Australian Government

MURRAY–DARLING BASIN AUTHORITY

River Murray System Annual Operating Plan

2012-13 Water Year
1 June 2012 – 31 May 2013

MDBA: D12/30777

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1 INTRODUCTION

The River Murray System Annual Operating Plan for the 2012-13 water year (1 June 2012 to 31 May 2013) provides context and describes how the River Murray System (the System) may be operated under a number of assumed scenarios in the coming year.

The scenarios have been prepared by the Murray-Darling Basin Authority (MDBA or the Authority) with input from the Australian Government and the States of New South Wales, Victoria and South Australia through MDBA's Water Liaison Working Group.

The contents of this summary include:

- Chapter 2 - A brief description of the legislative framework relevant to the operation of the River Murray System;
- Chapter 3 – Key objectives and constraints in operations;
- Chapter 4 – System status at 1 June 2012 and potential water availability in 2012-13;
- Chapter 5 –Summary of water sharing and significant river operations during the 2012-13 water year under a range of scenarios;
- Chapter 6 – River Murray System operations during 2012-13 under a range of scenarios (individual structures, reaches and issues);
- Chapter 7 – A calendar of events; and
- Chapter 8 – Further information on the River Murray System

The actual conditions that occur in the 2012-13 water year will inevitably be different from these scenarios, and therefore river operations will also be different to any projection presented. In particular, the patterns of environmental water use during 2012-13 are uncertain, and with the possibility of large volumes of environmental water to be delivered, the impacts on the scenarios in this operational plan may be significant. Nevertheless, these scenarios should provide a useful indication of potential river operations in the 2012-13 water year. This document may be updated during the year if there is a significant change. The States will also receive updates on a regular basis through the Water Liaison Working Group to take into account what happens as the season progresses.

In the event that this plan has not been finalised prior to the start of the 2012-13 water year (1 June 2012), river operations would continue according to actions outlined in this plan and/or following past practice. In addition, this plan may also apply in the early months of next water year (2013-14) until the 2013-14 River Murray System Annual Operating Plan is finalised.

2 LEGISLATIVE FRAMEWORK

MDBA co-ordinates the operation of the River Murray System to provide water to the States of New South Wales, Victoria and South Australia in accordance with the Water Act 2007 *(Cth.),* and the Murray-Darling Basin Agreement ('the Agreement') which is a schedule to the Act.

State water entitlements are determined in accordance with Part XII of the Agreement – Distribution of Waters. MDBA must obtain approval of the jurisdictions for any proposed river operations that may have a material impact on State water entitlements and which are not consistent with prior practice.

This Annual Operating Plan is consistent with the:

a) Water Act 2007;

b) MDB Agreement;

c) Objectives and Outcomes for River Operations in the River Murray System;

d) MDBA corporate Plan;

e) MDBA Asset Management Plan;

f) MDBA Asset Agreement;

g) memoranda of understanding with Constructing Authorities; and

h) operating procedures for the River Murray System.

This Annual Operating Plan has regard to;

a) The Living Murray Annual Environmental Watering Plans;

b) Commonwealth Environmental Water Holder Environmental Watering Plans;

c) Southern Basin State watering plans (where provided).

MDBA will aim to achieve an appropriate balance if there is a conflict between these plans and obligations.

3 SOME KEY OBJECTIVES AND CONTSTRAINTS IN OPERATIONS.

3.1 Key Objectives

There is extensive prior practice in relation to river operations. Over decades, practices and procedures have been developed to manage the River Murray System, and also provide for variations in specific circumstances. Some of these are at a system or multi-storage scale, some relate to individual storages, and others relate to specific locations along the river. In many instances river operations often involve balancing competing objectives on a day-to-day basis. The following objectives need to be taken into consideration by MDBA when carrying out river operations:

Structural safety and maintenance – Operate the structures along the River Murray System in accordance with their fundamental design parameters and having the highest regard for the safety of downstream communities. The structures also require regular maintenance and at times there is a need for upgrades as the structures age, or as Occupational Health and Safety and engineering standards (e.g. the Australian National Committee on Large Dams guidelines) become more stringent through time. River operations need to ensure that the structural and operational integrity of dams, weirs and other structures is maintained. In addition, the maintenance and improvement of the flow management structures along the River Murray System is scheduled, as far as possible, to not restrict the flexibility needed for river operations required at the time.

Water orders - deliver and account for the water orders of each Southern Basin State in a timely, transparent and efficient manner.

Water security - maintain and, when the need arises, enhance, the security of supply of water to Southern Basin States.

Water trade - facilitate the transfer of water entitlements and allocations between States and between valleys.

Environmental watering - facilitate the implementation of environmental watering activities, including where practicable, overbank flows.

Other environmental outcomes - mitigate significant adverse environmental events, such as fish kills, unseasonal watering, algal blooms, river bank erosion and soil acidification, and where possible trial the implementation of the *Environmental Guidelines* that continue to be developed for the River Murray System.

Water quality - mitigate events that may adversely affect the quality of water available for urban, irrigation, industrial, stock and domestic, and environmental use.

Flooding - The primary purpose of MDBA storages is for water conservation. Floods should be managed (to the extent reasonably practicable) to (in priority order):

1. Protect the security of the asset,

2. Maximise water availability, and subject to meeting these objectives, floods should be managed to

3. Limit damage to downstream communities and enhance environmental and amenity outcomes.

Aboriginal cultural heritage - facilitate the protection of Aboriginal cultural heritage, in accordance with relevant cultural heritage management plans and by other means.

Navigation and recreation - maintain adequate river depth for navigation and recreational use, in accordance with the Agreement.

Connectivity with other valleys - to take account of and co-ordinate with inflows from tributaries to the River Murray, including regulated catchments such as the Snowy Mountains Scheme and the Goulburn, Murrumbidgee and Darling Rivers.

Southern Basin State information - To take account of information relevant to river operations, provided by the Southern Basin States.

