival of Murray hardyhead.

  Approximately 1.5 GL of water has been added to the Boggy Creek system on Hindmarsh Island to maintain critical habitats for threatened Murray hardyhead populations in the Lower Lakes.

- **'Integrated Carp Management' demonstration project at Brenda Park wetland**

  This project, funded under the Murray-Darling Basin Authority's Native Fish Strategy, is envisaged to be the first to model, measure and demonstrate the effects of carp on the aquatic environment, and the benefits of their removal.

  There are three components:
  - Use an integrated approach to remove carp from an identified carp 'hot spot'
  - Measure the response of native fish, macroinvertebrates, submerged vegetation, and water quality to carp removal, and
  - Communicate the key results as widely as possible.

  The project is a collaboration of SARDI, Overland Vineyards (Brenda Park), the Murray-Darling Freshwater Research Centre, EPA, PIRSA Fisheries, the SA

Murray-Darling Basin Natural Resources Management Board and the Riverland West LAP group.

- **Investigation of carp acoustic attractants and repellents**

  SARDI Aquatic Sciences secured a two-year project funded by the Invasive Animals CRC focussing on carp acoustic attractants and repellents. Several 'attractive' carp sounds (feeding, spawning, flowing water) were recorded and a sound bank of potential 'repellent' noises developed. Experimental designs have been developed for trialling acoustic attractants within the Adelaide Botanic Gardens and the Torrens Lake. Acoustic trials in the exit chamber of the Lock 1 fishway (length approx 25m) are also under consideration.

- **Monitoring native fish populations in the SA Murray-Darling Basin**

  This project is funded by PIRSA Fisheries for fish stock assessment. From 2006-07 to 2008-09 the work has mainly focused on golden perch with some data collected for Murray cod and other species. Monthly sampling at seven sites of the lower River Murray, during spring and summer has been completed for three years with assistance from commercial fishers.

  A stock assessment report is being prepared for golden perch. SARDI has been requested by DWLBC and the Murray-Darling Basin Authority to prepare a report assessing recruitment success of large-bodied fish, particularly golden perch, following the 2005-06 elevated flow and weir pool manipulations in the lower River Murray.

  This information will assist PIRSA Fisheries in the sustainable management of the fishery and further assist other natural resources management (including environmental water allocation and habitat management) seeking to improve native fish stocks in the SA part of the River Murray. Additional resources will be required to collect additional information for Murray cod in order for a comprehensive stock assessment of this species to be conducted.

- **Murray cod fishery closure 2009**

  The closure, which prohibits the take of Murray cod during 2009, was introduced to protect the South Australian Murray cod populations given the continued severe drought conditions across the Murray-Darling Basin. Consistent scientific advice is that there has been little recruitment in the population since 1994 due to lack of flows in the River Murray.

- **Projects investigating the ecology of Ruppia megacarpa in the Coorong**

  Two complementary projects have continued to be funded under The Living Murray program for SARDI Aquatic Sciences to investigate the ecology of *Ruppia megacarpa* (large-fruit tassel) in the Murray estuary and north lagoon of the Coorong. No *Ruppia megacarpa* plants or propagules (seeds) were detected in the Murray estuary or north lagoon so the project has been cancelled until there are barrage outflows.

- **Recreational fishing survey and logbook**

  Information on the recreational survey carried out in 2007-08 has been collated and analysed by PIRSA Fisheries and is currently being added to a recreational fishing atlas. The atlas is formatted to present the data in simple clear tables,

charts or maps with concise factual information. The atlas is designed to inform recreational fishers, students, community groups, government agencies and the general public.

- **Spawning migrations and attractant flows: 'Achilles heel' exploitation of innate carp behaviours**

  In mid-2006, SARDI secured a 3-year Invasive Animals Cooperative Research Centre funded project to develop and evaluate wetland carp separation cages. The project successfully demonstrated the utility of wetland carp separation cages, incorporating jumping and pushing trap components. Over 6 months of testing at Banrock Station, nearly 8 tonne of carp was removed and excellent information about the movement patterns of carp and native fishes was gained. The design of the cage allows the majority of native fish to pass through unimpeded but traps broad-bodied carp for harvest and removal.

  Current conditions in the lower Murray have caused the drying out a number of managed wetlands. SARDI has developed a draft decision support package to assist in the selection and implementation of carp management options for use at wetland inlets along the River Murray in South Australia.

- **Small bodied native fish rescue projects**

  DEH and PIRSA Fisheries have continued to undertake a project in conjunction with the SA Murray-Darling Basin Natural Resources Management Board and Native Fish Australia (SA) to collect specimens of Yarra pygmy perch and purple spotted gudgeon, and maintain and breed these sub-populations in captivity, ensuring their short to medium term survival and in the instance that wild populations are 'lost'.

  The 2008-09 summer saw an intensification of drought impacts on all aquatic refuges across the State. Many sites breached critical environmental triggers requiring threatened fish rescues and emergency watering.

  Quarterly monitoring and assessment has been undertaken at 26 key native fish sites during 2008-09 and are expected to continue in 2009-10. Comprehensive monitoring including data reports are delivered through a partnership between SARDI Aquatic Sciences and Native Fish Australia (SA) under DEH direction.

  As reported above (1.1 – River Murray Environmental Water Plan and Prioritisation Framework) several wetlands received emergency water during 2008-09. All watering events proved successful in greatly improving water quality parameters, re-connecting aquatic vegetation and protecting critical fish populations.

  In total over the 2008-09 period three populations of the Environmental Protection and Biodiversity Conservation Act listed Murray hardyhead were rescued and transported to the Murray-Darling Freshwater Research Centre. The Murray-Darling Basin Authority funded these rescues. The program is expected to be viable only for 6-12 months before the likelihood of successful reintroduction is compromised. Medium to long-term recovery plans for this species are currently being discussed. A Murray hardyhead recovery team workshop was held in June 2009 (across State partnership) to develop a national recovery plan for the species.

Expansion of the surrogate dam refuge program has occurred with targets to assess and identify approximately 20 dams as possible medium term refuge for several threatened native fish. Captivity bred Yarra pygmy perch have been bred and released into surrogate dams chosen through the refuge dam project.

Pre-winter rains slightly alleviated the intensity and urgency of intervention for protection of native fish across the State but plans for next year and the return of the dry seasons require careful planning. The Murray-Darling Basin Authority has provided funding to further develop a second Southern Basin Southern purple-spotted gudgeon breeding facility at Berri, and to develop a reintroduction plan as part of broader species recovery in the Lower Murray

The preparation of the Final draft of the Drought Action Plan is underway an across agency workshop g will be held in later in 2009 to review the year past and discuss plans for 2009-10.

- **Synthesis review of carp vulnerabilities**

  SARDI Aquatic Sciences has been engaged to synthesise the outputs of the Invasive Animals CRC multi-state, coordinated analysis of carp ecology and population dynamics Program, to assess weaknesses that can be exploited for control purposes.

