Chapter 2

Background

Introduction

2.1 This chapter provides an overview of the physical characteristics of the Coorong and Lower Lakes, including its geography and ecosystems. The chapter then provides an overview of water management within the Basin before setting the Coorong and Lower Lakes within the wider context of the Murray-Darling Basin.

Geography

2.2 The Coorong, Lower Lakes and Murray Mouth are a system of lakes, lagoons and wetlands which form the terminus of the River Murray. The diverse environmental, economic, social and cultural values offered by the Coorong and Lower Lakes has been formally recognised by the declaration of portions of the system as a wetland of international importance under the Ramsar convention and the area's nomination as an Icon Site under the Living Murray Initiative. The system covers approximately 140 500 hectares (ha) and contains both fresh water and estuarine ecosystems. There are three major bodies of water – Lake Alexandrina, Lake Albert and the Coorong.

Lake Alexandrina

2.3 Lake Alexandrina is the largest of the lakes with an area of 76 000ha. The lake is relatively shallow, with a maximum depth of approximately 4 metres (m), and is fed by fresh water from the Murray River and rivers from the Mt Lofty ranges. The Murray passes through Lake Alexandrina to the sea. The lake receives the majority of its fresh water from the Murray, although local rainfall and runoff from the Mt Lofty Ranges also contributes substantial inflows. Historically, the lake has been a predominantly fresh to brackish water system which, in the pre-European period would have occasionally become saline for short periods during extreme droughts. Currently the water in the lake is highly saline near the barrages and brackish in the centre.

Lake Albert

2.4 Lake Albert is a smaller fresh water lake connected to Lake Alexandrina. It has an area of 16 800ha and is shallower than Lake Alexandrina. It has no other significant inflows and is not connected to the sea.

The Coorong

2.5 The Coorong is a chain of lagoons which stretch along the coast for approximately 140 kilometres (km) and is divided into the North Lagoon and the South Lagoon by the narrows at Parnka Point. The two lagoons are distinct from the Murray Estuary leading from the mouth to Goolwa Barrage. The aquatic environment ranges from estuarine in the North Lagoon to hyper-saline in the far reaches of the South Lagoon. The Coorong relies on river flow, tidal exchange, runoff and ground water from the Upper South East Drainage scheme area and wind mixing for water to balance evaporation. As a consequence of low or no inflows over the past ten years, reduced tidal prism and silting of the mouth, hypersalinity in the South Lagoon has been increasing beyond natural limits.