If, on any occasion, MDBA is unable to achieve one or more of the objectives above, in whole or in part, because of a conflict between those objectives and one or more other objectives, MDBA, after consulting with the States, will aim to achieve an appropriate balance between conflicting objectives, taking into consideration the surrounding circumstances.

3.2 System constraints

Some key considerations in River Murray System operations are: the considerable variability of both inflows and usage; weir pool operations; the long travel times; and system constraints such as the Barmah Choke. Each is briefly discussed below.

Considerable variability of both inflows and usage. Operations of the River Murray System occur in the context of considerable variability:

- There is extreme variability in the weather of the Murray-Darling Basin, and the inflows to the River Murray System are amongst the most variable in the world. Short-term rainfall forecasts have improved substantially over recent years and are used to support operational decisions. Medium term rainfall forecasts and run-off forecasts are also improving and serve as a useful guide to what might happen in the future.
- The water market has become increasingly active during recent years, and this growth is expected to continue into the future. The impacts of trade on the timing and location of water demand will become clearer with time.
- Increasingly, trade mechanisms are being used to account and deliver environmental water. An alternative approach needs to be developed in the medium to longer term.
- The amount and location of water carried-over from year to year is changing as entitlement holders adapt to new and evolving carryover policies.
- The amount of water available for environmental purposes is increasing and its timing and location of use is expected to vary greatly between years. This is difficult to encapsulate in the operational plans.
- There may also be short-term issues along the river, which are difficult to foresee, that can require rapid response. Some issues affecting river operations develop within weeks (e.g. blue-green algal blooms), or within days (e.g. a salinity spike, or a fish kill). Some of these issues can potentially be mitigated by river operations, particularly in years when water is relatively abundant.
- Very rarely, there are emergency river operations carried out (such as the 1996 emergency release from Hume Reservoir) that require an immediate response.

The coordination of inflows. The operation of the River Murray System occurs in coordination with:

- the Snowy Mountains Scheme (operated by Snowy Hydro Limited) – the Snowy Water Licence allows Snowy Hydro substantial flexibility over its day to day release pattern whilst fulfilling water supply targets on an annual basis;
- regulated tributaries, particularly the Goulburn River in Victoria (operated by Goulburn-Murray Water) and the Murrumbidgee River and Billabong Creek in NSW (operated by NSW State Water), including the delivery of water held in inter-valley trade accounts (Valley Accounts) as a result of permanent and temporary water trade to the Murray;
- tributaries that are primarily unregulated, such as the Kiewa and Ovens Rivers in Victoria; and

- the Darling River in NSW, including any operations of the Menindee Lakes directed by NSW.

This coordination is important, as water released from storages within MDBA's control needs to be managed in conjunction with other regulated and unregulated inflows to the system in order to optimise outcomes.

Weir pool operations. Drawing on or raising weir pools has become a more common practice at some weirs in recent years to assist in meeting environmental or water delivery objectives. These operations may not always match the expectations of local communities that may have previously experienced constant or near constant weir pool levels. River operations may lead to changes in weir pool levels after consideration is given to balancing objectives in Section 3.1 in the context of the circumstances of the time.

Long travel times. From Hume Dam to Lake Victoria there is limited capacity for re-regulation or release of flows into the River Murray. The typical flow time between Hume Dam and Lake Victoria under regulated flow conditions is 25 days, and it is likely that weather conditions will change over this time period and there will be variability in river transmission losses and demand for water. This limited re-regulation capacity affects the level of control that MDBA has over the flow regime in much of the River Murray, particularly in years of average and high inflows, or during extended hot spells when the available water in the River may be less than orders for short periods of time. Once the water has been released, and there is significant rainfall along the river and hence water orders are cancelled ('a rain rejection'), subsequent out of bank flows are possible, particularly in the Barmah-Millewa Forest (discussed further in Chapter 6).

System flow constraints. At various locations in the River Murray System there are flow constraints, which may apply during periods of regulated release, which if breached, may have social and environmental impacts depending on timing. Some of these constraints include:

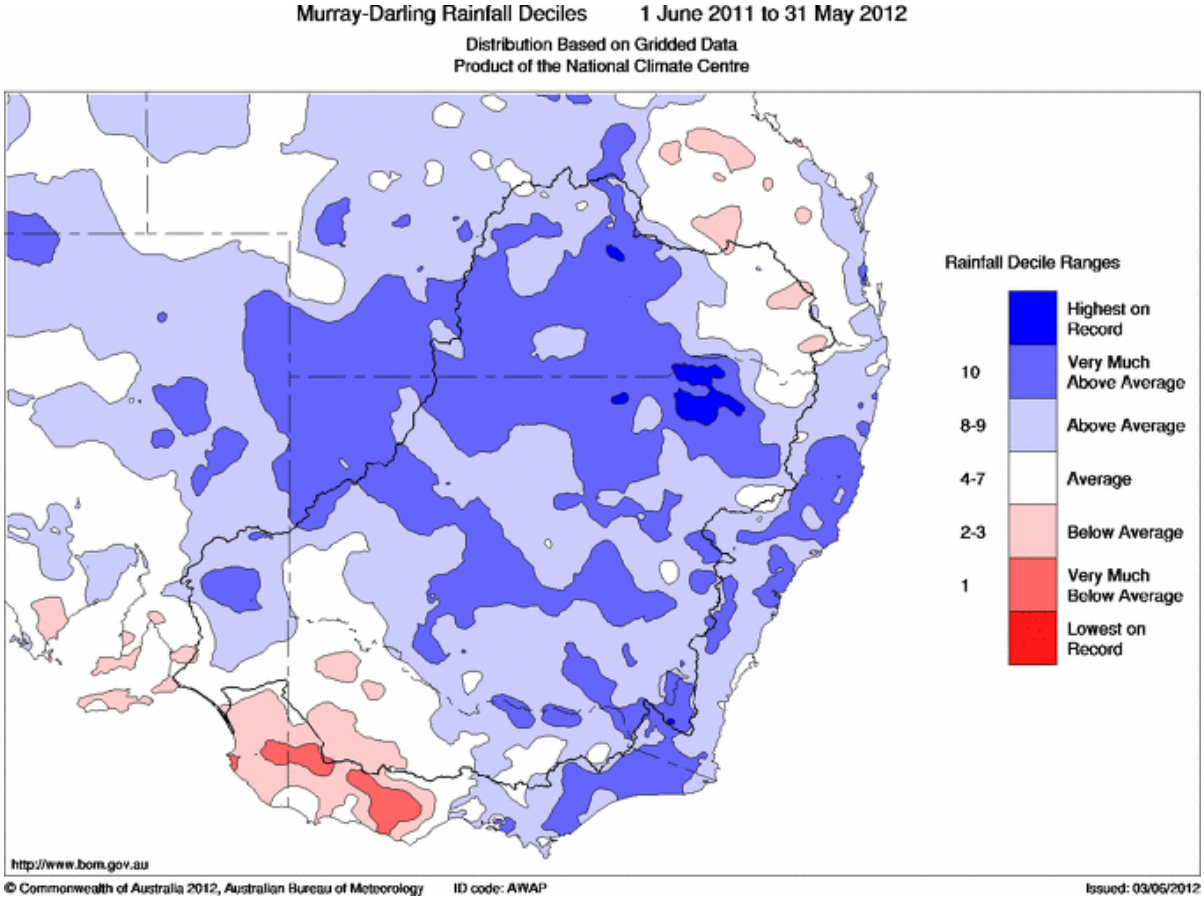
- Mitta Mitta downstream of Dartmouth: approx 10,000 ML/day at Tallandoon
- Hume to Yarrawonga: 25,000 ML/day at Doctors Point
- Release from Yarrawonga Weir (due to "Barmah Choke"): approx 10,400 ML/day (*not applicable when watering of the Barmah-Millewa Forest is desirable*)
- Inlet to Lake Victoria: up to 10,000 ML/day depending on level in Lake Victoria
- Outlet from Lake Victoria: up to 10,000 ML/day depending on river and lake levels
- Edward River downstream of Stevens Weir: 2,700 ML/day (*not applicable when watering of Werai Forest is desirable*)
- Darling River downstream of Menindee Lakes: 9,000 ML/day
- Outlet to Darling from Lake Menindee: up to 4,000 ML/day depending on level in Lake Menindee

4 POTENTIAL WATER AVAILABILITY IN 2012-13

4.1 System status on 1 June 2012

In 2011-12, the majority of the Murray-Darling Basin experienced rainfall that was above or very much above average (FIGURE 1). This has followed on from the very wet year of 2010-11, with floods occurring multiple times along parts of the Murray, Barwon-Darling, Condamine, Gwydir, Murrumbidgee, Goulburn, Ovens, Kiewa and many other rivers in the Basin.

FIGURE 1 Rainfall Deciles – 12 months 1 June 2011 to 31 May 2012



Inflows to the River Murray system, and to Menindee Lakes, during 2011-12 were around 16,400 GL, which has an Annual Exceedance Probability (AEP) of 18% (i.e. the % of years with a greater inflow), compared with the long-term average of 9,800 GL. In the south of the Basin, River Murray System inflows (excluding Snowy releases and Menindee inflows) totalled around 11,600 GL during the year (FIGURE 2 and 3), which has an AEP of 27%.

Total inflows to Menindee Lakes were about 4,850 GL, which has an AEP of 13% and is more than double the long-term average of around 2,000 GL (FIGURE 4).

FIGURE 2 **Inflows to River Murray (excluding inflows to Menindee and Snowy Mountains Scheme) since 1892 assuming modelled current conditions.**