- **Threatened River Murray Fauna Recovery Program**

  The Threatened River Murray Fauna Recovery Program is in its fifth year and has prepared and implemented four recovery plans for priority species: the nationally listed regent parrot and golden bell frog, and the regionally significant carpet python and bush stone-curlew.

  The main focus during 2008-09 has been on-ground management for the regent parrot. The DEH Murraylands threatened species team has partnered with the Riverland West LAP group to restore regent parrot foraging and nesting habitat, targeting the largest known colony in South Australia at Hogwash Bend, downstream of Waikerie. A similar restoration project for the regent parrot is underway at Swan Reach in collaboration with the Mid Murray LAP group.

  A long-term monitoring program has been established for the bush stone-curlew. Following rigorous detectability studies, a surveillance program has been developed on the floodplain of the Chowilla and Ral Ral anabranches. Friends of Riverland Parks will undertake this surveillance to record population trends over the longer term.

  The community continues to assist with the recovery of River Murray threatened fauna by reporting sightings of the carpet python and regent parrot.

1.4 Barriers to the migration of native species of animal within the River Murray system are to be avoided or overcome

- **Coorong Fish Movement and Recruitment Project**

  This project enters its third year of investigating the impact of freshwater inflow (or lack of) on fish assemblages and recruitment of diadromous fish (species that use both marine and freshwater habitats during their life cycle) in the Coorong

and Lower Lakes. Site-specific sampling concluded in January 2009 and preliminary results indicate abundances of freshwater and diadromous species at Tauwitchere and Goolwa barrages were very low compared to the previous two sampling seasons (2006-07 and 2007-08). At the same time, the proportion of marine species increased and in the continued absence of freshwater inflows the estuary now resembles a marine dominated tidal system. The significant decline in the abundance of diadromous fishes and most importantly continued evidence of poor recruitment of these species is a cause for concern for the long term viability of these populations in the Lower Lakes and Coorong.

A new component of this project commenced in April 2009 involving the use of acoustic tags to study the movement of congolli in the lower lakes. This project will investigate spatial and temporal variation in the movements of congolli and may also provide data on the potential impacts of new regulatory structures at Clayton and in the Finniss River and Currency Creek.

The project is a collaborative effort between SARDI and the SA Murray-Darling Basin Natural Resources Management Board and was funded under The Living Murray Environmental Works and Measures Program of the former Murray-Darling Basin Commission.

- **Sea-to-Hume Dam Fishway program and assessment**

  Fish passage is currently being addressed for the main channel of the River Murray through the construction of fishways at twelve main channel weirs and barrages between Lake Hume and the Murray Mouth.

  Fishways have been integrated into construction plans for capital works at Chowilla, Locks 1 to 6, and at the barrages. Works at Lock 1, Blanchetown, were completed in 2007-08. Lock 3 will be completed mid July and works at Lock 6 have commenced. The 'standard' fishway design for the lock sites has been modified to a dual fishway with an automated fish lock to cater for the smaller fish, and a vertical slot fishway for the large fish. All sites will incorporate carp separation facilities.

  To determine the success of the construction program, a tri-state Murray Fishways assessment team was assembled (New South Wales, South Australia and Victoria). Assessment was completed during 2008-09 of fishways above Lock 1, and tailwater levels at the Lock 1 fishway were outside of operational range. In September 2008 several hundred golden perch and carp were tagged as well as a few Murray cod between Lock 1 and Wellington. Long-term (2002 to present) sampling of fish assemblages downstream of Locks 1-3 continued on a monthly basis between September 2008 and February 2009. Trials of several fish counting techniques were undertaken at Lock 10 from October to December 2008.

  In January and February 2009 a black bream movement study commenced in the Coorong. Thirty black bream were implanted with acoustic tags and an array of 13 receivers was deployed in the Coorong in order to investigate spatial and temporal variability in black bream movement in response to environmental variables and fishways.

  Fish passage within off-channel habitats in South Australia using a catchment approach from Wellington to the Chowilla anabranch complex is also being

addressed as part of a new project. An expert working group was formed to assist in barrier identification, data sourcing and prioritisation.

2.1 Ecologically significant elements of the natural flow regime of the River Murray system are to be reinstated and maintained

- **Aquifer Recharge, Storage and Recovery (ASSR)**

  Planning is underway for a number of ASSR projects across metropolitan Adelaide and the State. The projects are designed to augment local supplies, increase water reuse, and further reduce South Australia's reliance on the River Murray. ASSR is and important component of the recently released Water for Good initiative.

- **Spatial and temporal variations in larval fish assemblages downstream of Locks 1, 5 and 6**

  This project, funded by the Murray-Darling Basin Authority and the SA Murray-Darling Basin Natural Resources Management Board, investigated the potential effect of flow and drought conditions on fish spawning in the lower River Murray, using larval fish assemblage as an indicator. Fortnightly larval sampling was conducted in the spring/summer season (Oct-Dec) during 2005, 2006, 2007 and 2008 at selected sites downstream of Locks 1, 5 and 6, within the main channel of the Lower River Murray. A draft report has been completed for the 2008 work and is currently being reviewed by SARDI.

- **Weir pool manipulations**

  Weir pool manipulations are funded under The Living Murray program and are used to enhance natural peaks in River Murray flow. Raising the level of weir pools enables the temporary flooding of wetlands increasing their water levels and flushing salt from the wetlands. A weir pool management strategy is under development to allow this action to occur more frequently. The assessment and development of concept designs for secondary regulatory structures is underway and proposals for works to upgrade priority structures. Salinity and water use impacts are being determined as well as the ecological benefits.

- **Water Proofing Adelaide**

  The *Water Proofing Adelaide, A Thirst for Change 2005-2025* strategy released in July 2005 included 63 strategies for the management, conservation and development of Adelaide's water resources to 2025. Implementation of the strategies will provide savings of 37GL/year from water conservation initiatives and 33GL/year from stormwater, roof runoff and recycled water by 2025.

  The SA Murray-Darling Basin Natural Resources Management Board has been actively involved in supporting a number of these strategies, including involvement in the following initiatives:

  - *Creating Water Sensitive Cities Across Australia*

  The achievement of a Water Sensitive Adelaide is a key strategy within Water Proofing Adelaide as well as the National Water Initiative. The Board has actively participated in the National Water Commission led series of National workshops "Creating Water Sensitive Cities".

- *Creating a Water Sensitive Adelaide*

  Driven by the Water Proofing Adelaide Strategy and the Adelaide Coastal Waters Study (EPA), DPLG and the Federal Government have partnered with a broad range of government and non-government organisations to complete the "Institutionalisation of Water Sensitive Urban Design in Greater Adelaide" project (see also 3.1 below). Both the Adelaide and Mount Lofty Ranges and SA Murray-Darling Basin Natural Resources Management Boards have played key roles in the steering committee and funding of this project. DPLG and the Office for Water Security are currently incorporating the outputs from the project into the 30 Year Plan for Greater Adelaide and the SA Water Security Plan.