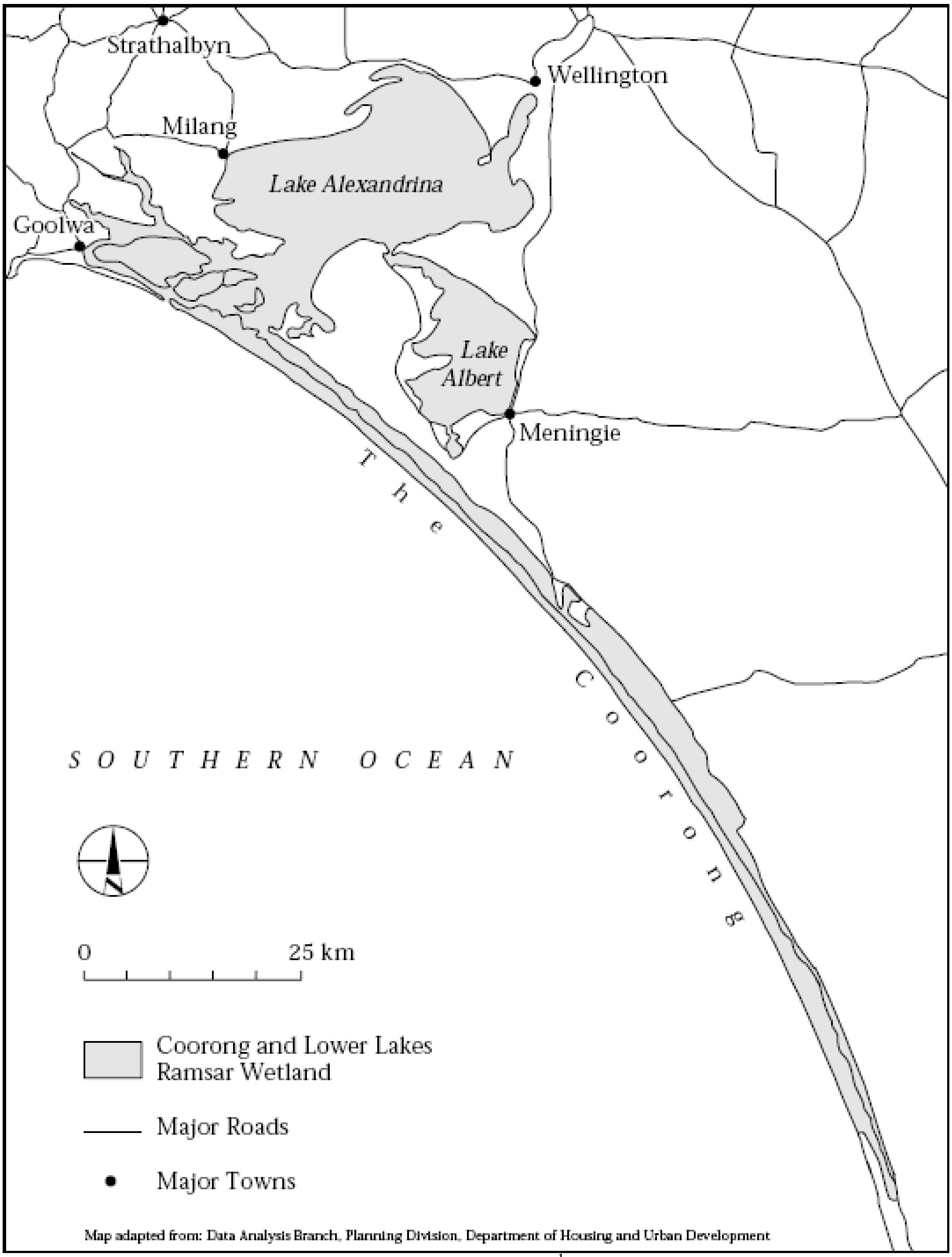

Fig 1. Coorong, the Lower Lakes and Murray Mouth.[1]

1 South Australian Department for Environment and Heritage, *Coorong, and Lakes Alexandrina and Albert Ramsar Management Plan,* 2000, p. 5.

Ecosystem

2.6 The region contains a variety of wetland ecosystems which are home to a number of threatened or endangered bird, fish and plant species.[2] The region's natural values have resulted in it being listed as a Ramsar convention protected wetland.[3] The Lower Lakes have historically been a predominantly fresh water environment, although there is evidence of periodic intrusion of salt water.

2.7 Sediment sampling indicates that the tidal prism regularly extended into Lake Alexandrina throughout the last 6000 years[4] Murray-Darling Basin Commission (MDBC) modelling based on data from 1891 to 2007 indicates that under natural conditions without human modification of the river flow, there would have been periodic reverse flows of sea water into the lakes resulting in high salinity in 17 per cent of years and in 5 per cent of years these reverse flows would have exceeded 70 gigalitres (GL).[5] Accounts from Charles Sturt's 1829 expedition indicate that there was a gradient of salinity on entering the lake, with the lake becoming more saline as he approached the mouth.

2.8 Despite this evidence of past salinity, the Lakes have been predominantly fresh since the construction of the barrages and are maintained as a fresh water ecosystem.

2.9 The Coorong lagoons support a variety of ecosystems, ranging from an estuarine environment in the North Lagoon, to a specialised hypersaline ecosystem in the far reaches of the South Lagoon. Some of the estuarine fish species of the north end of the Coorong are adapted to live in both the Coorong and Lower Lakes and a fishway has been constructed in the barrages to allow these species access to the lakes. The hypersaline species in the South Lagoon are adapted to live in water approximately three times as saline as sea water.

The Barrages

2.10 Lake Alexandrina is separated from the Coorong by a system of barrages constructed in the 1930s. These are low dams across the channels leading from Lake Alexandrina to the Coorong. The purposes of the barrages are to: reduce salinity levels in the lower reaches of the River Murray and associated lakes caused by tidal effects

2 *Threatened Ecological Community Nomination Form*, Humane Society International, attachment to *Submission* 17, p. 5.

3 The Ramsar Convention on Wetlands is a global treaty adopted in the Iranian city of Ramsar in 1971. The treaty supports international cooperation for the 'conservation and wise use of wetlands and their resources' and is the only global treaty that deals with a particular ecosystem (wetlands). Aside from the River Murray Channel, all of the six Icon Sites identified under the Living Murray Initiative are listed as, or are part of, Wetlands of International Significance under the Ramsar Convention.

4 P. Gell and D. Haynes, *A Palaeoecological Assessment of Water Quality Change in The Coorong, South Australia*, Diatoma, University of Adelaide, 2005, p. 12.

5 Murray-Darling Basin Commission (MDBC), *Submission* 76, p. 14.

and salt water intrusion during periods of low flow; stabilise the river level, and normally maintain it above the level of reclaimed river flats between Wellington and Mannum for irrigation; concentrate releases to the ocean to a small area in order to scour a channel for navigation; and maintain pool water that can be pumped to Adelaide and the south-eastern corner of South Australia.