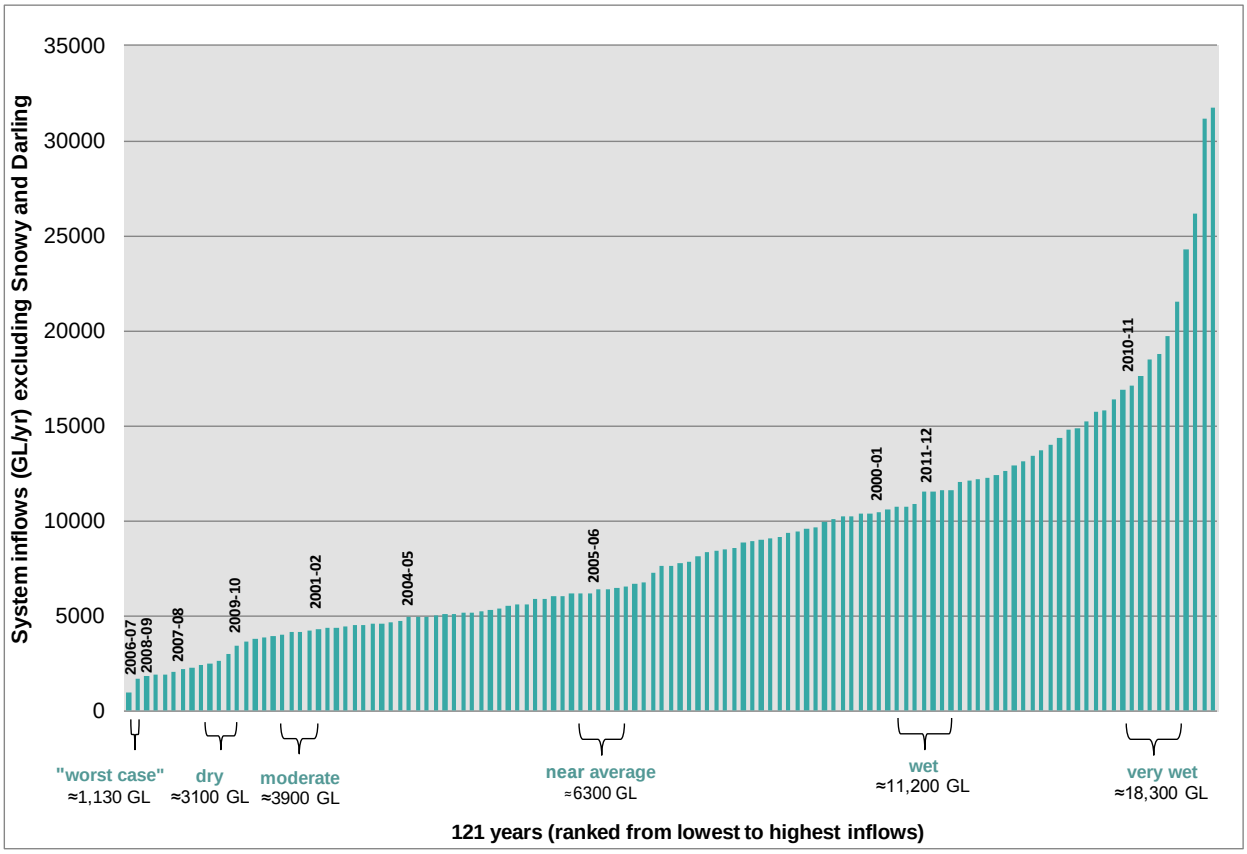


FIGURE 3 **River Murray System inflows (excluding inflows to Menindee and Snowy Mountains Scheme) - recent years and long-term averages**

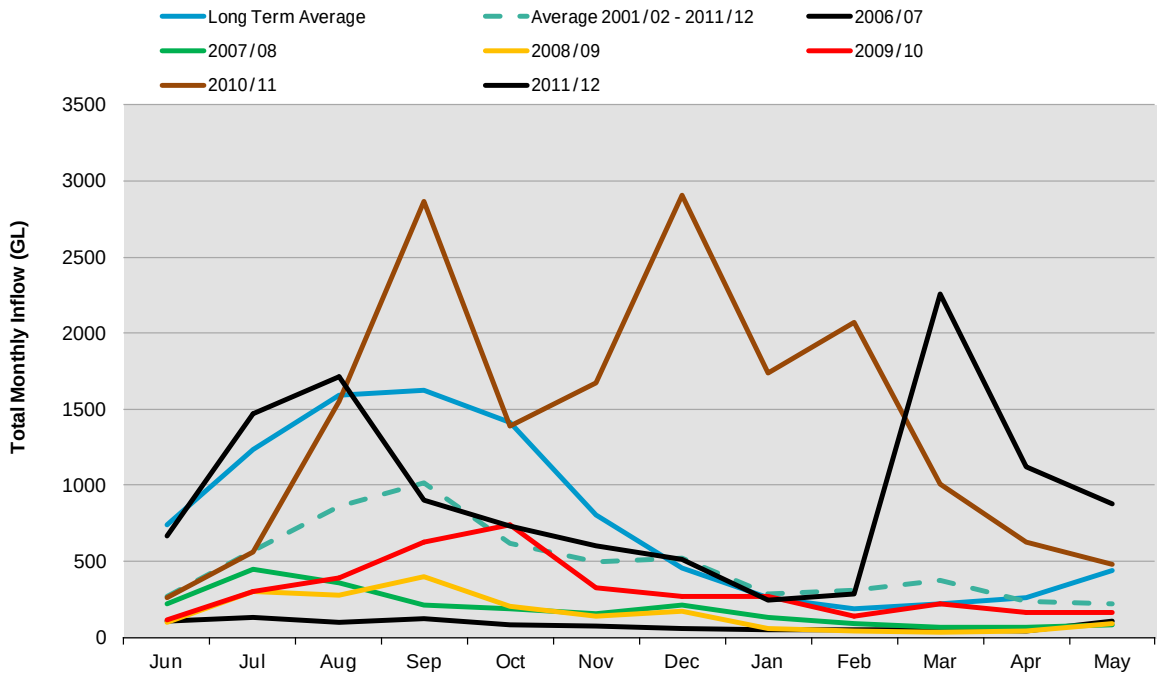
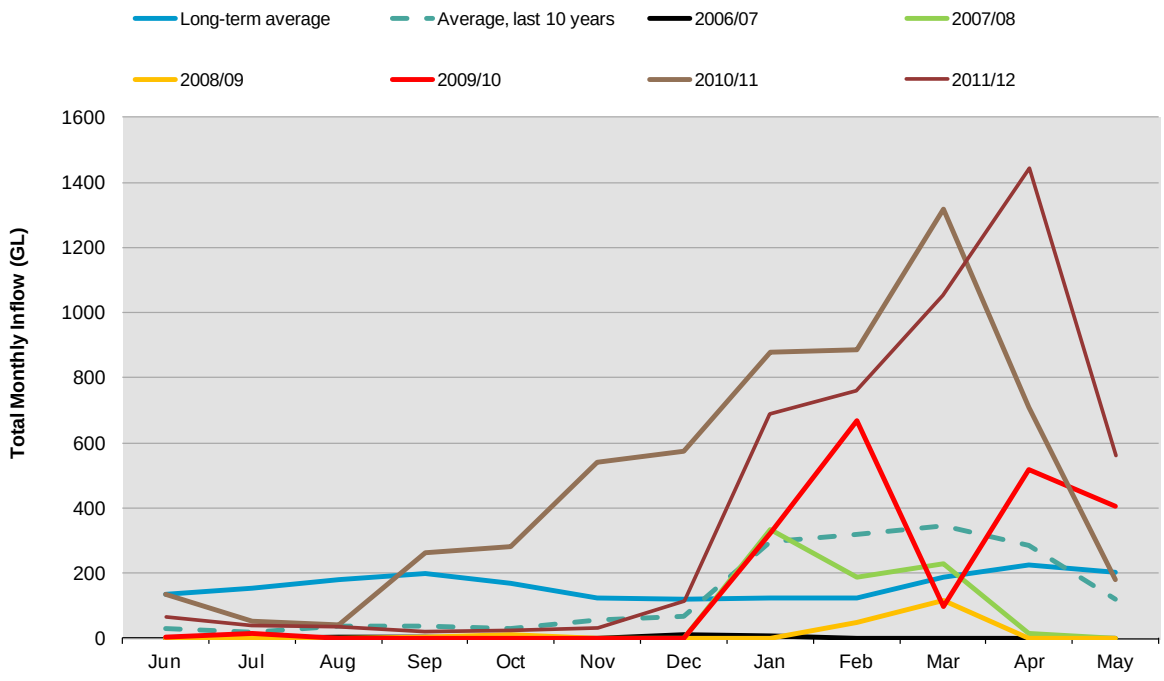


