Programs supported by the South Australian Government that contribute to the achievement of the Objects of the *River Murray Act 2003* and Objectives for a Healthy River Murray (ORMs)

The South Australian Government supports a wide range of programs that directly contribute towards the Objects of the Act and the ORMs. These programs are listed below against the relevant ORM. Many programs contribute to a number of ORMs, and for simplicity have only been listed under the ORM they most clearly relate to. Programs have not been listed against the Objects of the *River Murray Act 2003*, as the ORMs provide a more detailed breakdown and encompass programs that relate to the Objects.

Acronyms

CRC	Cooperative Research Centre
DEH	Department for Environment and Heritage
DWLBC	Department of Water, Land and Biodiversity Conservation
EPA	Environment Protection Authority
GIS	Geographical Information Systems
INRM	Integrated Natural Resource Management
INRM Group	The Integrated Natural Resource Management Group for the South Australian Murray Darling Basin Inc.
LAP	Local Action Plan
MDB	Murray-Darling Basin
MDBC	Murray-Darling Basin Commission
NRM	Natural Resource Management
PIRSA	Primary Industies and Resources South Australia
RMCWMB	River Murray Catchment Water Management Board
SARDI	South Australian Research and Development Institute
SIS	Salt Interception Scheme

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

- **River Murray Wetland Management Plan**
  A management plan is under development that guides future actions and investment for River Murray wetlands in South Australia.

- **Community Wetland Management**
  The River Murray Catchment Water Management Board contributed over $470,000 to wetland management projects run by community groups. A ‘Condition Assessment Framework’ for wetlands was developed and tested, assisting the Board to prioritise works and investment. Baseline surveys of 39 River Murray wetlands were also undertaken, which involved collecting data on physical features, water quality, groundwater, aquatic macro-invertebrates, fish,

frogs, birds, aquatic and terrestrial vegetation. These will enable community groups to produce wetland management plans that meet best practice.

- **Wetlands Strategy for South Australia**
  A Senior Wetlands Officer has been employed to implement the Wetlands Strategy to improve the understanding and conservation of wetlands in South Australia, including in the Murray-Darling Basin.

- **Wetland Guideline Document**
  Wetland Guidelines have been developed, published and distributed that set the management standards that all wetland managers in South Australia must meet before a water licence will be issued.

- **South Australian Revegetation Framework**
  A pilot project is being undertaken in the Murray-Darling Basin to develop a framework to ensure data consistency in regional catchment revegetation programs. This framework will subsequently be applied State-wide.

- **Grazing Impact Assessment Project**
  In partnership with the Mid-North Grasslands Working Group, and funded by Land, Water and Wool Australia, the Catchment Board has employed a project officer to assess the impacts of different grazing regimes on watercourse health and weed translocation in the Burra catchment.

- **South Australian Land Resource Assessment**
  Soil profile and landscape data have been collected from agricultural districts in South Australia, including the Murray-Darling Basin, in order to maximise the sustainability and productivity of agriculture.

- **Review of Major New Land Releases**
  The Office of Sustainability is engaging with the Government's Land Management Corporation in reviewing major new land releases, to achieve advanced sustainable development outcomes that are consistent with Government policies, desired commercial performance of projects and site constraints.

- **Lower Murray Landuse Integration Project**
  A tri-State collaboration between South Australia, New South Wales and Victoria is integrating landuse data sources and mapping. This will be applied in assessing the impact of farming practices on the River Murray.

- **Forest Land Resumption and Rededication**
  Four Forest Reserves within the MDB are being resumed, and rededicated as Conservation Parks under the National Parks and Wildlife Act. These will be managed as part of the protected areas network.

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

- **Coorong, and Lakes Alexandrina and Albert Ramsar Management Plan**
  The Coorong and Lakes Alexandrina and Albert are listed as Wetlands of International Importance under the Ramsar Convention. This status recognises the worldwide importance of the area as a waterbird habitat, particularly for migratory waders and waterfowl, and as a drought refuge. Through the implementation of this management plan awareness of Ramsar issues has been improved amongst key stakeholders, and wetland habitats in the Coorong and Lower Lakes floodplain within the Ramsar area are being identified and rehabilitated.

- **Ramsar Habitat Mapping and Planning Program**
  Detailed mapping provides information to Councils regarding conservation values contained within the Coorong and Lower Lakes Ramsar site. The results of this project will inform decision makers about the manipulation of water levels in the Coorong and Lower Lakes, support improved recreation planning and management and aid future zoning decisions.

- **Riverland Ramsar Site Management Plan**
  The Department for Environment and Heritage is drafting a management plan for the Riverland Ramsar site, in cooperation with landholders and the community. This will form an integral component of the Chowilla Environmental Enhancement Strategy.

- **Chowilla Integrated Natural Resource Management Project**
  A multi-disciplinary project that aims to enhance and restore the environmental values of the Riverland Ramsar Site by delivering environmental and salinity benefits to the Chowilla floodplain and the River Murray. The project takes an integrated natural resource management approach that includes adaptive management, community engagement, management of surface water flows and the construction of a salt interception scheme. Intensive investigations have been commenced into the physical impacts of salinity and flow management affecting the wetland values.

- **Wetland Management Plans at Chowilla**
  Development of wetland management plans is underway for four specific wetlands within the floodplain areas of Chowilla.

- **Integrated Floodplain Management Strategies**
  Integrated Floodplain Management Strategies have been initiated for the priority floodplains at Pike and Murtho. These strategies will be advanced as pilot projects to develop planning frameworks and implementation arrangements for floodplain management.

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

- **Botanical Survey**
  An examination of the botanical composition and plant health of native vegetation within the Lower Murray Basin, with a particular focus on remnant populations was carried out in 2003-04. This was referenced against salt maps and models produced by the program to identify both current and future impacts of salinity on natural ecosystems and to identify biodiversity assets at risk from salinity.

