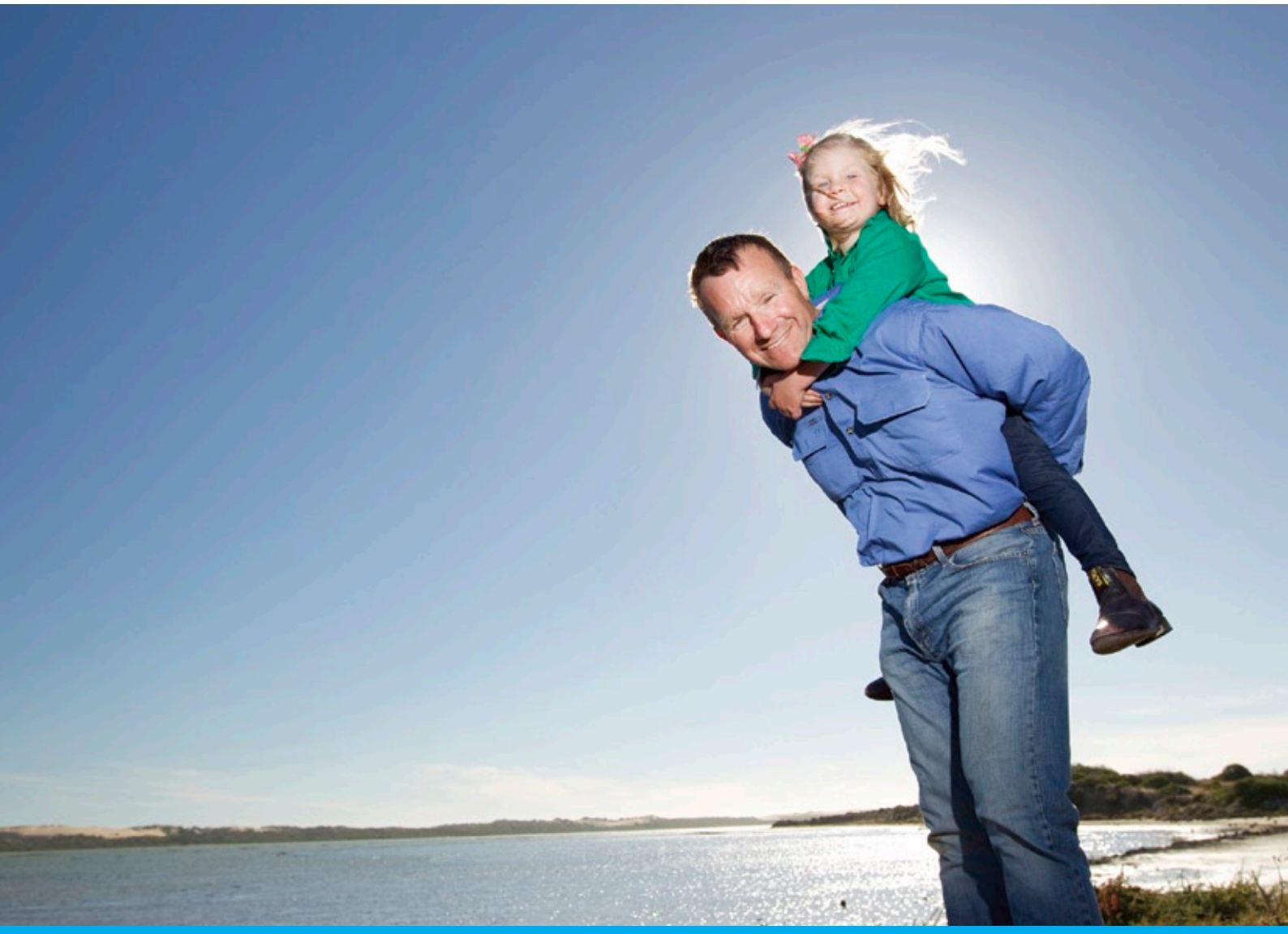
MURRAY**FUTURES**
Lower Lakes & Coorong Recovery

Securing the future

A long-term plan for the Coorong, Lower Lakes and Murray Mouth

June 2010



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WATER FOR GOOD

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Foreword

The situation facing South Australia's Coorong, Lower Lakes and Murray Mouth region is unprecedented.

Years of drought and over-use of water have left internationally significant wetlands dry, the lakes disconnected, communities and industries under significant stress and native species at risk of being lost.