2.11 The barrages reduce the tidal prism through the Murray Mouth by approximately 90 per cent.[6]

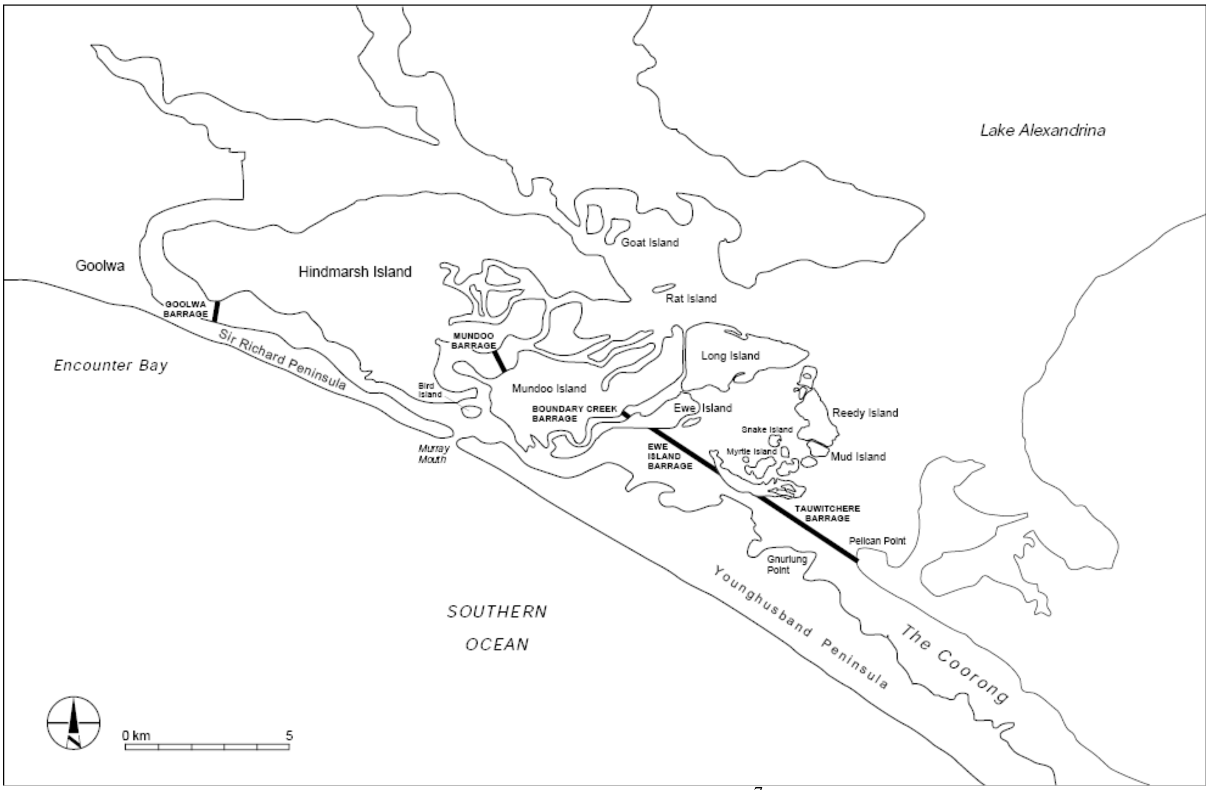

Fig 2. Barrages separating Lake Alexandrina from the Coorong.[7]

2.12 There are 5 barrages: Goolwa Barrage, Mundoo Barrage, Boundary Creek Barrage, Ewe Island and Tauwitchere Barrages. Goolwa Barrage, located 8km upstream of the Murray Mouth, is the deepest of the barrages and is constructed on fine sand and silt. It is founded on timber piles and sheet piling up to 14m deep. Ewe Island and Tauwitchere Barrages are wide and shallow barrages built on a calcareous reef, with earth embankments at both ends. The Mundoo Barrage and Boundary Creek Barrage are the shortest of the barrages and are founded on a limestone reef.

2.13 Goolwa contains a lock chamber 30.5m by 6.1m and Tauwitchere has a lock of 13.7m by 3.8m but no provision was made in the other barrages to allow the passage of shipping. The barrages also contain fishways which, when operational, allow passage for estuarine species that require access to the fresh water environment of the lakes. These fishways begin to operate effectively when the lakes are above

6 Dr Ian T. Webster, *An overview of the Hydrodynamics of the Coorong and Murray Mouth*, CSIRO, p. 3.

7 South Australian Department for Environment and Heritage, *Coorong, and Lakes Alexandrina and Albert Ramsar Management Plan,* 2000, p. 10.

0.3 metres higher than mean sea level, formally known as Australian Height Datum (AHD).

2.14 In normal operation, as designed, the barrages raise the level of fresh water in the Lower Lakes to approximately 0.75 metres AHD. The barrages cause an increase in water level of approximately 50cm as far upstream as Lock 1 at Blanchetown (274km upstream).[8]

2.15 At full supply the lakes hold approximately 2200GL. Estimates of evaporation vary, but the lakes probably require 700-950GL to maintain their normal level. When flow exceeds this volume it is released to the Murray Estuary and flows into the Coorong North Lagoon or out the Murray Mouth.[9]

Water management

2.16 Water levels in the Lower Lakes have followed an annual cycle of drawdown during the summer/autumn period, when extraction and evaporation exceed entitlement flows, and refill during winter and spring as flows increase and extraction and evaporation decreases.