FIGURE 4 **Inflows to Menindee Lakes in recent years and long-term averages**



Inflows to the River Murray system in 2011-12 followed the long term average distribution of inflows through to August. Rainfall during this time was below normal and as a result, inflows

eventually fell beneath the long term average between September and November before returning to average between December and February. In late February and early March 2012, an unusually significant rainfall event occurred which boosted inflows. March inflows were around 2,200 GL which is the highest March inflow ever recorded and more than double the previous record, set in the preceding year of 1,000 GL.

Although there was below-average rainfall in the south of the Basin after March, the catchment remains primed, increasing the possibility of high inflows in the coming winter and spring should there be significant rain events. It is worth noting, however that the BoM is forecasting an increased chance of drier than average conditions during winter 2012 in the south of the Basin.

In the north of the Basin, there were considerable flood events during 2011-12 in the catchments of the Darling River driven by multiple rain events. As a consequence, the Menindee Lakes commenced pre-release/flood operation at the beginning of December 2011 and, at the end of May 2012, were surcharged and held 1,925 GL (112% capacity). This is the third Darling flood in three years and the floods have given much needed water to floodplains along the Lower Darling and Great Darling Anabranch as well as the River Murray in South Australia. During flood operations, day to day management of Menindee Lakes is coordinated by the NSW Government.

System reserves have now been above average since November 2010 (FIGURE 5). The total MDBA active storage on 31 May 2012 was 8,235 GL (TABLE 1). This is the highest volume of water held in storage for the end of May since all four storages were built. On 1 June 2012, there was also about 180 GL of water available to the Murray held in storages in the Murrumbidgee and Goulburn Valleys as a result of earlier net trade out of those valleys and into the Murray.

Total storage in the Snowy Mountains reservoirs (which are managed by Snowy Hydro) remains modest, although Lake Eucumbene storage has near doubled its volume in the past year and is now around 62% capacity.

FIGURE 5 MDBA active storage June 2000 to May 2012

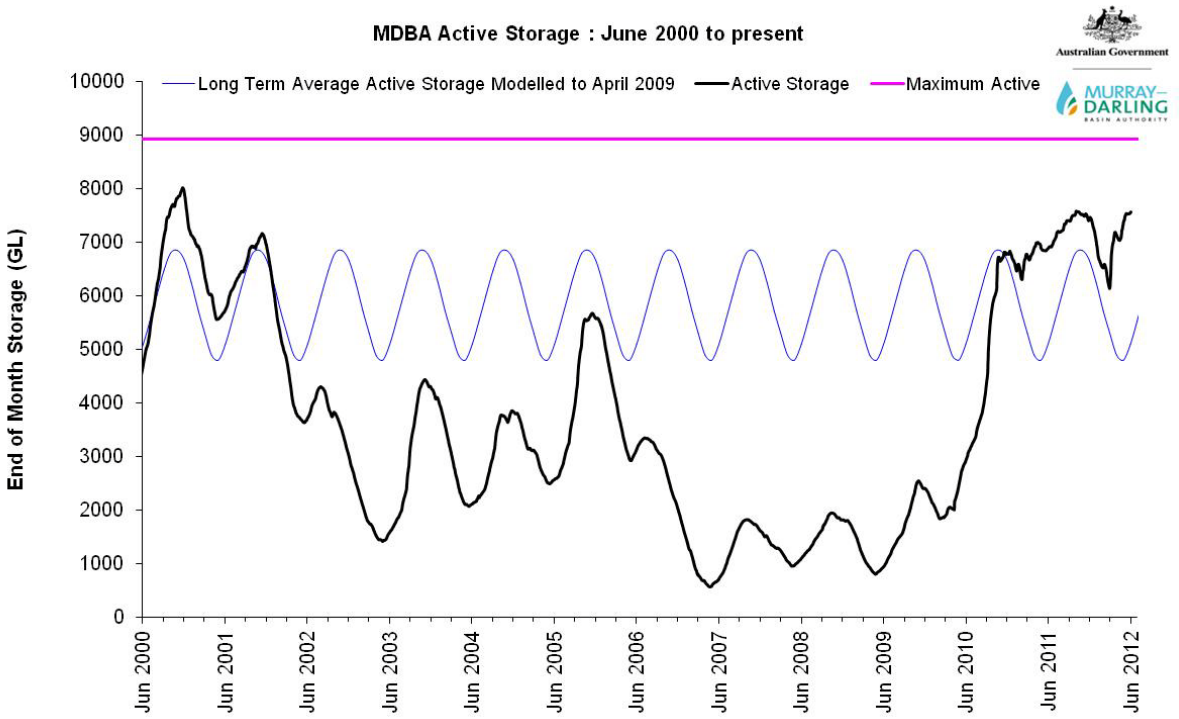


TABLE 1 Storage in MDBA major reservoirs on 31 May 2012

Major storage	Total capacity (GL)	Active capacity (GL)	Total water in storage (GL)	Percentage of total capacity	Active water in storage (GL)
Dartmouth Reservoir	3,856	3,785	3,230	84%	3,159
Hume Reservoir	3,005	2,975	2,719	91%	2,690
Lake Victoria	677	577	358	53%	258
Menindee Lakes	1,731	1,251	1,925	111%	1,445
River Murray System Total	**9,269**	**8,588**	**8,232**	**89%**	7,552

* Menindee Lakes may be surcharged to a maximum of 2,050 GL under certain circumstances.