- **Impacts of Salinity on the Aquatic Invertebrate and Aquatic and Terrestrial Vertebrate fauna of the River Murray Floodplain in South Australia**
  The biological survey is assessing faunal communities and their relationship to salinity in the River Murray Valley from the New South Wales border to Murray Bridge. This survey follows prior groundwater assessments and a vegetation sampling and mapping program in the region, which examined a range of sites from 'natural' to highly salinised. A subset of these sites is being sampled for vertebrates and terrestrial invertebrates, along with sampling of aquatic invertebrates in associated river stretches. The survey includes four field-survey periods over two years, and will conclude in 2005.

- **Recovery of Threatened Biodiversity in the Murraylands**
  Threatened species and threatened ecological communities are priority issues under National Heritage Trust II. This project aims to increase understanding of the requirements of threatened species, in order to develop draft multi-species recovery plans for threatened fauna and nationally threatened plants.

- **Perennial Vegetation Protection and Revegetation Projects**
  In 2003-2004 over $516,000 was contributed to community groups to undertake investigations that identify high priority sites for biodiversity conservation and to provide incentives to landholders to protect and re-establish perennial vegetation.

- **Implementation of the Black-eared Miner Recovery Plan**
  This project will make a major contribution to the conservation of one of Australia's most endangered birds, the Black-eared Miner (*Manorina melanotis*). It will also directly benefit a number of nationally threatened species such as the Malleefowl (*Leipoa ocellata*), Major Mitchell's Cockatoo (*Cacatus leadbeateri*), White-browed Treecreeper *(Climacteris affinis),* Striated Grasswren *(Amytornis striatus),* Hooded Robin *(Melanodryas cucullate),* Chestnut Quail-thrush *(Cinclosoma castanotus)* and Red-lored Whistler *(Pachycephala rufogularis).*

- **River Red Gum Investigations & Remedial Flooding**
  Following the completion of the MDBC Technical Report '*Preliminary Investigations into Observed River Red Gum Decline along the River Murray below Euston'*, further investigations have been undertaken, including modelling and mapping of tree health at Chowilla and development of future projects.

- **Freshwater Fish Action Plan**
  Specimens of fish in the South Australian Museum are being classified to provide foundational information on the presence of species and their distribution over time. This will feed into the development of statuses for freshwater fish, and actions plans for their conservation. Freshwater fish will also be provided legislative protection through being listed in Schedules of the *National Parks and Wildlife Act 1972*.

- **River Murray Native Fish Monitoring**
  A fishery-independent research and monitoring program has been initiated to facilitate data collection for the assessment and effective management of native fish populations. A three-year sampling program will monitor biological performance indicators of Murray Cod and Callop, which aims to gain an understanding of the biology, ecology and stock status for South Australian populations of these species.

- **Protecting biodiversity on Narrung Peninsula through integrated vertebrate pest control**
  The impact of feral animals is the single greatest threat to biodiversity in habitat remnants on Narrung Peninsula, which supports migratory waders and the nationally endangered Orange-bellied Parrot and Sandhill Greenhood Orchid. This project aims to build on the Narrung Peninsula Rabbit Eradication Project by completing destruction of all rabbit warrens and by reducing fox, cat, hare, goat and deer numbers through integrated control programs. The near island geography of the peninsula means controls will have lasting benefits for biodiversity.

- **A Landscape Approach to Determine the Ecological Value of Scattered Trees**
  This project runs from 2001 to 2005, investigating the contribution of scattered trees and small remnants to native vegetation cover targets within two regions of agricultural South Australia that are typical of woodland within the Murray-Darling Basin. Critical zones are being identified across the landscape where scattered trees and clumps of trees in cleared agricultural land make a significant contribution to biodiversity conservation. This will result in the development of guidelines that can be used in other regions to evaluate the ecological value of scattered trees, and strategies for identifying revegetation sites on a landscape scale.

- **Carp Ecology in South Australia**
  In order to improve control of carp in the Murray-Darling Basin, this project address priority knowledge gaps for carp in South Australia and investigates novel control measures, including pheromone attractants/repellents and Cyprinid (carp) specific biocides. The project is funded by the Pest Animal Control Cooperative Research Centre, and will contribute to the development of an Integrated Pest Management plan for carp in the Murray-Darling Basin, with specific application to “Daughterless Carp” technology.

- **National Park Pest Plant and Animal Control**
  Pest plant and animal control has been undertaken in National Parks along the River Murray on an ongoing basis, working with adjacent landowners in order to maximise the benefits to the community and the effectiveness of control within the Parks. Pest control in 2003-04 focused particularly on Feral Pigs, rabbits, African Boxthorn and Golden Dodder.

- **Golden Dodder and Branched Broomrape Eradication Programs**
  Eradication of golden dodder and branched broomrape from along the River Murray has contributed to protection of environmental diversity and the economic viability of local communities.

- **Assessments of Native Vegetation Clearance and Heritage Agreement**
  Applications for native vegetation clearance and Heritage Agreements are assessed and enforced on an on-going basis, to ensure that biodiversity is protected in the Murray-Darling Basin.

- **Stockyard Plain Basin Revegetation**
  Rehabilitation and revegetation of the land surrounding the Stockyard Plain Saline Disposal Basin with indigenous plants of local provenance was continued in 2003-04.

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

- **Construction of Fishways**
  As part of the Murray-Darling Basin Commission's plan to restore native fish passage along the River Murray between Lake Hume and the sea between 2003 and 2008, SA Water constructed fishways at three sites in 2003-04. Vertical-slot fishways were completed at Lock 8 in November 2003 and Lock 7 in June 2004. A vertical-slot fishway and rock-ramp fishway were completed at Tauwitchere in June 2004.