2.17 The main operating rule for the Lower Lakes has been to maintain an average water level of 0.75m AHD. This is compared to a mean sea level of -0.03m AHD at Victor Harbour. This level is regulated through the opening and closing of barrage gates.

2.18 When flows from the Murray are limited to entitlement flows, evaporation from the lakes exceeds inflow and lake levels drop unless some action is taken to reduce the drawdown. To mitigate this effect, in normal operation the barrages are closed and the lakes surcharged to 0.85m AHD at the beginning of summer to allow for evaporation dropping the level to an average minimum of 0.60m AHD in autumn.

2.19 Irrigation development and management of salinity and algal blooms have all placed operational constraints on the management of the Lower Lakes. Irrigation development around the lakeshore is generally based on gravity systems that rely on water levels being maintained above a minimum level of 0.6m AHD. Current operating rules have aimed to maintain the water level within a narrow band of 0.6m-0.85m AHD for the purpose of water supply, irrigation and bank stability.

2.20 Several small communities rely on pumping water from the lakes for domestic supply. High salinities and algal counts are of concern to these communities and water users. The salinity of the Lower Lakes can increase substantially during low flow periods. Salinity in the Lower Lakes has been managed in the past by decreasing the water level to 0.65m AHD to allow flushing. Reclaimed irrigation areas in the Lower

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8 MDBC, *Design and operation of the Barrages,* http://www.mdbc.gov.au/rmw/river_murray_system/barrages/design_and_operation_of_the_barrages

9 MDBC, *Lower Lakes Fact Sheet*

Murray can be a source of nutrient loads to the river, but rehabilitation of these areas to minimise such returns is well advanced.[10]

The Murray-Darling Basin

2.21 The Murray-Darling Basin (the Basin) covers approximately 1 059 000 square kilometres or 14 per cent of Australia's land area. Two million people (10 per cent of Australia's population) live in the Basin and are dependent on it for their drinking water, as are another 1.1 million residents of the city of Adelaide.