One of the major aims of River Murray operations is to keep as much water as possible in Dartmouth Reservoir where evaporation losses are minimised. As a result, storage in Dartmouth Reservoir increased over the 2011-12 year from 63% to 84% capacity.

High inflows from downstream tributaries and rainfall across the irrigation areas meant that releases from Hume Reservoir, to meet downstream irrigation requirements in 2011-12 were modest. This, coupled with high inflows, resulted in Hume Reservoir spilling from June to

November 2011. About 425 GL of environmental water was released from Hume between September 2011 and February 2012.

In March 2012, following high rainfall and inflows, pre-releases were implemented to provide airspace in Hume Reservoir for the upcoming winter/spring season. During April, pre-releases from Hume Reservoir ceased, however about another 130 GL of environmental water was subsequently released to aid in the dilution of 'blackwater' with low levels of dissolved oxygen along the Murray, Edward and Wakool Rivers as a result of the summer flooding. At the end of May 2012 Hume Reservoir held 2,719 GL (91% capacity).

Lake Victoria, at the end of May 2012 held 358 GL (53% capacity) and Menindee Lakes held 1,925 GL (111% capacity), which included around 200 GL of surcharge.

4.2 Hydrological assumptions for the 2012-13 water year

The overall water availability for the River Murray System is determined by MDBA at the start of each water year (1 June) and then at least monthly during the year. Throughout the year, the overall water availability is calculated using data and models and assumptions agreed to by each of the jurisdictions. In some instances water availability assessments are prepared twice monthly to assist allocation announcements by the States.

Each determination of annual water availability needs to take into account the available water that is in storage at the time, water in transit, the amount of water used in that water year so far, estimates of future inflows (both regulated and unregulated) and the losses that may be experienced in delivering water along the length of the River Murray System for the remainder of the year.

River Murray System scenarios for 2012-13

Since the inflows to the River Murray System cannot be known in advance, this plan addresses the operations that may be undertaken under six different scenarios that cover, in broad terms, the likely range of conditions that may be experienced during this year.

Each scenario has in-built assumptions regarding inflows from the Snowy scheme, unregulated inflows into Hume Reservoir, inflows into Dartmouth Reservoir and inflows from the tributaries, including the Kiewa, Ovens, Goulburn, Murrumbidgee, and Darling Rivers, conveyance (river losses), storage losses and usage patterns.

Generally, it is only the volume of water available under the 'worst case scenario' (and updates thereof) that is progressively allocated by the States to their water users. The other scenarios are used to provide indicative quantities of water availability to the States to assist yearly planning for water managers and customers should those wetter scenarios eventuate. The assumptions in each scenario could change in future years as data and models are updated.

The scenarios in this plan are based on information available at 1 June 2012. The scenarios include the impacts of rain up to this date and allow for a recession of inflows into late June 2012. The relative difference between inflows of each of the six scenarios can be compared in FIGURE 2. The details of the six scenarios are provided in TABLE 2 and they are labelled according to the assumed River Murray System inflow as follows:

- the ‘worst case’ scenario, assumes about 1,130 GL of River Murray System inflows, which is more than the normal ‘worst case scenario’ adopted in recent years of 650 GL. The assumed inflows are greater due to higher forecast inflows in June as a result of recent rainfall;
- the ‘dry’ scenario, assumes River Murray System Inflows of about 3,100 GL, which is comparable to inflows in 2009-10;
- the ‘moderate’ scenario, assumes River Murray System Inflows of about 3,900 GL which is comparable to inflows in 2001-02;
- the ‘near average’ scenario, assumes River Murray System Inflows of about 6,300 GL which is comparable to inflows in 2005-06; and
- the ‘wet’ scenario, assumes River Murray System Inflows of about 11,200 GL which is comparable to inflows in 2000-01 and 1996-97; and
- the ‘very wet’ scenario, assumes River Murray System Inflows of about 18,300 GL which is comparable to inflows in 1992-93.

TABLE 2 Detail of assumptions in each scenario for 2012-13 (all volumes in GL)

	worst case	dry	moderate	near average	wet	very wet
Inputs between June 2012 to May 2013						
Active MDBA storage on 1 June 2012	7,563	7,563	7,563	7,563	7,563	7,563
Storage in Valley Accounts on 1 June 2012	180	180	180	180	180	180
Change in water in transit on 1 June 2012	558	538	578	553	468	298
Inflows from Upstream of Albury (including SMS)	660	1,750	2,020	2,800	4,400	6,300
Inflows from Upstream of Menindee	95	95	95	780	2,800	6,800
Inflows from Victorian tributaries	200	750	1,200	2,250	4,100	7,200
Inflows from NSW tributaries	430	440	530	930	1,900	3,500
Commitments between June 2012 May 2013						
Conveyance losses upstream of SA Border	-800	-800	-1040	-1310	-1650	-2000
Conveyance losses along lower Darling River	-230	-230	-230	-230	-340	-1000
Conveyance Reserve for 2013-14	-225	-225	-225	-225	-225	-225
Storage losses upstream of the SA Border	-700	-810	-840	-940	-970	-990
Supply of South Australian Dilution and Loss Entitlement	-696	-696	-696	-696	-696	-696
Supply of Additional Dilution Flow	-250	-510	-550	-900	-1095	-1095
Supply of Unregulated Flow	-480	-510	-650	-2,220	-6,400	-15,500
Minimum reserve for 2013-14	-835	-835	-835	-835	-835	-835
Approximate Total Murray allocatable water	**5,470**	**6,700**	**7,100**	**7,700**	**9,200**	**9,500**

Conveyance water (river losses)

The volume of water set aside for conveyance, which includes losses to evaporation and seepage along the river system, varies between scenarios. The 'worst case' and 'dry' scenarios assume 800 GL for conveyance between Dartmouth Reservoir and the South Australian Border and a further 230 GL between Menindee Lakes and the Murray at Wentworth. The 800 GL conveyance along the Murray takes a conservative approach and is slightly higher than losses experienced in recent dry years, i.e. about 750 GL in 2006-07 (FIGURE 6).