Everyone should be concerned with the state of the Murray-Darling Basin – and the Coorong and Lower Lakes in particular – but not surprised. The extremes of climate and rainfall, and the history of drought in our nation, are well known. While the extent of the problems facing the Coorong, Lower Lakes and Murray Mouth region may have only become apparent relatively recently, ecological degradation has been taking place for decades. Over-allocation of water across the entire Murray-Darling Basin has played a significant part in this.

The Long-Term Plan for the Coorong, Lower Lakes and Murray Mouth region has been prepared to ensure the region and its people have a healthy, viable and sustainable future in the context of variable climatic conditions and water resources.

Input from scientists, industries, and the community has played a vital role in developing the management actions proposed in the Long-Term Plan. Considerable emphasis has been placed on direct engagement with the region's communities through representative committees, regular meetings and direct contact with community members.

The development of the Long-Term Plan has included three community consultation phases that generated useful feedback. The result is a plan that recognises the implications of the current situation for a range of groups and individuals and proposes responses based on the best available science and local knowledge.

Critical to this plan is the relationship between the State Government and the Ngarrindjeri people – the Traditional Owners of the region – and the Kungun Ngarrindjeri Yunnan Agreement (KNYA), a framework for consultation and negotiation with the Ngarrindjeri Regional Authority.

The Long-Term Plan proposes actions that can be adapted to suit prevailing climate and inflow conditions and that are responsive to community and cultural needs. Importantly, work will be closely monitored, so that information gained and lessons learned can be incorporated into future actions.

A healthy Coorong, Lower Lakes and Murray Mouth region will depend on everyone accepting responsibility for its future. This document provides a foundation on which everyone can work together to build a sustainable and viable environment for future generations.

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Introduction

The Coorong, Lower Lakes and Murray Mouth (CLLMM) region has been recognised internationally as one of Australia's most significant wetlands, satisfying at least eight of the nine criteria for listing under the Ramsar Convention when last assessed.

The region is of central significance to the life and culture of the Ngarrindjeri people, who continue to live on their traditional country, and is the basis for a local economy that has supported thriving communities, many with a focus on utilising the lakes for tourism or recreation and primary industries. Australia has a responsibility to care for this area through its international commitments.

Located at the terminus of Australia's largest river system, the CLLMM region is acutely sensitive to climate and water management throughout the entire Murray-Darling Basin. The health of the CLLMM region provides a benchmark for Australia's commitment to environmental protection and the equitable distribution of water resources.

Given the external influences driving the current ecological condition within the CLLMM region, an aim of complete restoration of all historic ecological values is neither practical nor realistic. However, restoring ecological function is an achievable goal and would establish an aquatic ecosystem that is resilient to external pressures and provides a diversity of ecological, social and economic values which reflect its international significance, albeit within an altered wetland environment.

Due to the barrages holding back seawater, substantially lower flows from upstream have led to the water levels in both Lake Alexandrina and Lake Albert falling to below sea level. The wetlands fringing the lakes are dry and no longer connected to the main water bodies, and vast areas of the lakebed have been exposed to air and have acidified. Inflows are now so low that there has not been a flushing of salt through the barrages to the sea for some years, or a freshening of the Coorong waters. Four years' worth of salt carried down from the Murray-Darling Basin by the river is currently sitting in Lake Alexandrina, unable to be discharged since the last flows over the barrage in 2006-2007, and the increasing salinity is having a serious impact on the ecology of the Lower Lakes. The failure to discharge the salt is a problem owned by all states in the Murray-Darling Basin.

The Coorong has lost much of its productivity. Conditions within this section of the Ramsar-listed Wetland of International Importance are now unsuitable for much of the wildlife it has previously supported. It no longer supports the full range of economic activities that sustained the surrounding communities, and there has been an impact on the cultural life of the Ngarrindjeri people.

There is no precedent for dealing with environmental impacts on this scale. The CSIRO Murray-Darling Basin Sustainable Yields Project predicts that changing climatic conditions will result in changes in freshwater availability, but the precise timing and impacts of these changes are uncertain.

The regional economic, cultural and social values derived from the site depend on a healthy and functioning wetland environment. Furthermore, the River Murray and Lower Lakes, from Lock 1 at Blanchetown downstream to the barrages, form one weir pool. It follows that when lake levels are lowered and water quality is compromised, this also occurs within the River Murray channel – with serious environmental, social and economic consequences. Management of the CLLMM region must therefore also be considered within the wider context of the area downstream from Lock 1 and vice versa.

Purpose and context of the plan

The purpose of this plan is to provide a clear direction for the future management of the CLLMM region as a healthy, productive and resilient Wetland of International Importance.