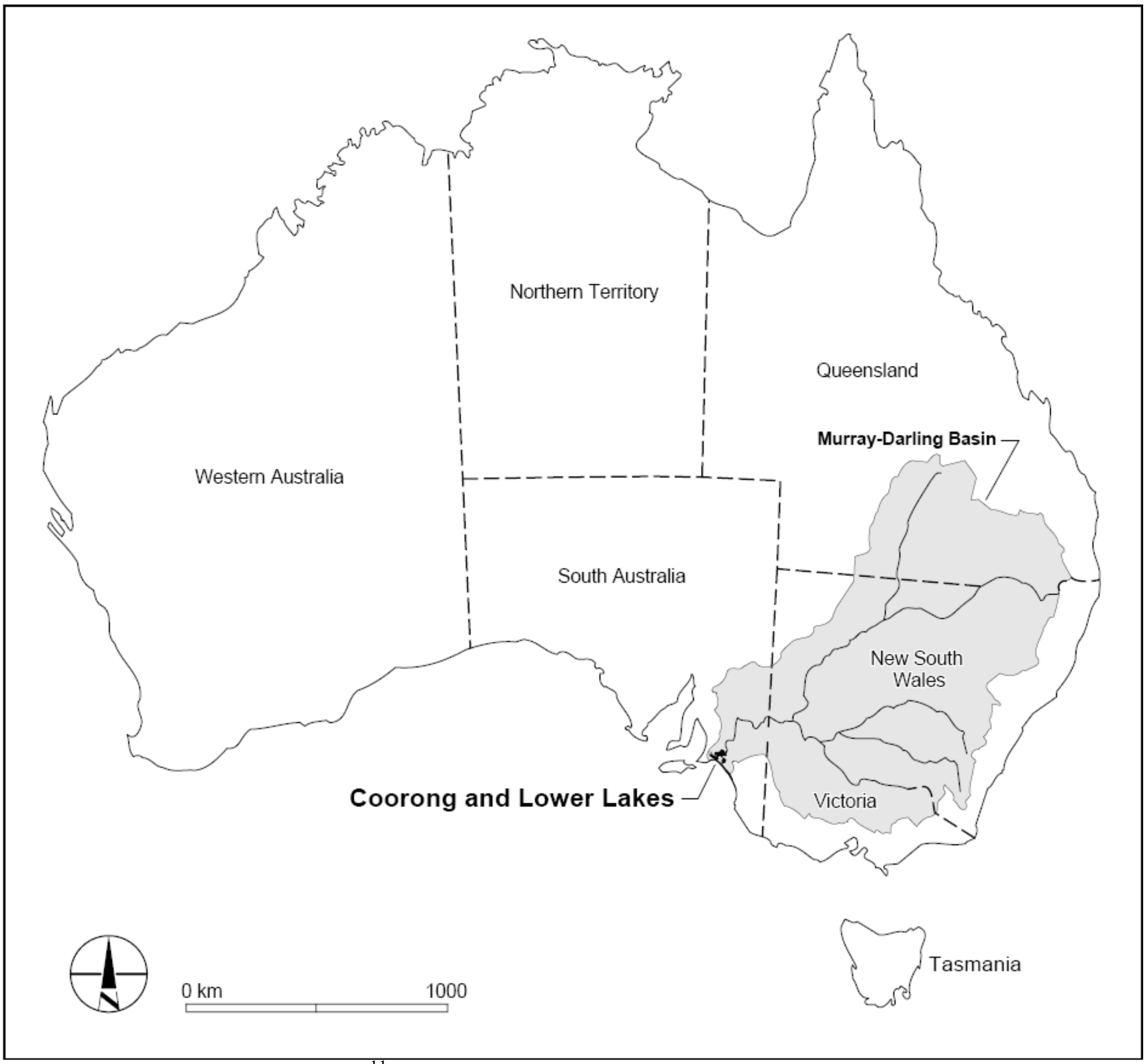

Fig 3. the Murray-Darling Basin.[11]

10 MDBC, *Lower Lakes, Coorong and Murray Mouth Icon Site Environmental Management Plan 2006-07,* pp 16-17, http://www.thelivingmurray.mdbc.gov.au/publications#pub_icon (accessed 29 September 2008.)

11 South Australian Department for Environment and Heritage, *Coorong, and Lakes Alexandrina and Albert Ramsar Management Plan,* 2000, p. 4.

Water availability

2.22 The Basin is one of the driest catchments in the world. By way of comparison, the catchment of the Mississippi River contributes 20 times more runoff per square kilometre, and the Amazon catchment 75 times more runoff per square kilometre, than the Basin. The average annual flow of the rivers of the Murray-Darling would pass through the Amazon River in less than a day.

2.23 The estimated long term average annual runoff into all rivers in the Basin is approximately 23 609GL which is approximately 4 per cent of the average annual rainfall of 530 618GL. There is considerable variation in runoff from one part of the Basin to another.

2.24 The catchments draining the Great Dividing Range on the south-east and southern margins of the Basin make the largest contributions to total runoff. For example, the Murrumbidgee and Goulburn, Broken and Loddon river catchments account for 35 per cent of the Basin's total runoff from 12 per cent of its area. The Upper Murray catchment alone accounts for 17.3 per cent of runoff from just 1.4 per cent of the Basin. In contrast, and further illustrating the Basin's climatic differences, runoff in the Darling Basin is estimated to be just 30 per cent of total runoff in the entire Basin, despite the Darling Basin accounting for 70 per cent of the Basin's total area.

2.25 Runoff variability in the Basin over time is considerably high. Over the period from 1894-1993, the annual discharge at the mouth of the Murray-Darling system ranged from 1626GL to 54 168GL. Except during very wet years, some 86 per cent of the Basin contributes virtually no runoff to the river systems.

2.26 The MDBC noted that it has been estimated that under natural conditions almost 11 000GL/year were contained in wetlands, on the floodplains or lost to evaporation from the river surface and that only 12 890 GL/year or 54 per cent of the runoff reached the sea. Some of the water that would have been consumed by wetlands and the floodplain under natural conditions is now used for irrigation or is evaporated from reservoirs.[12]

2.27 The CSIRO Sustainable Yield Project has modelled the aggregated flow impacts through the connected rivers of the Basin and identified (under the current climate and development scenario) that the current development of the water resources in the Basin has reduced the flow to the Murray Mouth by 61 per cent and that the river now ceases to flow 40 per cent of the time compared to 1 per cent of the time without the current level of development.[13]

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12 MDBC *Submission* 76, Part 2, p.3. See also Senate Standing Committee on Rural and Regional Affairs and Transport, *Water Policy Initiatives*, December 2006, pp 21-27.

13 CSIRO, *Water Availability in the Murray-Darling Basin: A Report to the Australian Government from the CSIRO Murray-Darling Basin Sustainable Yields Project*, 2008, p. 5.

2.28 To regulate the River Murray system, River Murray Water utilises four major storages, sixteen weirs, five barrages and numerous other smaller structures. Major storage capacity in the Murray system (Dartmouth, Hume, Lake Victoria, and Menindee) is approximately 9000GL and in all Basin storages is approximately 23 000GL.

2.29 The total net open water evaporation from major water bodies within the Basin is in the order of 3000GL/year. Of this, the Menindee Lakes account for about 460GL/year, Lake Victoria 120GL/year, and Lake Hume accounts for about 60GL/year of evaporation. The Lower Lakes account for net evaporation of approximately 700-950GL per year, almost a third of the total estimated evaporation.

2.30 Inter-Basin transfers are also a feature of the system with water being transferred into the Basin via the Snowy Mountains scheme. However, these flows are only equivalent to less than 5 per cent of the natural runoff.[14]

Land use

2.31 The Basin accounts for 40 per cent of the value of Australia's agricultural output.[15] It should be noted however, in previous years this percentage has been higher. Some 84 per cent of the land in the Basin is owned by businesses engaged in agriculture and 67 per cent of this land is used for growing crops and pasture. The vast bulk of agricultural land in the Basin is not irrigated, with only 2 per cent of Basin land under irrigation – this produces 44 per cent of the value of Australia's irrigated agricultural output.[16]

2.32 The total gross value of production of agricultural crops in the Basin in 2005-06 was $15 billion, which is nearly 39 per cent of the total Australian gross value of agricultural production.