In the drier scenarios, the pattern of losses is skewed towards the summer months when evaporation is expected to be higher. The volume and pattern of water set aside for conveyance will be regularly reviewed by MDBA and altered to suit the actual conditions as they develop.

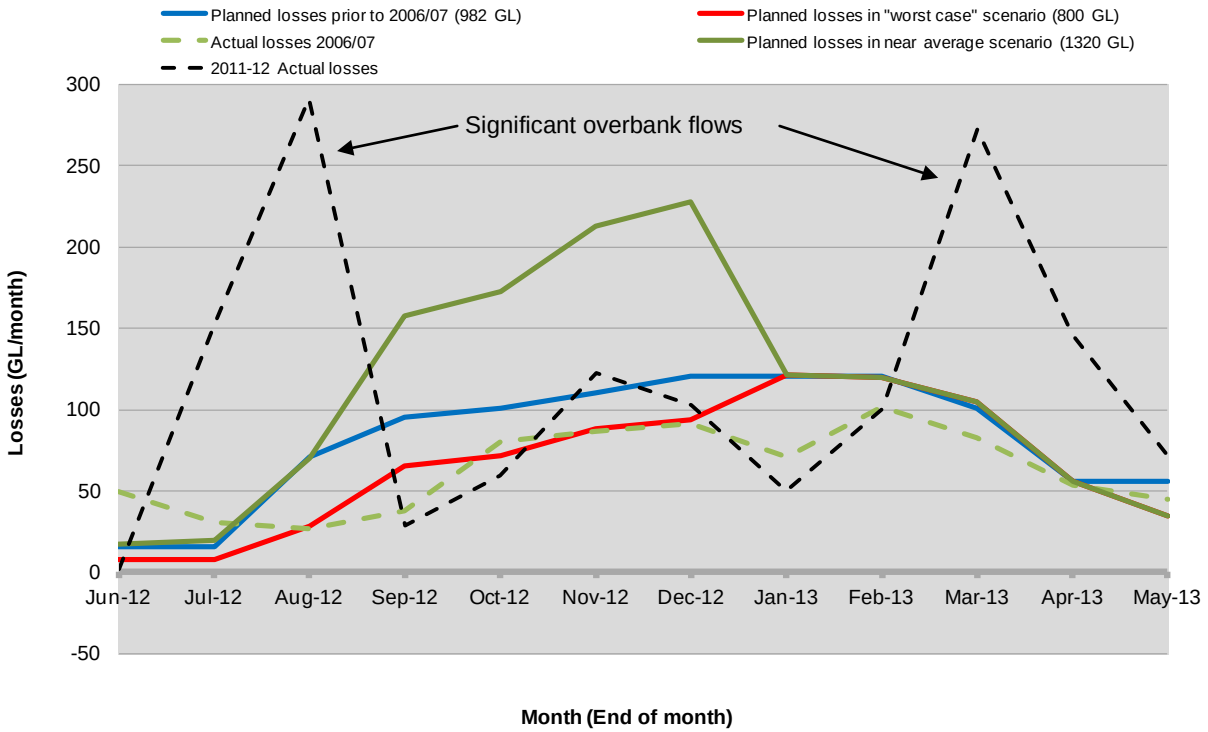
The 800 GL assumes that:

- river flows are at channel capacity through the 'Barmah choke', but not above, for at least a short period during the year;
- all major wetlands affected by regulated flows are connected at some stage of the year; and
- weir pools are held at normal operating levels.

If conditions are wetter, then conveyance losses will be higher due to increased overbank flow and flooding and consequential evaporation and seepage on the floodplain. Consequently, the wetter scenarios assume higher conveyance losses, with about 1,300 GL assumed in the 'near average' scenario (FIGURE 6) and 2,000 GL assumed for the 'very wet' scenario. As can be seen in Figure 7, the pattern of losses can be very different to those assumed in the operational plan. For instance, in March 2011-12 unseasonal flooding caused very high losses.

The conveyance loss along the River Murray in South Australia upstream of Wellington is included as part of the South Australian 696 GL Dilution and Loss entitlement. How much evaporates or is otherwise lost between the border and Wellington (just upstream of Lake Alexandrina) and how much flows to the lake will vary from year to year depending on a range of factors including: evaporation, extent of flooding and local rainfall. For "worst case" planning purposes it is assumed that about 50% of the 696 GL is lost and the other 50% flows to the Lower Lakes.

FIGURE 6 Assumptions for conveyance losses upstream of the South Australian border



Conveyance Reserve

In response to the extreme drought conditions in 2006 and 2007, the Water Act (2007) includes provisions to improve security of supplies under a repeat, or even worse drought conditions. Two Schedules to the Murray-Darling Basin Agreement have been enacted in this regard.

Ministerial Council approved the Schedule to Account for South Australia's Storage Right (Schedule G), the Schedule for Water Sharing (Schedule H) and associated consequential

amendments to the Agreement on 15 June 2011. Schedule G came into effect on 1 September 2011 and South Australia has been providing a draft of the deferred water and delivery plan each month. At the time of writing, the South Australian storage right has remained at 0 GL. This is primarily because South Australia cannot put water into the storage right whilst there are unregulated flows, which have prevailed throughout most of 2011-12.