- *Cities as Water Catchments*

  The SA Murray-Darling Basin Natural Resources Management Board has teamed with the Adelaide and Mount Lofty Ranges Natural Resources Management Board and other agencies, including SA Water and local councils, to invest in a National Water Commission endorsed 5-year National Applied Research Project into 'Cities as Water Catchments'.

- *Stormwater Management Plans*

  The Board has provided funding and technical support to a number of local councils to develop stormwater management plans and integrated water resources management plans.

- *Better Development Plans – Water Sensitive Towns and Cities*

  The SA Murray-Darling Basin and the Adelaide and Mount Lofty Ranges Natural Resources Management Boards are currently working with DPLG to maximise the effectiveness of the next review of the Better Development Plans (BDP) Policy Library in achieving best-practice natural resources management. In particular, this review will examine how the achievement of Water Sensitive Towns and Cities can be expedited via the BDP initiative.

- **Wastewater re-use**

  SA Water is involved in the design, planning and delivery of several wastewater re-use schemes (e.g. dual reticulation of recycled water from Bolivar Waste Water Treatment Plant to parts of Northern Adelaide). Significant progress has been achieved in new schemes to further reduce reliance on the River Murray. Construction is underway for the Glenelg Adelaide Parklands Scheme and the Southern Urban Reuse Scheme and planning is progressing toward further expansion by dual reticulation to new subdivisions north of Adelaide.

- **Water Allocation Plan for the Eastern Mount Lofty Ranges**

  Temporary water authorisations have been issued to current water users in the Eastern Mount Lofty Ranges Prescribed Water Resources Area to enable them to continue to operate during the Notice of Prohibition that will remain in place until the Minister for the River Murray adopts the water allocation plan, expected by June 2010. The plan will outline the policies that will govern the take and use, transfer and other management activities of the prescribed water resources.

- **Water Allocation Plan for the River Murray Prescribed Watercourse**

  The SA Murray-Darling Basin Natural Resources Management Board is developing a new water allocation plan for the River Murray Prescribed

Watercourse. The Board has developed and consulted on a concept statement for the draft plan. It has established three River Murray Water Allocation Plan Advisory Committees to assist in the development. Membership includes industry and local community representatives.

Development of the draft plan will continue over the next four years and is planned for completion in 2011 following the release of the Basin Plan. In the interim, the current plan has been amended to allow for the unbundling of water rights that commenced on 1 July 2009. Whilst current water allocation planning policy will remain until the new water allocation plan is approved, changes will be made in the administration of existing licences.

The River Murray Environmental Manager unit is managing a project to develop a detailed understanding of the environmental water requirements of the ecological assets of the River Murray in South Australia using a systems approach. The unit will look at the best way to provide for these requirements through the water allocation planning process.

2.2 The Murray Mouth should be kept open in order to maintain navigation and the passage of fish in the area, and to enhance the health of the River Murray system and estuarine conditions in the Coorong

- **Murray Mouth Sand Pumping Program**

  South Australia received the lowest flows on record in the Murray-Darling Basin in 2008-09. Dredging is vital for maintaining an open channel for tidal flows to help maintain the health of the Coorong. Dredging effort was reduced from two dredges to one during 2008-09. Further research is underway to investigate the ecological benefits for the Coorong of an increase in dredging effort.

2.3 Significant improvements are to be made in the connectivity between and within the environments constituted by the River Murray system

- **Calperum Station Learning on Country Aboriginal NRM project**

  A major aim of the Calperum Station Learning on Country project is to revegetate and restore the connection between the River Murray floodplain / wetlands and the expansive area of Mallee habitat on the property.

- **Regent parrot habitat corridors**

  Work has been done to identify current regent parrot habitat corridors and address gaps to augment and improve on the vegetation in those corridor areas. Habitat connectivity is also addressed through the SA Murray-Darling Basin Natural Resources Management Board's involvement in the River Murray Forest project and work funded through LAP Associations and other community groups.

  The Board works with DEH on the *Naturelinks* project, which addresses connectivity for wildlife between the South East and the River Murray corridor. Furthermore, Habitat 141 is a major partnership in the Mallee that addresses links between the large Mallee parks and the river system.

- **Tagged trading of interstate water entitlements**

  A pilot tagged trade program replaced the pilot exchange rate program in late 2006 between South Australia and restricted parts of Victoria and New South Wales. This pilot was replaced with a fully-fledged tagged trading regime over the southern connected Murray-Darling Basin in July 2007. The program permits holders of water access entitlements to trade ownership and then direct the use of the associated water allocation to a specific site within the connected river system, which may or may not be in the same state as the entitlement is issued.

  The necessary legislative changes to permit this expanded interstate tagged-trade in water access entitlements as required under the National Water Initiative have been passed in South Australia and the ongoing administrative arrangements to facilitate the trade commenced on 1 July 2009. Negotiations to remove interstate restrictions on the amount of water that can be traded from irrigation districts are continuing.

  During this period the size of the allocation market has grown spectacularly as a combined result of the National Water Initiative reforms, declining river flows and other State and Commonwealth Government related water market reforms (refer http://www.nwc.gov.au/www/html/804-water-markets-report.asp for information on trading volumes).

3.1 Water quality within the River Murray system should be improved to a level that sustains the ecological processes, environmental values and productive capacity of the system

- **Audit, compliance and enforcement**

  The EPA continued to conduct random audits and inspections of industries that potentially impact on River Murray water quality, including dairies, river vessels, slipways and animal husbandry. Where necessary compliance letters, fines and environment protection orders are used to achieve compliance with State Government legislation.

- **Code of Practice – Vessel and Facility Management: Marina and Inland Waters**

  The introduction of greywater management requirements has been a key component of the implementation of the Code of Practice. The timeframes set out in the Code have been very successful in driving industry and associated initiatives in areas such as:
  - Facilitating commercial research trials of greywater treatment technology in both SA and NSW waters;
  - Development of an Australian Standard. This program has also developed considerable interest at a national level, through regular liaison with the NSW Maritime Authority on SA greywater management policy developments for river vessels and the development of a close working relationship with the Australian Marine Industries Federation; and
  - Upgrading of River Vessel Waste Disposal Stations (RVWDS). This is being fast-tracked to ensure that RVWDS meet the service requirements of the greywater treatment systems.

- **Development of a catchment water quality model for the River Murray**

  SA Water has completed Phase 1 of the River Murray Water Quality and Hydrodynamic Model construction (Lock 1 to Wellington). This project is critical to inform policy, decision-making and investment priorities with respect to water quality maintenance and improvement in the SA Murray-Darling Basin. Rollout of subsequent phases of the model (up to the NSW/Vic border) will be planned in the second half of 2009. The model will constitute the "receiving waters" for the E2 Catchment Model detailed below.