During the next 20 years, this Long-Term Plan will work towards keeping adequate freshwater in the CLLMM system, with the implementation of complementary management actions when necessary. The proposed management actions aim to maintain the ecosystem in a state from which recovery to a healthy, productive and resilient wetland is possible (Part 2). As conditions may not return to those that historically supported the site, measures must be taken that allow for the site to function under stable but altered conditions.

The plan is to be used as an active management document, which will be regularly reviewed. This review process is to ensure that emerging information, science and knowledge (for example in relation to acid sulfate soils management and the environmental water requirements of the site) are appropriately considered and incorporated.

This plan's approach to management, while based on science and interpreted with local knowledge, will also be responsive to cultural and community guidance and direction, new forms of governance, and the development of a close working relationship with the Ngarrindjeri Regional Authority.

New information and revised Long-Term Plan documents will be made available as required online from the Department for Environment and Heritage website at www.environment.sa.gov.au/cllmm

The plan is designed to deliver environmental outcomes, and in achieving these support the local economy and community.

The plan envisages that:

- Lake Alexandrina and Lake Albert remain predominantly freshwater and operate at variable water levels
- The Murray Mouth is predominantly kept open by end-of-system river flows
- There is a return of salinity gradients along the Coorong that are close to historic trends with a corresponding response in species abundance
- There is a dynamic estuarine zone
- The biological and ecological features that give the CLLMM wetlands their international significance, albeit a changed and changing wetland (Section 7), are protected
- There is a return of amenity for local residents and their communities
- There are adequate flows of suitable quality water to maintain Ngarrindjeri cultural life
- Tourism and recreation businesses can utilise the lakes and Coorong
- Productive and profitable primary industries continue.

While this is a long-term plan, it also proposes a number of short-term actions and interventions. Without these, the longer-term goals for the CLLMM region will not be achieved.

This document outlines the priority actions for funding in the next five years, through partnership arrangements between the Australian Government's Water for the Future program and the South Australian Government's Murray Futures program. However, given the significant uncertainties resulting from continuing extremely low end-of-system flows, all proposed actions are being taken with a view to maximising future management options.

The Australian Government has implemented a number of measures that are associated with the actions of this program. As part of the Australian Government's Water for the Future program, the Australian Government has invested substantially in buying back water for the Murray-Darling Basin and implemented a program for Sustainable Rural Water Use and Infrastructure.

At the July 2008 Council of Australian Governments' meeting, the Australian Government agreed to provide, subject to due diligence, up to $200 million to support an enduring response to the environmental problems facing the CLLMM region. To accelerate this work the Australian Government agreed to advance $10 million to South Australia to undertake the feasibility work necessary to advance this important project.

As part of this feasibility work, this Long-Term Plan has been developed, as well as a Business Case, to address Australian Government due diligence criteria. This Long-Term Plan is a high level strategic document, underpinned by a suite of technical feasibility assessments that have been developed for each proposed management action. These assessments, also funded through the $10 million feasibility study, provide more specific detail on the feasibility of each action and the technical detail of how they may be carried out.

Another South Australian Priority Project underway in the region which complements this $200 million project is the $120 million Lower Lakes Integrated Pipeline Project.

The plan does not exist in isolation. Government legislation, international agreements and policies influence the CLLMM area and its management (listed and explained in Appendix 1). Two particularly important pieces of legislation are the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*, which provides particular legal protection for wetlands of international importance, and the *Water Act 2007*, which both implements the process for developing the Murray-Darling Basin Plan and establishes the water-sharing arrangements between New South Wales, South Australia and Victoria.

The scope of this plan does not cover all the changes to water management throughout the Murray-Darling Basin that would enable adequate River Murray flows to be returned to the CLLMM site, the management of the Murray River between Lock 1 and Wellington, nor the proposed weir at Pomanda Island near Wellington if it were to become necessary as a last resort measure. This plan primarily details actions and strategies that will be undertaken at the site. The intensity of management intervention required will depend on River Murray inflows during the next few years and beyond, as addressed in the adaptive management section of this document. For this reason, this plan proposes a suite of management interventions that may be undertaken to varying degrees under different inflow scenarios.

The Basin Plan, currently being developed by the Murray-Darling Basin Authority as a requirement of the *Water Act 2007*, is establishing an environmentally sustainable level of take for water resources across the Murray-Darling Basin by identifying key environmental assets and ecosystems functions and environmental watering requirements across the Basin including for the CLLMM region. The Authority is working to produce the first Basin Plan in 2011.