2.33 Irrigated agriculture covers a total of almost 1.65 million hectares in the Basin and is the single greatest water user. Average annual diversions in the Basin are about 11 500GL per year; about half of the annual flow in the Basin. Around 95 per cent of this diversion is for irrigation. In 2006-07, water diverted from the Murray, Murrumbidgee and Goulburn Rivers accounted for about 72 per cent of all the water diverted in the Basin.[17]

2.34 Irrigation within the Basin can be broadly characterised by several main industries with different patterns of water use. These are:

- pasture in the southeast which is often flood-irrigated and occurs throughout much of the year (17 per cent);

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14 *Submission* 76, Part 2, pp 3-4.

15 See MDBC *Submission* 76, Part 2, p. 4, quoting Australian Bureau of Statistics figures for 2008.

16 *Submission* 76, Part 2, p. 4.

17 *Submission* 76, Part 2, p. 4.

- rice in the Murray and Murrumbidgee which is flood-irrigated (standing water) for about three months in the summer (16 per cent);
- dairy farming (17 per cent);
- cotton in the northern Basin catchments which is flood-irrigated for about three months in the summer (20 per cent); and
- Horticulture, including grapes, other fruit, nuts and vegetables (13 per cent).[18]

Environmental conditions

2.35 The Coorong and Lower Lakes are one of fifteen wetlands and one of six Icon Sites under the Living Murray Initiative in the Basin that are recognised internationally for their environmental significance.[19] For example, it provides habitat for more than 30 per cent of the migratory waders summering in Australia.[20]

2.36 It should also be noted that there are numerous other wetlands of significance across the Basin and that the rivers themselves support important environmental values.

2.37 The prolonged dry period across the southern half of the Basin continues to severely impact on wetland and floodplain ecosystems across the Basin. Whilst portions of the Barmah-Millewa Forest have received limited flooding as recently as 2005, there has not been any significant flooding in the mid and lower floodplains of the Murray downstream of Euston for many years. Floodplain vegetation is under severe stress. The 2007 Living Murray Icon Site condition report indicates that up to 80 per cent of River Red Gums are declining or dead significant wetlands along the Murray, such as the Koondrook-Perricoota Forest and the Chowilla floodplain.

2.38 In November 2007, aerial surveys of waterbirds along the Murray indicated that the drought had greatly reduced the availability of wetland and floodplain habitat and this had a severe impact on waterbird abundance and breeding. The greatest number of birds was recorded in the Lower Lakes, Coorong and Murray Mouth where a total of about 250 000 birds and 42 species were observed. Most of the other Living Murray Icon Sites supported low numbers and very little breeding.

2.39 In May 2008 a small volume of environmental water (7.7GL) was delivered to Gunbower Forest and this has stimulated an encouraging response from plant and animal life. The MDBC noted that this response emphasises the importance of using

18 *Submission* 76, Part 2, p. 4.

19 The Living Murray Initiative is a partnership of the Federal, NSW, Victorian, South Australian and ACT governments established in 2002. The first step of the program focuses on recovering 500 gigalitres of water for the River Murray along with improving the environment at six Icon Sites chosen for their high ecological value. Most are listed as internationally significant wetlands under the Ramsar convention. The six sites are: Barmah-Milewa Forest; Gunbower-Koondrook-Perricoota Forest; Hattah Lakes; Chowilla Floodplains and Lindsay-Wallpolla Islands; Lower Lakes, Coorong and Murray Mouth and River Murray Channel.

20 Wentworth Group of Concerned Scientists, *Submission* 71, p. 1.

the small volumes of environmental water available to maintain drought refuges along the river and avoid loss of threatened species.

2.40 Overall, however, the riverine environments across the southern and central regions of the Basin are in severe decline and this is not expected to improve until there is a very significant improvement in rainfall and system inflows.

2.41 In the northern Basin, the benefits of good summer rainfall and associated flooding are still evident at some sites. Although most wetlands and lakes along the Warrego and Paroo Rivers are drying up, those still containing some water are supporting large concentrations of waterbirds.[21]

Water management in the Basin

2.42 Water resources in the Basin are managed through the Murray-Darling Basin Agreement (the Agreement). The Agreement sets out the arrangements for sharing water between New South Wales (NSW), Victoria and South Australia (SA). Part X of the Agreement regulates the sharing of the waters of the 'upper River Murray' (water upstream of the SA border) the waters of the Murray tributaries below Albury and the waters for the Darling River and its tributaries upstream of Menindee Lakes remain under the control of the relevant state, although only when below an agreed level for the Menindee Lakes. [22]