- **Development of a water quality model for the *SA Catchments* of the River Murray**

  The EPA has completed an E2 Catchment Model for all South Australian catchments of the River Murray in partnership with the SA Murray-Darling Basin Natural Resources Management Board. This model will be coupled to the River Murray model (detailed above) to inform policy, decision-making and investment priorities with respect to water quality maintenance and improvement in the SA Murray-Darling Basin. The second half of 2009 will see the formalisation of arrangements to maximise the combined effectiveness of the two models in terms of overall public good.

- **EPA comment on development proposals**

  The EPA evaluated proposals for development as a referral agency by virtue of the *Development Act 1993* (through the declaration of the River Murray Protection Area under the *Environment Protection Act 1993*[4]) and more recently through provisions of the *River Murray Act 2003*. The Authority offers advice or provides direction in relation to development proposals (e.g. jetties, boat ramps, retaining walls, dwellings, land divisions, intensive animal keeping, dredging and wastewater treatment plants) to avoid or minimise potential impacts on water quality and other environmental values.

- **Lower Murray Reclaimed Irrigation Area (LMRIA) restructuring and rehabilitation program**

  The EPA successfully concluded the Environmental Improvement Management Program (EIMP) component of the LMRIA program. All 70 irrigators (the majority of which are dairies) were visited, assessed and subsequently sent written reports outlining individual progress against environmental milestones. Since the conclusion of the program this year the EPA served three Environmental Protection Orders for failing to erect fencing to prevent stock access to the River Murray. The EPA continues to conduct random audits and respond to complaints promptly.

- **National Water Quality Management Strategy (NWQMS)**

  The EPA and the SA Murray-Darling Basin Natural Resources Management Board are partnering to deliver the NWQMS, which seeks to work with the community to set environmental values and subsequent water quality objectives (WQOs) for the region's water assets. Community consultation sessions have commenced with a trial run in the Bremer Catchment. Sessions for the remaining

[4] The Environment Protection Act requires the Minister, Environment Protection Authority and any other body administering the Act in relation to the Murray-Darling Basin to seek to further the objects and ORMs of the *River Murray Act 2003*. This is a separate process to the referrals required under the *River Murray Act 2003*.

sub-catchments in the Board area will be held in the second half of 2009, with associated WQOs and monitoring and evaluation strategies to be in place by late 2009.

The EPA engaged CSIRO to conduct a survey of community environmental values in the South Australian Murray-Darling Basin.

- **Sand dumping**

  A media and enforcement campaign was undertaken to increase awareness and reduce the instance of importing and dumping sand along the banks of the River Murray for amenity. Dumped sand blocks intake pumps, smothers natural ecosystems and creates navigation hazards. Only one Environment Protection Order was required this year, as the mailout and media campaign has largely eliminated the practice.

- **Wastewater and Urban Stormwater Treatment and Reuse Program.**

  The SA Murray-Darling Basin Natural Resources Management Board works with State and Local Government partners as well as private sector partners and Federal Government investors on an on-going basis to reduce the overall load of pollutants entering the River Murray via wastewater and urban stormwater. During 2008-09, the Board (in partnership with the Federal Government) invested approximately $500,000 in nine new projects, trialling a market based instrument approach to four of these projects to maximise the water quality benefits of the investment.

- **Water Sensitive Urban Design (WSUD)**

  The Institutionalising Water Sensitive Urban Design (WSUD) project aims to ensure water-friendly design will be incorporated into all of Greater Adelaide's suburbs, houses and commercial and industrial precincts and buildings.

  The State Government project, led by DPLG and financially supported by the Commonwealth, is investigating how to formalise Water Sensitive Urban Design principles and ensure WSUD leading practice is applied to all forms of urban development in the Greater Adelaide region.

  For the purposes of this project, WSUD relates to all water resources (from whole of catchment level to dwelling and allotment scale) including surface water, groundwater, and urban and roof runoff.

  The project's objectives are to economically and safely:
  - improve water quality
  - minimise the use of potable ('mains') water
  - maximise water reuse
  - reduce pollution
  - reduce peak flows and flood risk
  - restore and maintain water for the environment, and
  - provide visual and potential recreational benefits in local communities.

  The application of WSUD is not limited to private development. It also applies to, and requires integration with, works carried out on public lands such as roads and open space.

The project is being funded by the Commonwealth and a number of State Government agencies, with support from the Local Government Association.

3.2 The impact of salinity on the ecological processes and productive capacity of the River Murray system is to be minimised

- **Automatic Weather Monitoring Network**

  The SA Murray-Darling Basin Natural Resources Management Board has continued to manage and maintain the regional Automatic Weather Monitoring Network during 2008-09 to ensure it remains a valuable resource for regional natural resource managers. An additional automatic weather station was installed at Bookpurnong in February 2009 that has added further value to the existing network.

  During 2008-09 the Board worked with the Bureau of Meteorology to progress initial discussions concerning collaborative weather data sharing arrangements. A Draft Memorandum of Understanding between the Board and the Bureau was developed and it is planned to finalise the Memorandum in the latter part of 2009. The collaboration is intended to provide an improved data service to regional stakeholders that will contribute to long term, sustainable natural resource management practices.

  Additional projects and programs will be developed in 2009-10 to increase the rate of adoption of weather monitoring data into on-farm irrigation management decision-making.

- **Community Land and Water Management Planning Initiatives**

  Land and Water Management Planning (LWMP) activities have continued to be implemented in key SA Murray-Darling Basin irrigation districts in 2008-09 in collaboration with LAP Groups. Upgrades to the Bookpurnong to Lock 4 and Pyap to Kingston-on-Murray LWMPs are complete and post-plan technical investigations are occurring in the Taylorville North LWMP district.

  LWMP implementation has also continued in the Pike and Murtho irrigation districts via the Pike Implementation Plan project, funded by the SA Murray-Darling Basin Natural Resources Management Board and managed by DWLBC.

  During 2008-09 the Bookpurnong Lock 4 Environmental Association released its annual State of the Environment report that showcases the activities undertaken during the year. The Association supported the adoption of regional scale irrigation efficiency software. The software showed that the district improved its irrigation efficiency from 80% in 2003-04 to 91% in 2007-08.

  In 2008-09 the Board invested in a review of the Lower Murray Reclaimed Irrigation Areas (LMRIA) Land & Water Management Plan. The original plan was developed prior to the LMRIA rehabilitation project and therefore it was considered timely to revisit the plan. As part of the project several on-ground investigations were undertaken of optimal water management practices in an environment of severely reduced water availability and low river levels. A scoping document will be developed as part of the LWMP review to provide direction for

future investment in the LMRIA to ensure long sustainable production and NRM outcomes.