- **Murray Barrage and River Murray Fish Passage Assessment**
  As part of the MDBC fish passage program a range of types of fishways are being installed for trials at the barrages at Goolwa and Tauwitchere, prior to wider application. SARDI is collecting baseline data on the potential migratory fish species, comparing the relative efficiency of the fishway options, conducting specific fishway experiments to optimise final fishway design, placement and operation, and gauging the success of the fish passage at the Murray mouth barrages. Simultaneously, a tri-state collaborative project between SARDI, Arthur Rylah Institute, Victoria, and NSW Fisheries is assessing the success of a series of eleven vertical slot fishways.

- **Swimming Ability of Small Native Fish Species in the Lower River Murray**
  An investigation of the swimming ability of three species of small-bodied native fishes of the lower River Murray is being carried out to optimise the design of culverts and regulators to enhance fish passage within and between in-channel

and off-channel habitats (eg. wetlands). The experimental component of the project is being undertaken by an Honours student at the University of Adelaide, with supervision and analysis by SARDI and funding from the RMCWMB.

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

- **The Living Murray Initiative**
  South Australia has provided pivotal support in the development of the Murray-Darling Basin Ministerial Council's program to restore the health of the River Murray by recovering 500 Gigalitres per year of new water over a period of five years and focusing on six ecological assets (SEAs). South Australia's contribution has included identification of potential infrastructure projects to recover water, organization of an interjurisdictional drafting group to develop a Living Murray Business Plan, and assessment of the economic impact in South Australia of several water recovery scenarios, including the determination of the value of primary production that derives specifically from Murray River Water.

- **Draft Environmental Flows Strategy**
  In order to deliver the Living Murray Initiative in South Australia, a strategy is currently under development to give a framework for collective action to deliver environmental flows. The strategy will address the 'First Step' of recovering 500 Gigalitres for environmental flows over 5 years, and delivering flows to significant ecological assets. In South Australia ecological assets are the main river channel, the Chowilla floodplain and the Lower Lakes, Murray Mouth and Coorong. The strategy also sets out a clear vision for water recovery and flows beyond this 'First Step', including the State Government's commitment to pursue the return of a minimum of 1500 Gigalitres to the River Murray over 15 years.

- **Asset Environmental Watering Plan: Lower Lakes, Coorong & Murray Mouth Significant Ecological Asset**
  Environmental watering plans are being developed that identify the specific watering regime (volume, timing and security) for each of the six Significant Ecological Assets (SEAs) identified under the Living Murray First Step Decision. A range of investigations have been undertaken to inform the development of the Environmental Watering Plan for the Lower Lakes, Coorong and Murray Mouth SEA. These include a Morphological Model for the Murray Mouth, a Lower Lakes Socio-Economic Study and a Murray Mouth Decision System to inform sand pumping.

- **Save the Murray Levy**
  In 2003-04 the South Australian Government introduced the 'Save the Murray Levy', which is payable by all SA Water customers. The levy will raise an estimated $20 million per annum that can be directed towards restoring the health of the River Murray, including the recovery of 500 Gigalitres of water over five years as part of the Living Murray Initiative, and the 'River Murray Improvement Program' which funds ecological improvement projects across South Australia.

- **River Murray Environmental Flows Fund**
  A joint South Australia – Victoria fund to secure increased environmental flows for the River Murray as part of The Snowy Package, funding the 'Water for Wetlands' project, 'sewer mining' in Port Augusta and a Lake Mokoan water savings project.

- **National Water Initiative**
  The South Australian Government has contributed to the development of the Intergovernmental Agreement which gives effect to the National Water Initiative (NWI). The NWI seeks to: improve the security of water access entitlements; ensure ecosystem health; ensure water is put to best use by encouraging the expansion of water markets and trading across and between districts and States; and, encourage water conservation in our cities, including better use of stormwater and recycled water.

- **Wetlands for Water**
  A system of careful management of selected wetlands is being developed to reduce water use while retaining elements of the water regimes that support the biodiversity of the wetlands. The water saved through this management can be used to provide priority environmental flows elsewhere in the River Murray system.

- **Weir Pool Lowering Project**
  In preparation for proposed weir pool level manipulation exercises in 2004-05, ecological baseline information has been collected in selected river reaches, and hydrogeological and hydrological assessment has been undertaken to determine salt returns to the River Murray from wetlands and backwaters.

- **Control of Lake Victoria**
  SA Water is operating this off-stream water storage in New South Wales under a plan of management that protects cultural heritage and enhances vegetation growth on the bed and shores of the lake. The operating regime has been revised from a previous system of filling to full during the winter and drawing down as required for irrigator needs, to an extended period of being held down that facilitates plant establishment.

- **Eastern Mount Lofty Ranges Prescription Investigations**
  A "notice of intent to prescribe" the Eastern Mount Lofty Ranges water resources occurred during 2003-04. A series of hydrological and ecological investigations were undertaken underpin the prescription of these resources. These included surveying land use, assessing the current status of surface water and groundwater resources, the interaction of surface and groundwater in the Marne/Saunders area, a peer reviewed report published on the environmental water requirements of the Marne catchment and identification and mapping of water-dependant ecological assets in the Angas and Tookayerta catchments.

- **River Murray Drought Response Strategy**
  The extended dry period across much of the MDB between 2001-03 resulted in reduced water availability across the River Murray system, and the introduction of restrictions on the taking of water from the River Murray during 2003-04 that will be extended into 2004-05. A simple, transparent policy framework was developed

in 2003-04 for the management of River Murray water resources in 2004-05, to improve clarity for water users.