Water sharing arrangements

2.43 Under the basic sharing provisions of the Agreement, SA is entitled to receive a minimum volume of 'entitlement' water from the upper States (1859GL per year). The upper states retain access to their own tributary inflows to the Murray except for inflows upstream of Albury/Wodonga (including Snowy Scheme releases) and inflows to Menindee Lakes when under MDBC control. The inflows above Albury and into Menindee Lakes are 'shared' equally between NSW and Victoria.[23]

2.44 The Agreement provides each state with flexibility to manage its water share as it wishes within certain limits. Each state can manage its water use according to its own water security profile. Victoria and NSW have equal access to the storage capacity of the major MDBC reservoirs upstream of the SA border. Victoria, NSW and SA can each, by way of its own policy, choose to consume its share or hold it in storage for a future time. Each of the three states may also permit an individual water license holder to 'carry over' water from one year to the next.

2.45 Security of water for SA is provided via three key mechanisms under the Agreement. SA's dilution and loss component is the most secure water in the

21 MDBC, *Murray System Drought Update No.15*, September 2008, pp 5-6. See also Senate Standing Committee on Rural and Regional Affairs and Transport, *Water Policy Initiatives*, December 2006, pp 26-27.

22 *Submission* 76, Part 2, p. 5.

23 *Submission* 76, Part 2, p. 6.

Agreement, together with system losses upstream of the SA border. Special accounting provisions in the Agreement also apply during drier times and a concept of a minimum reserve of water held in major MDBC storages reserves a proportion of water for SA's access in the following year once SA's share reaches full entitlement.[24]

Interim water sharing arrangements

2.46 The record low inflows observed in 2006-07 combined with record low storage levels both in the Snowy Scheme and MDBC storages have required interim water sharing arrangements to be agreed to by the Murray-Darling Basin Ministerial Council (Ministerial Council) in 2007-08 and 2008-09.

2.47 In 2007-08 the agreed interim arrangements meant that SA's share was initially reduced to ensure availability of critical water to the upper states. Initial improvements in water availability were shared between all states, instead of going solely to SA, to protect industry and permanent plantings in all three states. The arrangements then directed further improvements towards increasing SA's share.[25]

2.48 In 2008-09 a new set of arrangements were agreed which included contingency arrangements to ensure availability of SA's full dilution and loss entitlement. The arrangements permitted all three states to carryover water to meet critical human needs as well as those volumes carried over by individual license holders in each state.

2.49 Under both sets of arrangements SA's share was higher than it would have otherwise been under normal sharing arrangements and SA owed a debt in the form of 'drought imbalance' to the upper states.[26]

Water entitlements

2.50 Approximately 350GL of River Murray Water is used by urban and domestic consumers each year. The largest consumer of this water in dry years is SA (200GL), near the end of the River Murray.[27]

2.51 Water use throughout the Basin is managed through the granting of some form of water access entitlement and water allocation.[28] A 'water access entitlement',

24 *Submission* 76, Part 2, pp 6-7.

25 *Submission* 76, p. 78.

26 *Submission* 76, pp 8-9.

27 *Submission* 76, Part 2, p. 4.

28 In NSW water access licences specify a share component and an allocation component; in SA there are currently two types of water licences – a licence endorsed with a water (holding) allocation and a licence endorsed with a water (taking) allocation, will change shortly. In Queensland water entitlements specify the conditions for the taking of water and water allocations are only created once a resource operations plan has been finalised for the relevant water resource area, in Victoria water may be allocated by the minister as an environmental entitlement, a bulk entitlement (held by operators), a water share or other licences to take and use water.

such as a water licence, is defined in the National Water Initiative (NWI) as 'a perpetual or ongoing entitlement to exclusive access to a share of water from a specified consumptive pool as defined in the relevant water plan'. A 'water allocation' is defined as 'the specific volume of water allocated to water access entitlements in a given season, defined according to rules established in the relevant water plan'. [29]

2.52 Ms Jenni Mattila, coordinator of the Bondi Group[30] explained to the committee the distinction between water entitlements and water allocations by likening permanent water entitlements to an empty glass in so far as they represent a maximum capacity but not a physical asset. She said:

> At the start of each season, the state crown determines the percentage of the glass that will be filled with the annual allocation. That is the physical water. [31]

2.53 Long term average water diversion in the Murray system is approximately 4068GL. However, there is a total of 5280GL of River Murray water entitlements. There is 2487GL of high reliability water entitlements and 2793GL of low reliability water entitlements.

2.54 From 1955 consumptive use of Murray-Darling water rose extremely rapidly and by 1965, according to the Wentworth Group, was exceeding sustainable yields. Consumptive use continued to rise in the 1970s and 80s.[32] In 1995, in response to the findings of an audit of river use, a cap was imposed on the volume of water which could be diverted from the rivers for consumptive uses, and was put into effect from 1 July 1997.