Coupled with this Long-Term Plan, other methods of delivering freshwater flows to the CLLMM region will be pursued by South Australia through the Commonwealth Environmental Water Holder, the River Murray Environmental Manager and its environmental watering plan, The Living Murray initiative, through the South Australian Government's development of an environmental water reserve and the finalisation of water allocation planning for the Eastern Mount Lofty Ranges. All of these, however, complement rather than replace the need for the Murray-Darling Basin Plan to ensure that diversions of water are set at sustainable limits.

The development of this plan has been supported financially by the Australian Government as part of its $200 million contribution to addressing the problems facing the site. Cost sharing arrangements are on the basis of funding to a maximum proportion of 90:10 (Commonwealth : state/other). Additional funding has been made available to the CLLMM site through projects such as the $10 million Lower Lakes Bioremediation and Revegetation Project, funded by the Australian Government, and the existing Murray Mouth dredging strategy, funded by the Murray-Darling Basin Authority.

The plan has called on the expertise of scientists, academics and research establishments. A considerable amount of research has been conducted in the preparation of this plan to extend understanding of the CLLMM site and the factors affecting it. Furthermore, feasibility assessments have been undertaken on the range of management actions proposed in this plan, as referenced in Section 10 of this document.

Consultation with the community has been an essential component. This has occurred through a Long-Term Plan Reference Group (including Australian Government representatives), extensive discussions with the Ngarrindjeri Regional Authority, and meetings with interested people, especially within the communities surrounding the Lower Lakes. Many individuals and organisations have provided helpful comments and suggestions through the feedback processes employed.

Action has also been taken to prevent irreversible ecological damage to the region before the plan's long-term strategies are ready to be fully implemented. Research into mitigating the impacts of low flows has been undertaken, including a major acid sulfate soil research project involving key universities and national research bodies. Bioremediation trials to mitigate acid, involving seeding more than 10,000 ha and planting more than one million wetland plants on exposed soil has also been undertaken, along with acid sulfate mitigation experiments and using more than 3,000 tonnes of limestone to neutralise acidity in the Goolwa Channel, Currency Creek and Finniss river.

The potential effect of using seawater to avert lake acidification is also the subject of research (and is the subject of a complementary Environmental Impact Statement). The initial findings of this research indicate that the introduction of seawater with current lake water levels should be avoided and only be adopted as a last resort short-term response, with likely serious longer-term management implications. Furthermore, investigations are underway to confirm the amount of freshwater required at the site to avoid large-scale catastrophic acidification events in the immediate future, as well as the longer-term ecosystem water requirements at the site.

Summary of the plan

The environmental issues facing the Coorong, Lower Lakes and Murray Mouth (CLLMM) represent a basin-wide problem, and therefore a basin-wide solution is required.

The wetlands in the CLLMM region were declared a Ramsar site in 1985. The current crisis in the CLLMM region threatens the key values of the site and it is suggested by various academics that this process may have been underway at the time of listing.

Emerging from this work is the requirement to maintain adequate supplies of fresh water to this site. No other strategy provides a long-term future that preserves the current values of the site and avoids potentially catastrophic change to the environment. The CSIRO Murray-Darling Basin Sustainable Yields Project, which emphasises the probability of a freshwater future for the site, shows that the approach is realistic.

Freshwater inflows may take some time to return to the CLLMM site, and will depend on unpredictable climatic conditions. Thus, the management challenge is to find ways to use the freshwater available in the interim to best effect, while mitigating the worst effects of the crisis on the site and preparing the site so it may adapt to an uncertain future under changing climatic conditions.

The plan proposes an adaptive approach to managing the site. The aim of this adaptive approach is to develop strategies that can respond to changing conditions, as well as building ecological resilience into the site so it can cope with whatever climatic conditions prevail in the future. The best available science will develop management actions, and the effects of the actions will be closely monitored.

This plan's ultimate goal is to secure a future for the CLLMM site as a healthy, productive and resilient wetland system that maintains its international importance. Whilst the full array of historic ecological values may not be practical, restoring ecological function will be the principle driver to achieving the plan's goal, and a new suite of significant ecological values the likely outcome. Achieving this will directly support the economic, cultural and social wellbeing of the regional communities. The return of adequate freshwater end-of-system flows (flows through the Murray Mouth) is essential for any improvement in the health of the site, as any solution other than fresh water would not preserve the current values of the site to the same extent.

The plan recognises that large flows down the River Murray will maintain an open mouth and transport salt and other pollutants to the ocean via natural processes.