It is intended to continue supporting the implementation of Land & Water Management Planning activities in 2009-10 albeit with limited resources resulting from changes to Commonwealth Government investment directions for land and water management related projects.

- **Determining the impact of salinity and hydrology on larval fish recruitment in the Chowilla Anabranch**

  This project entails research into the community composition and spatial and temporal variation of larval fish in lotic (river, streams and springs) and lentic (lakes, ponds and swamps) waters of the Chowilla Anabranch system. The project is funded by the National Action Plan for Salinity and Water Quality through the DWBLC Centre for Natural Resources Management. A project report has been published.

- **Influences of salinity and water quality on the recruitment dynamics of fish in the lower River Murray – larval distribution in relation to habitat**

  This project was funded by the National Action Plan for Salinity and Water Quality through the Centre for Natural Resources Management (SA).

  Larval sampling was conducted during the spring/summer season during 2005-06 and 2006-07 at selected sites downstream of Locks 1, 5 and 6, within the main channel of the lower River Murray. Sampling was conducted fortnightly from September to February targeting key native species to determine if linkages between the larval assemblage and any environmental parameters could be identified. During the field sampling for larval fish, zooplankton samples were also conducted to determine if any linkages between larvae and prey could be identified and if food availability could also be a limiting factor for larval survivorship.

  Laboratory trials have been conducted to determine the salinity tolerance of critical life stages for key species including several protected species (e.g. silver perch, freshwater catfish, Yarra pygmy perch and purple spotted gudgeon). Additional trials were run to determine the tolerances off fish eggs and hatching success for dwarf flat-headed gudgeon, carp gudgeon, and galaxias maculatus. Experiments were also run to develop a methodology and assess the chronic long-term impacts of sub-lethal salinities on freshwater catfish, Murray rainbowfish, carp gudgeon and flat-headed gudgeon.

  A final report to the CNRM is currently in preparation.

- **Irrigation management training & support**

  The SA Murray-Darling Basin Natural Resources Management Board has continued to provide irrigation extension services to River Murray irrigators in 2008-09 through its *Improving Irrigation Efficiency Project*.

  A total of 21 irrigation management workshops were conducted in the 2008-09 water use year with in excess of 270 irrigators attending the training. A new Salinity Management in Irrigated Horticulture workshop was developed in April 2009 in partnership with SARDI. As part of this workshop SARDI has developed

a leaching calculator to assist irrigators with managing root zone salinity accumulation, to be officially launched early in the 2009-10 irrigation season.

The Board and SARDI developed a set of Best Management Practice Guidelines in 2008 for the *Management of High Salinity Irrigation Water in Low Yielding Wine Grapes.* This project was focused on the Currency Creek - Finniss irrigation area that has been struggling with managing high salinity irrigation water for many seasons.

- **Loxton Salt Interception Scheme**

  Work on the Loxton Salt Interception Scheme continued in 2008-09 with the completion of the interception bores on the Thiele's, Rilli's, and the Caravan Park floodplains. All floodplains interception bores have now been commissioned and are fully operational with the proportional benefit entered on the State Salinity Register. During 2008-09 hydrogeological investigations continued in the highland area behind the Loxton irrigation pumping station and other targeted areas to identify the best options for expanding the interception scheme in the highland areas.

- **Murtho Salt Interception Scheme**

  The investigation and design work for the Murtho Salt Interception Scheme continued in 2008-09 including the completion of the first two stages of investigative bore drilling. Approximately 32 investigation bores were completed in 2008-09, most of which have been sized and located to become production or observation bores once the final borefield design is completed in December 2009. Contracts have been awarded for the SIS pipeline river crossing at Renmark, the supply of all pipework for the collection and disposal mains and the pipelaying contract for the collection and disposal mains.

  The Murtho Salt Interception Scheme is scheduled for completed in June 2011 and is designed to intercept up to 100 tonnes of salt per day from entering the River Murray.

- **Waikerie Lock 2 Salt Interception Scheme**

  Construction of the Waikerie Lock 2 Salt Interception Scheme continued in 2008-09 with investigation and design work and bore drilling completed the previous year. The pipeline construction was completed in December 2008 and work on the installation of the bore headworks commenced in February 2009. The provision of power to each production well site by ETSA commenced in April 2009. All site works were completed in June 2009 and will be commissioned in July 2009.

  The Waikerie Lock 2 Salt Interception Scheme is an extension to the existing Qualco Sunlands Interception Scheme and is designed to prevent approximately 39 tonnes/day of salt from entering the River Murray.

3.3 Nutrient levels within the River Murray System are to be managed so as to prevent or reduce the occurrence of algal blooms and to minimise other impacts from nutrients on the ecological processes, environmental values and productive capacity of the system.

- **Drought response monitoring – water quality**

  SA Water has continued its enhanced amoeba, salinity and algal monitoring program to ensure the supply of potable water under the current unprecedented circumstances. In addition to the routine monitoring, the Drought Field Response Team (established in September 2007) continues to provide immediate on-the-ground assessment, tracking and early warning of potential water quality challenges through focused surveys of the river. This involves the use of blue-green algal sensors, in-field identification of algae, and the use of algal toxicity test kits. The monitoring initiatives allow the implementation of appropriate operational actions to address any impending water quality issues and assist in the management of those water supply systems likely to be affected.

  Together with water sampling, the enhanced algal monitoring program also utilises high-resolution digital aerial imagery to help in the early detection of algal blooms in the Murray River as well as other related floodplain management issues. This involves flying the river at an altitude of 2500 m, using high-resolution digital still and video cameras to rapidly survey the length of the river. The resulting GIS registered images are then checked for discoloured water indicating the presence of blue-green algae. In addition to the algal monitoring benefits of this aerial photography, the footage is particularly useful in identifying illegal discharges and isolated algal blooms outside SA Water's jurisdiction, illegal water harvesting and the connectivity of wetlands to the river. There has been interest from other government agencies to use this aerial footage to conduct compliance monitoring.

- **Greywater treatment**

  The SA Murray-Darling Basin Natural Resources Management Board assisted with working trials of greywater treatment systems that implement the EPA's new code of practice for greywater management on inland vessels (see 3.1 above).

- **Effluent reuse and stormwater management**

  The SA Murray-Darling Basin Natural Resources Management Board has contributed to various effluent reuse and stormwater management projects in the region (see 3.4 below).

3.4 The impact of potential pollutants, such as sediment and pesticides, on the environments constituted by the River Murray system is to be minimised

- **Off-take exclusion zones**

  Investigation on the feasibility of establishing a series of exclusion zones for certain types of activities around drinking water supply off-take points along the River Murray was completed in 2008. Approval for the proposed off-take point exclusion zones is currently being sought from DEH (Crown Lands) and the Department for Transport, Energy and Infrastructure. On the granting of approval the installation of the infrastructure and signage will be implemented.