2.55 For NSW and Victoria, the cap is defined as 'The volume of water that would have been diverted under 1993/94 levels of development.' For Queensland and the Australian Capital Territory, the cap arrangements are still being finalised, but Queensland has had a moratorium on new development in place since 2000.[33]

2.56 The type of entitlement and the share of water for a given water resource system is established through water sharing plans. As a result, the specific attributes of high and low reliability irrigation water entitlements vary between states and river valleys. On the River Murray, the long term average allocation against the high reliability Victorian entitlement is called a 'high reliability water share'. The long term average allocation against the low reliability Victorian entitlement is called 'low

29 *Intergovernmental Agreement on a National Water Initiative*, 25 June 2004, Schedule B(i) Glossary of Terms, p. 30, http://www.nwc.gov.au/resources/documents/Intergovernmental-Agreement-on-a-national-water-initiative.pdf (accessed on 27 September 2008).

30 The Bondi Group is an incorporated organisation which represents the interests of Australian private irrigation water supply enterprises in the continuing public debate over water and the policy setting which follows that debate.

31 *Committee Hansard,* 19 September, 2008, pp 60 – 61.

32 The Wentworth Group, *Submission* 71, p. 7.

33 http://www.mdbc.gov.au/nrm/the_cap (accessed 2 October 2008). The cap does not constrain new developments provided they do not result in additional water extraction.

reliability water share'.[34] In NSW a distinction is made between 'high security' and 'general security' users.

2.57 Ms Mattila explained the practical difference in security or reliability of entitlements for the committee with reference to NSW. General security growers in NSW do not receive any annual allocation until the high security growers receive 80 per cent of their entitlement.[35]

Water trading

2.58 Under the NWI, water trade is the transfer of water access entitlements (permanent) and seasonal water allocations (temporary) between different entities including irrigators, environmental water managers and infrastructure operators. Water trading is intended to allow access to scarce water resources to be reallocated over time to their most productive uses. The 1994 Council of Australian Governments (COAG) water reforms sought to open up trading arrangements, including interstate trading. Through the NWI, COAG has agreed to 'an expansion of permanent trade in water bringing about more profitable use of water and more cost effective and flexible recovery of water to achieve environmental outcomes'.[36]

2.59 Temporary or permanent trading of access entitlements is provided for under state and territory legislation. In many cases, statutory water access entitlements are held by irrigators. In these circumstances the irrigators have clearly defined water rights that can be traded. However, in NSW and SA water entitlements are typically held by irrigation infrastructure operators on behalf of member irrigators.[37] There is evidence to suggest that the actions of such operators can impede trading processes.

2.60 The Australian Competition and Consumer Commission (ACCC) is considering the form of water market rules and water charge rules as part of its new functions under the *Water Act 2007* (the Act). In particular, the ACCC has noted how the actions of operators may impede the development of efficient water markets and has considered ways to improve transformation and/or trading processes and outcomes.[38]

2.61 In the southern Murray-Darling Basin the amount of water that can be permanently traded out of an area is limited to four percent of the total water entitlements of that area, per annum (the four per cent cap). Evidence suggests that the

34 *Submission* 76, Part 2, p. 4.

35 *Committee Hansard*, 19 September 2008, p. 62.

36 COAG Communique, *Council of Australian Governments' Meeting – 25 June 2004*, http://www.coag.gov.au/coag_meeting_outcomes/2004-06-25/index.cfm.

37 Australian Competition and Consumer Commission, *Water market rules: position paper-July 2008*, p. xi.

38 Transformation allows an irrigator to permanently transform an entitlement held on their behalf by an operator into an independently held water access entitlement registered on a state water registry. Once the water access entitlement is independently held, an irrigator can also trade the entitlement if they choose to do so.

cap is impeding structural adjustment in the agricultural sector, making it more difficult for those who can most productively use water to buy it and constraining environmental water purchases. Under the NWI, such caps on permanent trade are required to be removed altogether by 2014 at the latest.[39]

The Water Act 2007

2.62 The Act, which came into effect on 3 March 2008, creates new institutional and governance arrangements to address the sustainability and management of water resources in the Basin. The Act builds on earlier reform initiatives including the NWI, and the Murray-Darling Basin Agreement.

2.63 The key elements of the Act are:

- the establishment of the Murray-Darling Basin Authority with a range of function and powers;
- the preparation of a Basin Plan for the integrated and sustainable management of water resources in the Murray-Darling Basin, including:
  - limits on the amount of water that can be taken from Basin water resources;
  - identification of risks to Basin water resources;
  - an environmental watering plan
  - a water quality and salinity management plan; and
  - rules about trading of water rights in relation to Basin resources.
- The establishment of a Commonwealth Environmental Water Holder to manage the Commonwealth's environmental water to protect and restore the environmental assets of the Murray-Darling Basin, and outside the Basin where the Commonwealth owns water;
- The development and enforcement of water charge and water market rules by the ACCC; and
- Authorisation of the Bureau of Meteorology to collect and publish high-quality water information, including the National Water Account and periodic reports on water resource use and availability.[40]

39 COAG Working Group on Climate Change and Water, *Report to Council of Australian Governments*, March 2008, p. 11.

40 Explanatory Memorandum, Water Bill 2007.