- **Water Resource Allocation**
  Ongoing monitoring and enforcement of water extraction from the River Murray within South Australia, in accordance with the requirements of the *Water Resources Act 1997* and the River Murray Water Allocation Plan. In 2003-04 a regional compliance group was created within the Murraylands Region to identify and investigate illegal activity along the River Murray.

- **Water Use Efficiency Training Program**
  Rural Solutions SA have been providing on-farm training to irrigators in the Murray Darling Basin on drought management strategies and responding to water restrictions.

- **Controlling water-affecting activities**
  Water affecting activity permit application assessment, which covers dam construction, excavation in a watercourse, drainage and effluent use, was advanced in 2003-04. Assessment policies and the risk assessment framework have been developed with a GIS-based tool.

- **Water Proofing Adelaide**
  A strategy is being developed to ensure a sustainable water supply for Metropolitan Adelaide for 2005 to 2025. The strategy will set out a blueprint for the management, conservation and development of water resources. The strategy is being developed with extensive community consultation to ensure it is cost effective, environmentally sustainable and in line with community expectations.

- **Permanent Water Conservation Measures**
  In order to reduce the urban and domestic consumption of water, including water from the River Murray, water restrictions were introduced to parts of the State on the 1 July 2003. These were replaced by permanent water conservation measures on 26 October 2003. In conjunction with extensive community education this resulted in Metropolitan Adelaide using 10% less than the average water demand of the past 10 years for the period 1 July 2003 to 29 February 2004. This compares favourably to worldwide results for restriction programs.

- **Water Conservation Home Audit Pilot**
  A pilot study of home water conservation audits by the Riverland Energy and Water Friends group. Audits of individual households have assisted the community to voluntarily reduce domestic water consumption by identifying areas where conservation is possible, and facilitating the adoption of water saving devices within households.

- **Mawson Lakes Dual Reticulation Development**
  The Mawson Lakes project aims to reduce the use of traditional surface water supplies, including the River Murray. Reused water from the Bolivar Wastewater Treatment Plant is combined with stormwater and supplied through a second

reticulation system to Mawson Lakes, providing water for non-potable uses, such as landscaping.

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 Management**
  The Murray Mouth Advisory Committee has overseen a group of activities to ensure that the river mouth is kept open and that the Coorong and Lower Lakes are managed to provide both for the economic and ecological health of the region. Dredging, which commenced in October 2002, has continued throughout 2003-04 to ensure that the river mouth remains open to protect the ecological health of the Coorong. The development of a sophisticated computer model to describe the sand deposition process at work at the Murray Mouth has continued and the model is now being trialled.

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

- **River Murray/ Mallee Dryland Corridor Market Based NRM Investment Program**
  The Mallee dryland corridor that extends several kilometres each side of the Murray Valley in South Australia is a priority location for natural resource management works. This project is coordinating the current revegetation devolved grant scheme within the corridor and developing market based and associated community marketing strategies. An investment strategy is being developed for the corridor that integrates the social, environmental and economic objectives of the various stakeholders and considers trade-off issues.

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

- **The Environment Protection (Water Quality) Policy 2003**
  The Water Quality Environment Protection Policy (EPP) came into operation on 1 October 2003. The EPP's main objective is to achieve the sustainable management of South Australian waters, including the waters of the River Murray, by protecting or enhancing water quality while allowing economic and social development. The EPP provides South Australia with a consistent approach to the management of water quality and brings the State in line with the National Water Quality Management Strategy. The launch of the EPP involved targeted communication with Local Government and across agencies, and the Support Unit within the EPA has provided ongoing training and support for Local Government authorised officers.

- **River Murray Water Quality Risk Assessment**
  A River Murray Water Quality Risk Assessment is being conducted that will identify the nature and location of all potential sources of pollution between the South Australian/Victorian border and the Lower Lakes by the end of 2005, so that action can be taken to protect water quality in the river where its needed most. In 2003-04 joint state and federal government funding was secured for the project, a risk assessment unit was established in the EPA Murraylands Office and a trial risk assessment was completed in the section of the River Murray between Mannum and Mypolonga. The trial was used to develop a risk assessment methodology that will be implemented across the entire River and Lower Lakes during 2004-05.

- **Water Quality Codes of Practice**
  A number of industry and activity based water quality codes of practice that relate to the River Murray have been initiated during 2003-04 including: Vessels on inland waters, Wastewater Overflow Management, Marina and Boating Management, Materials Handling on Wharves and Industry, Retail and Commercial stormwater management. Consultation on these codes will be integrated with the regional communication strategies on the Water Quality Environment Protection Policy throughout 2004-05.

- **River Murray Houseboat Waste Disposal Stations Upgrade**
  There are twelve waste disposal stations located along the South Australian length of the River Murray. The stations provide black water pump-out facilities to houseboats using the River Murray. A project funded through the River Murray Improvement Program commenced in 2003-04 to upgrade several of the facilities.

- **Loveday Evaporation Basin Odour Control Project**
  The rehabilitation of the Riverland irrigation areas, combined with improved irrigation practices, has seen a significant reduction in the amount of irrigation drainage water generated. This has allowed a review into the number of irrigation drainage basins required which has resulted in the decommissioning of the Loveday Drainage Basin. The basin is being dried as part of the implementation of a long term management plan for the area, however the drying process has resulted in the generation of disagreeable odours which has had an impact on adjacent landowners and people living in the Cobdogla township. This project is working with a community reference group to address this issue, by means of a controlled drying, together with the trialling of various odour control methods.