- **Wastewater and Stormwater Reuse Management**

  During 2008-09 the SA Murray-Darling Basin Natural Resources Management Board completed a number of wastewater and stormwater reuse projects, including:

- Recycling Murray Bridge's municipal wastewater for use at Mt Compass Bacon for fodder production;
- Recycling wastewater from Big River Pork Abattoir and Wasleys / Sheoak Piggeries for fodder production;
- Conversion of Mid-Murray Council public toilets to waterless urinals;
- Laratinga wetlands – reuse of wastewater from Nairne, Littlehampton and Mount Barker;
- Strathalbyn Community Wastewater Management Scheme upgrade – support for new effluent storage lagoon;
- Unity College wastewater recycling and rainwater harvesting;
- Hindmarsh Island wastewater treatment plant upgrade;
- Purification of winery wastewater using solar technology at Langhorne Creek; and
- Feasibility study into alternative irrigation water sources (treated wastewater from Victor Harbor) for Currency Creek.

4.1 A responsive and adaptable approach to the management of the River Murray system is to be implemented taking into account ecological outcomes, community interests and new information that may become available from time to time

- **Development of a policy framework for environmental water access entitlements**

  DWLBC received funding from the Australian Government Water Fund in late 2006 for this project. Rural Solutions SA was employed as consultant to develop a policy framework for environmental water provisions in water allocation plans to ensure South Australia's compliance with the National Water Initiative Intergovernmental Agreement.

  The consultant identified the following issues of concern:
  - Current water allocation plans tend to make general qualitative statements about environmental water that do not allow for quantitative assessment or evaluation. There is a need for better definition of environmental water outcomes/requirements.
  - The process in the Act for determining existing user allocations in newly prescribed areas is separate to the process of determining the water required for environmental and other public benefit outcomes. These two processes need to be better integrated.
  - There is a need for a better process for determining environmental water provisions when balancing environmental, social and economic needs, in consultation with the community, and informed by best science.
  - Better monitoring and evaluation is needed to enable effective amendment of plans in response to arising resource conditions and environmental triggers.
  - More effective management of activities currently exempted from water licensing requirements is needed, e.g. stock and domestic water use, indentures and Crown agreements relating to mining interests.

  A number of miscellaneous amendments to the *Natural Resources Management Act 2004* are being considered for possible introduction in 2009-10. A fact sheet has been prepared recommending a process for preparing policies for environmental water in water allocation plans as the basis of a statewide rollout of the policy.

- **Development of a policy framework for the release of unallocated water**

  DWLBC received funding from the National Water Commission in late 2006 to undertake a review of water allocation planning in South Australia to ensure compliance with the Intergovernmental Agreement on the National Water Initiative. Rural Solutions SA was employed as consultant to undertake an analysis of existing policy, legislation and consultation as a basis to developing the Policy Framework.

  The Policy Framework for Unallocated Water recommends a minor legislative amendment to the *Natural Resources Management Act 2004* to clarify that for the purposes of releasing excess water in prescribed water resources areas, 'excess' has the same meaning as 'unallocated'. It also provides several NWI compliant options for Natural Resources Management boards to prepare policy on unallocated water in their plans, including making unallocated water available for consumptive use, providing additional water for the environment or to reduce risks associated with climate change and variability, and reserving water for future use.

  During 2008-09 a Policy Statement was prepared in draft form that formed the basis of final consultation within DWLBC. External consultation will take place in late 2009 prior to presenting the policy to the Minister for Environment and Conservation for consideration in early 2010.

- **Drought response planning – water quantity**

  Due to inadequate river flows water levels below Lock 1 have dropped alarmingly and SA Water implemented the following drought response actions during 2008-09:
  - early pumping of water from the River Murray to the Mt Lofty storages
  - commencement of a desalination plant for Adelaide
  - urban water restrictions
  - modifications to SA Water pump stations below Lock 1 to allow operation at lowered water levels
  - sealing the barrages to prevent ingress of seawater into Lake Alexandrina
  - supply of filtered water to Cooltong and Moorook Country Lands districts
  - pumping water from Lake Alexandrina to maintain the level in Lake Albert above the acidification level (ceased July 2009)
  - construction of new pipe networks to serve Old Clayton & Alexandrina Estates & connection to the SA Water supply network
  - construction of a stock and domestic pipeline from Tailem Bend to Meningie
  - construction of a stock and domestic pipeline to Langhorn Creek
  - commencement of a irrigation pipeline from the River Murray to Currency Creek
  - purchasing water for critical human needs
  - commencement of preliminary works for the proposed temporary weir below Wellington.

  Planning has continued on several items, including:
  - river channel water quality modelling and monitoring
  - investigations and planning for water level control embankments in Goolwa Channel (in addition to the temporary regulators under construction)
  - contingency planning for temporary weir below Wellington and various alternative options
  - initial planning for additional storage in the Mt Lofty Ranges.

- **Emergency moorings for River Murray houseboats**

  130 emergency mooring sites for houseboats were constructed during 2008-09 below Lock 1 with funding provided by the DWLBC Drought Team. Low water levels resulted in commercial marinas below Lock 1 becoming too shallow to access, and houseboats have been displaced to temporary locations over the past two years.

  DWLBC engaged a river barge operator to pile drive 6-8m long poles into the riverbed and to clear large areas of willows from the bank in several locations. The Infrastructure and Business Division of DWLBC undertook the engineering design of the emergency moorings, but the marina operators are responsible for lodging the required development applications with the relevant local council and for managing the moorings. While the emergency moorings will be primarily used for commercial houseboat mooring, they will also be available for use by the public. More emergency moorings will be constructed during 2009-10.

- **Impact of reduced flows on Murray River tourism**

  A strategic regional research project was initiated to measure the current and future economic impact of reduced river flows on Murray River tourism and the role community perception of the drought has played in that impact. This is a tri-state initiative between Tourism NSW, Tourism Victoria and SATC in conjunction with Tourism Research Australia.

- **Murraylands Integrated Strategic Tourism Plan**

  This strategy has similar aims to the Riverland Strategy (see below), namely to achieve realistic growth in tourism in the region, and is a collaborative initiative between key regional stakeholders and the SA Tourism Commission. The Murraylands Integrated Strategic Tourism Plan recognises the importance of aligning key strategic recreational and water management initiatives within the Murraylands.

- **Riverland Integrated Strategic Tourism Strategy**

  Commenced in May 2008, this strategy continues to aim at achieving realistic growth in tourism in the region – consistent with the Riverland community's aspirations. It is a summary of what has been learnt from substantial economic, market, resource, social, landscape, environmental and planning policy investigations.