When flows are adequate to maintain the Lower Lakes at or near an optimal operating range, minimal intervention is required and **adaptation** actions that aim to build and maintain a resilient ecology at the site are possible. These include:

- The management of the lakes at variable levels to achieve ecological improvement (developed in consultation with users of the lakes)
- The enhanced diversion of water from the south-east of South Australia to the South Lagoon of the Coorong (via wetlands and water courses where possible)
- Vegetation plantings to restore ecological processes
- The operation of fishways.

However, whenever flows are not sufficient to maintain an open Murray Mouth, it will be necessary to implement **mitigation** actions. Mitigation actions aim to reduce the rate of ecological degradation, remediate damaged areas, prevent immediate and permanent ecological collapse, and maintain the ecosystem until conditions improve. These include:

- As a first step, the dredging of the Murray Mouth to allow tidal interchange between the ocean and the Coorong, to reduce salinity levels in the Coorong (as has been the situation since 2006).

Additional measures will be required within the Coorong lagoons, including:

- Pumping hypersaline water from the South Lagoon of the Coorong to the sea to reduce salinity in the South Lagoon and reset salinity gradients as a short-term measure
- Translocation of key aquatic plant species *Ruppia tuberosa* and *Ruppia megacarpa*, once salinity within the Coorong is appropriate (if salinity and water level issues in the South Lagoon are addressed, *Ruppia* may also naturally recolonise).

The current flow scenario, brought about by water-sharing arrangements and drought, has meant water levels in the lakes have continued to fall. This situation calls for additional **mitigation** measures such as:

- Securing water to manage water levels, keeping acid sulfate soils saturated and preventing acidification
- Limestone dosing for acid sulfate soil management
- Vegetation plantings to increase soil carbon to reduce acidification
- Restoration of lakefront habitat at Meningie
- The protection of critical environmental assets (for example the off-site conservation of fish species).

Such activities will need to continue until freshwater flows improve.

In order to maintain maximum flexibility to respond to events similar to those being experienced now, it is proposed that over the next five years:

- The future management of the Narrung Narrows will be assessed, in conjunction with the community and other government agencies, when there is a greater understanding of future Lake Albert freshwater flows and water levels. This assessment will need to consider issues such as the water flow between the lakes and fishways.
- Careful management is required to protect the high-value ecological assets within the Goolwa channel, Currency Creek and Finniss River, as well as the tourism and recreational activities associated with the Goolwa township.
- Negotiations will be undertaken to continue to deliver freshwater flows to the site through the Commonwealth Environmental Water Holder, The Living Murray initiative and through the South Australian Government's development of an environmental water reserve.
- Appropriate governance arrangements involving the community, all three levels of government and the Ngarrindjeri (the site's Traditional Owners) will be introduced to ensure clear and transparent accountability.
- An 'adaptive management' approach will be adopted, promoting understanding of the effect of management decisions and providing flexibility to revise management decisions in response to new information. This will also involve the development and continual assessment of targets that outline the proposed start and end triggers for management actions directly associated with ecological conditions at the site.

Ideally, the improved inflows of 2009 will continue in 2010 and gradually restore water levels in the site. As this occurs the various management actions can take effect. However, if inflows are not sufficient for improvement in the water levels, the South Australian Government will continue to implement actions to build resilience in the site ready for recovery.

Further information

Just as this Long-Term Plan exists within a broader legal and policy framework, it also exists among a wide range of supporting and complementary documents. It is not feasible to repeat in this plan the detail that may be found elsewhere.

However, some people may wish to extend their knowledge or interest beyond this plan, and the reference list at the end of this document includes source reports and articles that may be useful.

There is also a wide range of material available online, and the Department for Environment and Heritage has provided links to informative reading at www.environment.sa.gov.au/cllmm/reference-publications.html

List of acronyms and symbols

AHD	Australian Height Datum
CLLAMMecology	Coorong, Lower Lakes and Murray Mouth ecology – CSIRO research cluster
CLLMM	Coorong, Lower Lakes and Murray Mouth
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DEH	Department for Environment and Heritage (South Australian Government)
DEWHA	Department of the Environment, Water, Heritage and the Arts (Australian Government)
DWLBC	Department of Water, Land and Biodiversity Conservation (South Australian Government)
EC	Electrical Conductivity
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth Government)
GL	Gigalitre (1 billion litres)
GRP	Gross regional product
IPCC	Intergovernmental Panel on Climate Change
ISO	International Organization for Standardization
IUCN	The International Union for Conservation of Nature
NRM	Natural Resource Management
NWQMS	National Water Quality Management Strategy
TBD	To be determined
µS/cm	Microsiemens per centimetre