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

- **Delivering improved Water Use Efficiency Across the Murray-Darling Basin**
  This three-year project is developing methodologies and tools to standardise Water Use Efficiency reporting on a variety of scales, from individual farms to catchments. The project has developed three prototype tools, the Irrigation Inventory Tool, the Water Use Efficiency Module and a Farm Level Water Management Module. The tools are being implemented in 2004 as a component of the Land and Water Management Plan Case Study Project. On-ground activities included 480 irrigators participating in 29 irrigation management courses, 187 irrigators involved in the scheduling program, digging 504 soil survey pits and installing 183 floating flag test wells.

- **Salinity Impacts on Lower Murray Horticulture**
  The 'Tri-State Salinity Project' is a collaborative project between Victoria, New South Wales and South Australia, with cash funding from Land and Water Australia, MDBC and the RMCWMB. Stage 1 of the project, completed in June 2004, concluded that the leaching efficiency of soils could determine the upper limit of irrigation efficiency for salinity sensitive horticulture in the Lower Murray region, and that ambient salinity in the crop root zone increases with increasing irrigation efficiency. This project will expand to include detailed field investigations, model calibration and an economic assessment of the potential salinity impacts on growers' returns from different crops grown under highly efficient irrigation practices. Outcomes from the study will be used for irrigation policy development, River flow regime management and planning and design of salinity mitigation works.

- **River Murray Salt Interception Program**
  This program address the threat of salinity to the River Murray and its floodplain environments by detailed monitoring of salt loads, assessment and prioritization of locations for salt interception infrastructure, and development of a Regional Saline Disposal Strategy. Salt Interception Schemes (SIS) reduce the salinity of the River Murray and its floodplains by pumping saline groundwater to evaporation basins, allowing irrigation induced salinity impacts to be offset. The Woolpunda and Waikerie SIS continue to prevent approximately 350 tonnes of salt per day entering the River Murray. In 2003-04 the Waikerie Stage 2A SIS scheme was commissioned, construction commenced on the Bookpurnong SIS, and extensive investigations were carried out on potential schemes at Loxton, Chowilla, Pike River and Murtho.

- **Interim Salinity Zoning System**
  Irrigation development and other actions that will result in salinity impacts on the River Murray are being directed to locations where they will have a low salinity impact, or to salt interception scheme zones, and away from areas where they

will have a more significant impact on the salinity of the floodplains and River Murray.

- **River Murray Salinity PAR**
  The Minister for Urban Development and Planning initiated a Ministerial Plan Amendment Report (PAR) in January 2004, which will affect the Development Plans for Councils along the River Murray. The PAR will seek to align land use policies with the levels of risk from salinity along the River Murray by restricting new irrigation to less sensitive areas.

- **Socio-Economic Impact Reports on a possible Salinity Levy and Salinity Zoning**
  Reports have been prepared on the socio-economic impacts of a salinity levy, should one be charged to irrigators in the Riverland based on their location/ salinity impact, and the impacts of separating the Riverland into high and low salinity impact zones.

- **Lower Murray Landscape Futures**
  This collobarative project by the Land Technologies Alliance will develop long term planning and evaluation to allow communities and government to assess the impact of regional natural resource management plans and strategies on the well being of the community. By analysing the impacts of plans on land-use change using integrated models, this project identifies alterative NRM plans, identifies gaps in range of current plans, and develops future options and scenarios for the Lower Murray Region.

- **Assessing Impacts of Land and Water Management on Floodplain Health**
  The aim of this project is to identify those areas of floodplain at greatest risk of degradation and to facilitate improved management of the impacts of land and water management on floodplain health. The first phase of this project involved completion of a GIS based model that predicts floodplain degradation for the entire River Murray floodplain in South Australia and an extensive native vegetation, native vegetation health and physical floodplain survey.

- **Upper South East Dryland Salinity and Flood Management Program**
  This program was developed to combat increasing salinisation in the Upper South East, by constructing drains that remove saline groundwater and surface water and lower the water table. The Coorong sub-program monitors and manages discharges of saline drainage water from this scheme into the Coorong, in order to optimise the ecological character of the Coorong. Progress in 2003-04 included ecological heath monitoring, continuous flow monitoring and water quality monitoring.

- **Decommissioning Floodplain Drainage Basins**
  A feasibility study to decommission and rehabilitate Cobdogla Basin was completed in 2003-04, including the development of concept designs and costing.

- **Salinity Impact Management System**
  Application and development of GIS based salinity impact assessment tools for the River Murray has continued in 2003-04.

- **Groundwater Salinity Risk in the Murray Basin Assessment**
  Assessment and modelling of future salt trends to the River Murray from native vegetation clearance was continued in 2003-04.

- **South Australian Field Evaluation Program: CRC for Plant Based Management of Dryland Salinity**
  A sub-program of this major project is assessing perennial grasses and legumes as alternative forage in pastures to reduce the level of groundwater recharge close to the River Murray.

- **Multipurpose Biomass Industry Development**
  This project is promoting an understanding of the economic feasibility of commercial production systems based on perennial plants along the River Murray Mallee corridor in South Australia, in order to reduce salt load into the river.

- **Viticare On-Farm Trials**
  This project aims to improve the sustainability of the viticulture industry, including workshops to train vineyard managers in the use of the Viticare Environmental Risk Assessment tool, a demonstration site using indigenous perennial plant species for mid-row management, and trials for Regulated Deficit Irrigation, which maintains fruit quality while reducing water use.

- **Wine Industry Partnering Strategy**
  This partnering strategy between PIRSA and the wine industry has been developed to ensure ecologically sustainable management of South Australia's natural resource heritage.

- **Noora Irrigation Drainage Disposal Basin Assessment**
  The Noora Drainage Disposal Scheme was commissioned in 1982, to take irrigation drainage water from the Berri and Renmark Irrigation districts. This project is working with adjacent landholders to finalise individual agreements. It is expected that all of these will be completed in 2004-05, prior to the commencement of pumping water to Noora from the Bookpurnong Salt Interception Scheme.