- **Scum Booms**

  'Scum booms' to prevent the accumulation of very high surface concentrations of blue-green algae adjacent to water supply off-takes are operating at Renmark, Loxton, Barmera, Swan Reach and Blanchetown.

- **Yatco Wetland LAP funding**

  The Loxton to Bookpurnong LAP Group received a $7,900 grant from the Commonwealth Government in June 2009 to survey various sites at Yatco Wetland through the installation of gauge boards that enable instantaneous monitoring of water levels.

4.2 The community's knowledge and understanding of the River Murray system is to be gathered, considered and disseminated in order to promote the health and proper management of the system

- **Community consultation by DEH on the Long Term Plan for the Coorong, Lower Lakes and Murray Mouth and the Pomanda Weir EIS**

  During 2008-09 numerous meetings were held with communities around the Lower Lakes in relation to the Long Term Plan for the Coorong, Lower Lakes and Murray Mouth, and for the Environmental Impact Statement (EIS) for the proposed temporary weir below Wellington (at Pomanda Island). The information gained from these meetings, and the submissions received as a result of them, informed the development of the Long Term Plan and the Supplementary EIS for the weir.

- **Friends of Riverland Parks**

  Supported by DEH, the Friends of Riverland Parks undertook a range of on-ground monitoring and rehabilitation programs, including surveys of regent parrots, bush-stone curlews, pythons, possums, kangaroos and rabbits. The group also undertook feral animal baiting and revegetation programs in the Murray River National Park.

- **Lower Lakes and Coorong Oral History Project**

  A project is being undertaken to record the oral histories and local knowledge of community members around the Lower Lakes and Coorong. Prior to collecting this information key management and research organisations were surveyed to ascertain their historical information requirements. A website is being developed to make this information widely available to the wider community.

- **National Parks and Wildlife consultative committees**

  Consultative Committees for the Murraylands and South East continued to provide avenues for community input into the management of parks and reserves during 2008-09.

- **Native Fish Strategy presentations**

  PIRSA's Native Fish Strategy Coordinator continued to provide a range of talks to the community and professional organisations throughout the year regarding the status of native fish and implementation of the Native Fish Strategy, including the coordination of a Native Fish Awareness Week in May 2009. The Native Fish Awareness Week included a series of site visits and public presentations to the community designed to raise knowledge of the issues facing native fish in South Australia.

- **Regional Natural Resources Management Plan**

  During 2008-09 the development of the Regional NRM Plan involved an extensive consultation through which the community's knowledge and understanding of the River Murray system was gathered, considered and disseminated to identify the outcomes and targets for the region. Methods employed included targeted planning groups, regional forums, public consultation, interviews and multi-criteria analysis.

Nearly two thousand comments were received during the formal consultation period and all comments were responded to. The information formed a fundamental part of finalising the plan, which came into operation on 1 July 2009.

4.3 The interests of the community are to be taken into account by recognising Indigenous and other cultural, and historical, relationships with the River Murray and its surrounding areas, and by ensuring appropriate participation in processes associated with the management of the River Murray system

- **Building community capacity and support for NRM in the SA Murray-Darling Basin**

  The SA Murray-Darling Natural Resources Management Board continued to provide resources during 2008-09 to enable community groups and individuals to further develop their understanding and capacity to play a meaningful role in natural resource management in the South Australian Murray-Darling Basin. The project employs a team of officers with a complementary skills base to build the capacity of and provide effective linkages between the community, government and industry.

- **Culturally Significant Species Project**

  The SA Murray-Darling Natural Resources Management Board is sponsoring a project to identify and describe management requirements for species of flora and fauna in the SA Murray-Darling Basin with Aboriginal cultural significance. Such species include food, fiber, tool-making and medicinal species as well as those with other cultural or spiritual significance.

- **Development Assessment**

  13 development applications (under the provisions of the Heritage Places and Historic Shipwrecks Acts) were referred to DEH for advice under delegation from the Minister for Environment and Conservation in the period April 2008 to June 2009.

- **Indigenous Engagement**

  The First Peoples of the River Murray and Mallee claimant group is finalising an Indigenous Land Use Agreement with the State Government over unallotted Crown land in the claim area. The group, together with the State Government and Berri-Barmera Council, is developing a cultural heritage management plan for Lake Bonney to ensure ecologically sustainable access to the Lake and foreshore.

  A consultation agreement has been reached between DEH and Ngarrindjeri representatives to guide future negotiations regarding Ngarrindjeri interests in the Coorong, Lower Lakes and Murray Mouth area.

- **Lake Bonney Archaeological Survey and Cultural Heritage Management Plan**

  1n 2008 closure of the inflow channel resulted in exposure of Aboriginal remains and archaeological material in Lake Bonney. The Aboriginal Affairs and Reconciliation Division of Department of Premier and Cabinet (DPC), with the assistance of the Murray-Darling Basin Commission, facilitated an archaeological survey of the lake and its surrounds. The survey identified extensive Aboriginal heritage sites around the lake.

  The Division commissioned a cultural heritage management plan to look at managing recreational impacts on the sites. It is anticipated that the plan will be completed in August 2009. The plan should enable the Berri Barmera Council to better manage the cultural values of Lake Bonney in consultation with the First Peoples of the River Murray and Mallee and the Division.

- **Mid-Murray Heritage Review / Development Plan Amendment**

  Under its *Heritage Directions* funding for local government program, DEH provided funding support to the Mid Murray Council in 2007-08 to undertake a heritage review of its Council area and to prepare an amendment to its Development Plan, including a list of places of local heritage value with policies to manage those places. The heritage review was completed in May 2009 and a Heritage Development Plan Approval will be undertaken in 2009-10.

- **NRM Education (formerly Catchment Care)**

  NRM Education is a major school and community education and engagement program. It works with 70 schools (approx 12,000 students) across the region and involves:
  - Building teachers' capacity for environmental education through quarterly professional development sessions on whole school approaches towards sustainability;
  - Assisting schools to develop School Environmental Management Plans and embed environmental literacy into the curriculum through the development of whole-school curriculum plans;
  - Delivering education sessions on a number of environmental issues to approximately 2400 students;
  - Quarterly water quality monitoring with 24 schools and 12 community groups at 48 sites;
  - Quality control and data systems for community water quality monitoring;
  - Leading youth leadership programs such as the River Murray Youth Council and the Junior Youth Environment Forums;
  - Developing close working partnerships with the Australian Sustainable Schools Initiative, DECS, DEH, OzGreen, Rotary and LAP Associations;
  - Promotion of events and programs through an Environmental Education for Sustainability Calendar, media releases and radio interviews.

- **Pike River Project**

  In September 2008, the Aboriginal Affairs and Reconciliation Division of DPC and Flinders University conducted a Site Recording and Conservation workshop in Barmera for Aboriginal community members from the First Peoples River Murray and Mallee Native Title Claimant Group.