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

- **Lower Murray Reclaimed Irrigation Areas Restructuring and Rehabilitation Program**
  This project aims to restructure and rehabilitate reclaimed irrigation areas used principally for dairy farming. Its benefits will be improved long-term viability of farm businesses, increased irrigation water use efficiency and reduced discharge of nutrients and pathogens to the River Murray. This project includes introducing increased and more easily tradeable water allocations, funding a restructuring

package to promote farm rationalisation, providing financial assistance to irrigators with the cost of infrastructure works, developing an Environment Improvement Program for each farm in the reclaimed irrigation areas and introducing and enforcing new environmental standards for irrigated dairying. Supporting this work has been extensive water quality monitoring, a trial of drainage water reuse to reduce water use and runoff-levels, and GIS land capability assessment to determine which alternative industries may be suitable for the land.

- **Improved Effluent Management along the River Murray**
  A desk top audit on centralised domestic effluent volumes was completed in 2003-04, including current and proposed effluent re-use projects, as the basis for a wastewater re-use strategy for the region.

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

- **Stormwater management**
  All River Murray and Lower Lakes Councils now have stormwater management plans, with the completion of Alexandrina and Coorong Council's plans in 2003-04. Water quality community grants went to stormwater quality monitoring in the Rural City of Murray Bridge, and the design and construction of a Gross Pollutant Trap and the Narooma Wetlands.

- **Reuse of stormwater and drainage water**
  A desktop audit detailing Councils and townships that are proposing to undertake stormwater harvesting for re-use was completed in 2003-04, as the basis for a comprehensive Stormwater Re-use Strategy for the region.

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

- **River Murray Integrated Environmental Monitoring Program**
  A biophysical monitoring program was developed to determine the ecological benefits to the River Murray system of flow manipulation, salinity and other management actions.

- **Active Adaptive Management Guidelines**
  The project is developing Active Adaptive Management guidelines and initiating 13 demonstration projects covering the range of on-ground works being undertaken in the region including revegetation, biodiversity management, wetland management, erosion control, grazing management, weed and pest animal control and protection of indigenous culture and resources.

- **Adaptive Management Wetland Demonstration Site**
  Management of the degraded Loveday Swamp is being carried out to restore its ecological values. Ongoing monitoring of the wetland will enable refinement of the management system, resulting in a 'best practice' wetland management system that will provide a template for wetland management initiatives across the Murray Darling Basin.

- **Lower River Murray Draw-down Monitoring Project**
  As part of the National Action Plan for Salinity and Water Quality Monitoring, monitoring was undertaken to assess the 2002-03 draw-down in water level on the ecosystem components of the Murray River below Lock 1, specifically the Lower Lakes and Coorong. Monitoring included tracking the impact of changing water levels on trees, fish, birds, water quality or groundwater in the river and lake systems. The results will form the basis of a Drought Monitoring Report.

- **Monitoring Ecological Outcomes from Barrage Releases**
  Monitoring has been carried out on the ecological impacts on the Murray Mouth and Coorong in 2003-04 from a managed release of freshwater through the barrages of in September and October in 2003. The sampling included water quality, phytoplankton, zooplankton, macro-invertebrates, fish and food resources for birds. A key component was focusing on the impact of native fish ecology, and spatial and temporal variations of the catch of key commercial species.

- **Sustainable Rivers Audit**
  The South Australian component of the Basin-wide Sustainable Rivers Audit (SRA) was implemented in 2003-04. The SRA is a framework for assessing the health of the Murray-Darling river system that aims to provide a robust environmental assessment and reporting process in a consistent, comparable and ongoing manner, across Basin valleys through time.

- **State of the Environment Report**
  The EPA is responsible for the preparation of a State of the Environment (SoE) Report at least every five years. The latest State of the Environment Report was released in November 2003, and specifically assessed the state of the River Murray against the *Objectives for a Healthy River Murray* under the *River Murray Act 2003,* in accordance with the requirements for such an assessment under Section 112 (3)(ab) of the *Environment Protection Act 1993*.

- **On-ground Stream monitoring**
  Stream flow and salinity loggers, water level probes and rainfall station gauges were installed in the Eastern Mount Lofty Ranges in 2003-04.

- **Ongoing Monitoring of the Lower Lakes and Coorong**
  Extensive monitoring including water levels, water quality, salinity, and ecology has been enacted on an on-going basis. Selected sites were upgraded with telemetered capability, with data managed and delivered through conventional and web-based systems.

- **State Groundwater Monitoring**
  Groundwater levels and salinity levels have been monitored to provide an ongoing assessment of the state and condition of State groundwater resources, especially with regard to land clearing, extraction and irrigation and salt interception schemes. This includes the River Murray and Eastern Mount Lofty Ranges regions.

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

- **Aboriginal Consultation Program**
  A formal meeting was held in the Riverland with members of the Riverland Aboriginal Organisation Forum. A significant outcome of the meeting was recognition that considerable research had already taken place in the Riverland, but it was not coordinated, and Indigenous people have a strong desire to have it published in a way that will respect their ownership of this knowledge. A pilot project was undertaken with the Gerard Community, recording indigenous stories on the meaning and changing nature of the river and its effect on the community's health.

- **Baseline community attitude survey**
  An extensive qualitative and quantitative survey of people within the River Murray catchment was undertaken in 2003-04, in order to understand community attitudes, levels of understanding, and barriers to behavioural change. The survey was completed and a detailed market research document was produced.

- **Drought Liaison Committee**
  A Drought Liaison Committee was established that consists of irrigators and industry representatives from along the length of the River Murray in South Australia. The Committee has provided significant input into decision-making on water restrictions and the Drought Response Strategy.

- **National Parks and Wildlife Consultative Committees**
  Consultative Committees for the Murraylands and Coorong and Lower Lakes provide avenues for community input into the management of parks and reserves.

- **River Parks visitor Facilities Development**
  Indigenous community representatives have provided advice to DEH to protect and recognize sites of cultural heritage significance in the development of visitor facilities in the Murray River National Park.

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

- **Indigenous Engagement**
  South Australia has participated in the development of a Memorandum of Understanding between the Murray-Darling Basin Commission and the Murray Lower Darling Indigenous Nations group, formalising an engagement process of the Indigenous communities in all the Commission activities. The final draft of this MoU has been submitted to the Australian Government for confirmation. In addition development of a comprehensive Indigenous Action Plan has commenced in line with CoAG directions to all Ministerial Councils. Site specific engagement process have been implemented for all major projects and where appropriate the local Indigenous community has been actively involved in the project, such as the employment of two Indigenous Rangers as part of the Murray Mouth Sand Pumping Project.

- **Community Involvement and Awareness Strategy**
  The River Murray Catchment Water Management Board has developed a comprehensive three-year communications strategy, which aims to provide a coordinated and planned approach to driving community involvement and awareness. The strategy was based on research and consultation that identified target audiences, attitudes, understanding, and levels of involvement by the community in catchment management.

- **Regional Support Program - Land and Water Management in the Lower Murray.**
  This project supports and assist irrigators and communities to develop district level Land and Water Management in the Lower Murray. The aim is to improve the sustainability of irrigation and reduce the impacts of irrigation activities on the River Murray. Local Guidelines for Land and Water Management Plans in the South Australian Murray Darling Basin have been completed. 'Case Study' regions have been established which provide knowledge on effective delivery of facilitation and coordination services in the area. Three communities were focused on in 2003-04, specifically the Lower Murray Reclaimed Irrigation Areas, Mypolonga Woodlane irrigators and other highland irrigators

- **Maintaining the Momentum**
  This project ensures that the confidence and capacity of the community to undertake change continues to develop and that engaged communities are not lost during the transition period of development of the region's INRM plan. The project uses financial incentives and provision of technical advice to build on the work undertaken through LAP devolved grant on-ground works programs in the region, capitalising on the investigations undertaken by the Mallee Sustainable Farming Project. The skills of landholders were developed to evaluate and implement options to address a range of INRM issues such as dryland salinity, recharge, soil erosion, watercourse management and biodiversity decline.

- **Building community capacity and support for NRM in the South Australian Murray Darling Basin**
  This project aims to provide resources that will 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 provide effective linkages between the community, government and industry. These officers support the community to manage its natural resources, to successfully manage complex NRM issues in a rapidly changing institutional environment, to build capacity in areas such as leadership, education, team building, group development, managing change, adaptive management and the development of partnerships and to recognise, incorporate and protect indigenous assets, values and knowledge.

- **Regional Biodiversity Support**
  This project supports INRM Groups, landcare groups and landowners to develop implement and evaluate integrated programs to achieve regional biodiversity and natural resource management priorities. Landowners (including private landowners, state and local government and statutory authorities) will be supported to establish and effectively manage their land to contribute to a comprehensive, adequate and representative system of protected areas. Biodiversity conservation, vegetation protection programs (ie Heritage Agreements) and best practice management strategies will be promoted to landowners and recipients of Bushcare funding supported.

- **Salinity Response Team**
  The salinity response team provided expert knowledge to the regional INRM Group, community groups and landholders, supporting the development of technically sound Land and Water Management Plans and targets for salinity and water quality outcomes. Ensuring that the economic, environmental and social considerations are all incorporated in the plans, the salinity response teams also assisted community groups to identify and implement on-ground salinity management strategies.

- **Targeting the Long-term Protection and Active Management of Biodiversity "Hot-Spots"**
  The aim of this project is to target the long-term protection of significant areas of remnant vegetation outside the protected area network in the South Australian MDB region, and to increase the capacity and motivation of landowners to undertake required management and maintenance activities.

- **Eastern Mount Lofty Community Engagement Strategy**
  As part of the "notice of intent to prescribe" the Eastern Mount Lofty Ranges water resources, a community engagement strategy was developed and implemented. Media communication and fact sheets were utilised to inform the community about prescription, its implications for the community, ecology, and the water resources of the Mount Lofty Ranges. This was followed by a series of public meetings and a period for public submissions.

- **River Murray Youth Council**
  Development of a youth council, that addresses the management of the River Murray and the role of youth, was continued in 2003-04. The Council builds capacity, developing informed and active young leaders who can influence their generation. The Council attended and presented at the International River Health Conference and the OzGreen MyRiver conference in Goolwa. A junior youth environment group has also been established to open a pathway between primary and secondary school students.

- **Waterwatch**
  This is a major community education and engagement project. In 2003-04 Waterwatch involved:
  - Water quality monitoring with 13 community groups and 42 schools at 90 sites
  - Quality control and data systems for community water quality monitoring
  - Delivering education sessions on water quality and catchment health to around 2800 students
  - Building teachers' capacity for environmental education through professional development sessions and writing four 'Teacher Resource Packs'
  - Holding forums for environmental education providers and teachers, to improve delivery and integration of environmental education in the South Australian Murray Darling Basin. Recommendations from these forums, including mapping and printed resources, are now being progressed by working groups.
  - Working in partnership with the Lions Club of Berri, Glossop High School and Berri Barmera Local Action Planning to develop interpretive signs about the environmental values and issues at Martins Bend
  - Mentoring students on the OzGreen MyRiver program, which involved water quality testing, identifying values, issues and concerns about the River Murray, and developing local action plans to achieve a vision for a healthy River

- **INRM Group for the South Australian Murray Darling Inc.**
  Ongoing development and support of INRM Groups and implementation the INRM Plan. Activities will focus on salinity and water quality, engaging the community to assist the development, refinement and implementation of INRM and Investment Plans, and the Community Support Strategy.