Community members who completed the field school then participated in a cultural heritage survey in the Pike River area. The project was funded by DWLBC to further their training and practice newly acquired skills in the field. Young people from the First Peoples group developed and managed the cultural heritage survey. The project resulted in the identification and recording of Aboriginal sites in the Pike River area.

- **River Murray icon sites**

  Each of the icon sites has a community coordinating committee that meets regularly to oversee actions and provide input to decisions regarding the site. Each also has an Indigenous facilitator to assist with consultation and management.

  A community reference group set up by DEH has met regularly with Government representatives and academics and provided valuable input into the Long Term Plan for the Coorong, Lower Lakes and Murray Mouth.

- **River Murray Licensing Project**

  The DEH River Murray Licensing Project (Crown Lands SA) aims to identify and license all structures in the River Murray Protection Area previously built without formal approval. Licensing commenced in 2005-06 and has continued during 2008-09 and was substantially completed by 30 June 2009. Legislative provisions of the *Crown Lands Act 1929* relating to mandatory consultation prior to the issue of licences have been carried forward in the *Crown Land Management Act 2009*, assented to by Parliament on 4 June 2009.

- **Upgrade of River Boat Trail**

  DEH completed an upgrade of the River Boat Trail along the River Murray from the Murray Mouth to the SA Border. This interpretation project includes 18 new signs at various points along the river as well as a new web-based product linked to the Discover Murray website.

4.4 The importance of a healthy River to the economic, social and cultural prosperity of communities along the length of the River, and the community more generally, is to be recognised

- **Aboriginal Partnerships Project**

  The Aboriginal Partnerships Project of the SA Murray-Darling Basin Natural Resources Management Board promotes the Aboriginal community's cultural connection to the River Murray. This has been done through tours, newsletters attending field days and presenting at meetings, workshops, conferences and schools.

- **Cross Government Participation**

  The Department of Trade and Economic Development (DTED) has been actively involved in the following high level groups and technical working groups to develop strategies and implement actions relating to the drought (including areas supplied by River Murray) and River Murray water security:

- Water Security Council;
- Water Security Technical Group; and
- Murray Futures Project.

DTED continued to contribute to projects in 2008-09 through the evaluation of the relative economic benefits of competing water uses for risk/consequence matrices, and evaluation of strategic options for the Lower Lakes.

- **Development Policy**

  DTED has been involved in the development of various policies and strategies relating to the River Murray. The purpose of this is to ensure an economic perspective is built into these instruments. In 2008-09 DTED provided input to the development of the River Murray Marina Strategy.

- **Drought Response**

  During 2008-09 the SA Murray-Darling Basin Natural Resources Management Board undertook a number of projects to assist the community in dealing with drought. These included provision of funding assistance to undertake works in the community to ameliorate the impacts of the drought, and educational and social projects to enable the community to cope with the current conditions.

- **Maritime Heritage Program**

  The Maritime Heritage Program managed by DEH protects and enhances community awareness of maritime heritage, including heritage along the River Murray.

  The wreck of an unknown ship discovered near Narrung Jetty was surveyed in May 2009. The dimensions fit with the description of the vessel *Alice*, a barge lost in the area.

  Vessel components recovered from an unknown shipwreck discovered near the Milang Jetty have been surveyed.

- **Regional Prospectus Project**

  DTED provided funding for the Regional Prospectus Project, which is being coordinated by the Riverland Futures Taskforce (see below). The focus of the project is to deliver outcomes that establish sustainable and economically productive industries, while seeking to protect and enhance the biological diversity and the community's social values of the area. Additional outcomes will include the alignment of the development plans and policy for the three Riverland councils involved in the project.

- **River Murray Drought Communications and Community Engagement Program**

  The continued low flows to the River Murray during 2008-09 led to strong demand for regular information from all sectors of River Murray users and other affected stakeholders. The SA Murray-Darling Basin Natural Resources Management Board worked with the DWLBC River Murray Drought Team to develop and execute an extensive communication program to meet this demand for information. This communication program included:

- Briefings and meetings with stakeholder and community groups;
- Production and distribution via email networks and public meetings of 'answers to frequently asked questions' for key issues (including water restrictions, a proposed temporary weir near Wellington and temporary closures of wetlands);
- Print and radio advertising; regular articles posted on the Drought Link website and SA Drought E-Newsletter;
- Information about the River Murray available via the SA Government Drought Hotline 180 20 20; and
- Contributions to a series of public meetings hosted by the Board in River Murray towns.

Local communities and contractors are extensively involved in the bioremediation strategies being carried out to mitigate the effects of acidification of exposed lakebeds at the Lower Lakes and their tributary streams.

Social and economic factors are an important consideration in the development of the Long Term Plan for the Lower Lakes, Coorong and Murray Mouth, and the social and economic costs of low flows past Wellington are very evident on those communities reliant on the quantity and quality of water available for the Lower Lakes.

- **Riverland Futures Taskforce**

  DTED provided funding over an 18-month period for a joint working group comprised of State Government and Local Government in the Riverland Region. Objectives included the promotion of diversification of existing industry to remove reliance on the River Murray, and the promotion of environmental policies and programs to align with strategies of the SA Murray-Darling Basin Natural Resources Management Board.

- **Water Conservation Community Education**

  SA Water continued to support and promote water conservation in South Australia throughout 2008-09.

  Additionally, a new information training and learning hub was opened in the new SA Water headquarters in Victoria Square. The hub focuses on promoting sustainable water use, building on existing water education in schools and the broader South Australian community.

  Together with partner organisations (SciWorld, Adelaide Fringe, Come Out, Botanic Gardens of Adelaide and Tandanya) and with the support of the Department of Education and Children's Services, SA Water presented a new School Education Program in 2009. The program supports a wide range of teaching and learning perspectives with a particular focus on science, technology, the arts, literacy and the environment. Programs use a student-centred approach and encourage collaborative learning. Each program is supported by teacher resources. The SA Water library also has a series of water related resources for schools available for loan by teachers.

  The centre is also complemented by SA Water's online interactive House + Garden website (www.sawater.com.au/interactivehouse); an online teaching tool.

Households can calculate their weekly water use and access easy ways to save water around the home.

A Teacher's Guide and Student Water Journal is also available to support this website and is designed to encourage learners to be engaged with water conservation at home, school or in the community. The Teacher's Guide includes curriculum links, learning outcomes and inquiry based student activities. The Student Water Journal enables students and their families to measure and record their water consumption at home and also includes water facts, jokes, tips and fun learning activities.

- **Water Efficiency Planning for Industry**

  DTED worked with DWLBC, SA Water, and PIRSA in the development of a water efficiency planning scheme for industries using River Murray water (either directly or via SA Water infrastructure). Following the introduction of regulations, prescribed industrial users are required to develop water efficiency plans. DTED developed a series of templates to assist business prepare their water efficiency plans.