- **River Murray/ Mallee Dryland Corridor Market Based NRM Investment Program**
  As part of the revegetation investment strategy a thorough review is being undertaken of the social, economic and environmental setting for this project including the demography and aspirations of land managers, land & biological resources, groundwater resources, land use and production systems and the presence of salt interception schemes. Significant community engagement has been commenced in 2003-04.

- **Environmental Awards and River Guardian Award**
  The Environmental Awards 2003 competition was held to build publicity of environmental issues and to acknowledge individuals, groups and organizations that have made significant and positive contributions to the environment of the River Murray in South Australia. The River Guardian Award competition was also held in 2003-04, which aims to build community capacity by providing the winner with a scholarship to participate in the Murray-Darling Basin Commission's Leadership Program.

- **Community Engagement Strategy for Weir Pool Manipulations**
  A strategy was written to engage of the community in the weir pool manipulations planned for 2004-05. The strategy combines informing the community about the proposed manipulations and the resource and ecological issues, and engaging the community in the decision making about the implementation of these manipulations.

- **Friends of Riverland Parks**
  Supported by the Department for Environment and Heritage, this community group has undertaken a range of on-ground monitoring and rehabilitation programs, including surveys of Regent Parrots, Bush-stone Curlews, possums and rabbits, and revegetating areas of Murray River National Park with Native Pines.

- **South Australian Biodiversity Advisory Group**
  An advisory group was established to coordinate biodiversity conservation actions across the Murray-Darling Basin in South Australia, resulting in the development of the investment strategy for the Murray-Darling INRM Group. The group comprised of members of Local Action Planning groups and biodiversity project staff from the Environment and Conservation portfolio and the RMCWMB.

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

- **The Greening of Government Operations (GoGO) Framework**
  This framework gives expression to the Government's election commitment to "build principles of Ecologically Sustainable development into Government decision-making", and was launched formally across the public sector in October 2003. 'Water conservation and Wastewater management' is one of eight key Priority Areas for greening action addressed in the Framework.

- **Greening Parliamentary Public Works Committee Submissions**
  All Parliamentary Public Works Committee submissions are now required to incorporate consideration of Ecologically Sustainable Development (ESD) principles. Criteria have been developed for agencies to address ESD in major projects, and in assessing projects for incorporation of appropriate sustainable building technology.

- **The River Festival**
  The second River Festival was held over a week in November 2003, with local residents learning about environmental issues by participating in workshops on sculpturing, handcrafts and film-making. A family day was held in Berri that celebrated the River Murray and showcased the results of these workshops, concluding with a dinner with speakers discussing their views on the current state of the River Murray environment.

- **Water Conservation Community Education**
  SA Water embarked on a major program of community education to inform the public about restrictions and permanent water conservation measures. This included the "Slow the Flow" TV, radio, press and bus back advertising, a "Slow the Flow" brochure delivered to all homes in South Australia, a range of fact sheets, SA Water website updates, presentations to community and interest groups and a two day gardening industry and community event at the Botanic Gardens. To support this campaign, SA Water also employed dedicated water conservation officers, established a 1800 hotline on water conservation, initiated a rebate scheme for water efficient household items, and formed partnerships with the Botanic Gardens of Adelaide and the Nursery & Garden Industry Association SA to educate the community about water wise gardening.

- **South Australian Museum Educational Program**
  Two projects were undertaken by the RMCWMB in collaboration and the South Australian Museum to bring science and environmental education about the River Murray to the community. An education display and activity called "Water our Most Precious Treasure" was developed and set-up at the South Australian Museum in Adelaide. During National Science Week the Museum held a road show in Mannum, with a debate between South Australian scientists for adults, and school students participating in science-based activities.

- **Maritime Heritage Program**
  This program protects and enhances community awareness of maritime heritage, including heritage along the River Murray. In 2003-04 information on maritime heritage sites was refined, updating the on-line GIS intragovernmental 'Coast Maps' and public access 'Atlas of South Australia', and distribution of the heritage booklet 'River Boat Trail' continued.

- **Waterwatch Curriculum Resource**
  The Waterwatch Curriculum Resource was completed in 2003-04, assisting teachers to integrate education on water quality and catchment health into the school curriculum, and plan their involvement in the Waterwatch program.

- **Community Information Material Development**
  Materials were published to inform the community and all levels of government about the *River Murray Act 2003*, including a First Users Guide, website and Fact Sheets. These publications are available on the DWLBC website: www.dwlbc.sa.gov.au.

- **Riverland television campaign**
  Four television commercials were developed to enhance community awareness and knowledge on aspects of catchment management, focusing specifically on Water tips, Community Grants, Waterwatch, and Irrigation Efficiency. These commercials were aired on WIN TV in the Riverland from August 2003 to February 2004.

- **Sustainable Recreation Support**
  A Sustainable Recreation Officer has been employed to enhance the amenity of the River Murray, and ensure that recreation is compatible with the sustainable use of the River. As part of this program, a River Murray Sustainable Recreation Site Planning and Implementation Guide has been developed.

- **Adelaide Thinkers in Residence**
  Adelaide Thinkers in Residence is bringing world-leading thinkers to live and work in Adelaide to assist in the strategic development and promotion of South Australia. Thinkers are challenging our beliefs, sparking fresh ideas and setting new directions for South Australia. As part of this program, Peter Cullen worked across agencies to bring his expertise and external perspective on water resource management in South Australia, culminating in papers and presentation on “Water and Sustainable Landscapes for SA”.