This plan includes a conveyance reserve of 225 GL in each of the scenarios. This reserve aims to preserve water in storage now so that it can eventually be utilised in future years to assist in the delivery of critical human needs water should there be a return to extreme dry conditions.

Storage losses

Assumptions of evaporative losses from storages vary for each scenario, being about 700 GL in the 'worst case' scenario and then increasing in the wetter scenarios (1,000 GL in 'very wet' scenario) due to the much larger wetted surface area, particularly over summer, with increased water in storage. The majority of the assumed evaporative loss is at Menindee Lakes (420-600 GL). High summer rainfall, as occurred in 2011-12, can significantly reduce evaporative losses.

5 SUMMARY OF WATER SHARING AND SIGNIFICANT OPERATIONS FOR 2012-13

State water entitlements and significant decisions on river operations are primarily driven by the timing and location of inflow events and usage patterns. For the six scenarios outlined in Section 4.2 of this plan, TABLE 3 provides a summary of water availability; TABLE 4 provides a summary of important operational decisions that may need to be made while TABLE 5 provides outlooks to assist environmental management.

The water sharing arrangements (Tier 1) between States, which are in effect for 2012-13, are outlined in Part XII of the Murray-Darling Basin Agreement.

TABLE 3 Summary of Water Availability under each scenario

WATER AVAILABILITY	'worst case'	Dry	Moderate	Near average	Wet	Very Wet
Sharing rules at end of May 2012	Tier 1	Tier 1	Tier 1	Tier 1	Tier 1	Tier 1
Indicative water availability at end May 2012						
NSW	2,300 GL	3,040 GL	3,390 GL	3,900 GL	4,770 GL	5,060 GL
VIC	2,280 GL	3,200 GL	3,490 GL	4,060 GL	4,810 GL	5,320 GL
SA	1,154 GL	1,154 GL	1,154 GL	1,154 GL	1,154 GL	1,154 GL
SA Dilution & Loss	696 GL	696 GL	696 GL	696 GL	696 GL	696 GL
Conveyance Reserve for 2013-14	225 GL	225 GL	225 GL	225 GL	225 GL	225 GL
Forecast Minimum Reserve at end May 2013	835 GL	835 GL	835 GL	835 GL	835 GL	835 GL
Trade Adjustment to South Australia at 1 June**	~-60 GL	~-60 GL	~-60 GL	~-60 GL	~-60 GL	~-60 GL
Special Accounting	NSW may commence special accounting in August	No special accounting for entire year	No special accounting for entire year	No special accounting for entire year	No special accounting for entire year	No special accounting for entire year

WATER AVAILABILITY	'worst case'	Dry	Moderate	Near average	Wet	Very Wet
Internal spill at Lake Victoria (Vic to NSW)	0 GL #	60 GL #	140 GL #	30 GL #	20 GL #	0 GL #
Additional Dilution Flow	≈ 440 GL #	≈ 510 GL #	≈ 550 GL #	≈ 900 GL #	1,095 GL (all year)	1,095 GL (all year)
Unregulated Flows	≈ 480 GL	≈ 510 GL	≈ 650 GL	≈ 2,220 GL	≈ 6,400 GL	≈ 15,500 GL
Assumed usage **NSW** **VIC** **SA Ent. Delivered**	# 1,500 GL 1,400 GL 1,850 GL *	# 1,500 GL 1,400 GL 1,850 GL *	# 1,500 GL 1,400 GL 1,850 GL *	# 1,500 GL 1,400 GL 1,850 GL *	# 1,500 GL 1,400 GL 1,850 GL *	# 1,300 GL 1,200 GL 1,850 GL *
End of season active storage	≈2,350 GL #	≈3,700 GL #	≈4,270 GL #	≈5,530 GL #	≈7,810 GL #	≈8,580 GL #

Highly dependent on the timing of improvements in water availability and usage patterns

* South Australia may defer some of its entitlement flow with the introduction of South Australia's Storage Right (Schedule G) and the introduction of formal carryover arrangements in South Australia.

** Trade Adjustment figure will reduce South Australia's Entitlement in 2012-13. Figure given is at 1 July and may change throughout the year.

TABLE 4 Summary of significant river operations under each scenario

RIVER OPERATIONS	'worst case'	Dry	Moderate	Near average	Wet	Very Wet
Expected Dartmouth release above minimum	~ 1,250 GL, commencing around Oct up to 9,500 ML/day. Plus <70 GL release for power generation, water quality or if Snowy Creek flow is very low	~ 500 GL, commencing around Nov up to 4,000 ML/day. Plus <70 GL release for power generation, water quality or if Snowy Creek flow is very low	<70 GL - some release for power generation, water quality or if Snowy Creek flow is very low	<70 GL - some release for power generation, water quality or if Snowy Creek flow is very low	Potential pre-releases and harmony transfers from Dartmouth to Hume. Plus <70 GL release for power generation, water quality or if Snowy Creek flow is very low.	Potential pre-releases and harmony transfers from Dartmouth to Hume. Plus <70 GL release for power generation, water quality or if Snowy Creek flow is very low.
Dartmouth Storage end May 2013	~2,010 GL	~3,350 GL	~3,500GL	~3,750 GL	~ 3,850 GL	~ 3,850 GL
Hume storage	low levels (<10% capacity) in autumn increased chance of algal bloom	low levels (~10-20% capacity) in autumn increased chance of algal bloom	Possible spill until August, moderate levels (~20-40% capacity) over summer/autumn	Spill until November, moderate levels (~30-50% capacity) over summer/autumn	Spill until December, higher levels (>50% capacity) over summer/ autumn	Spill until January, higher levels (>50% capacity) over summer/autumn
Use of Goulburn Valley Account	At the start of July 2012, it is expected that there will be around 100 GL in the Goulburn Valley Account (from net trade out of the valley). In the near average and wetter scenarios a spill from Lake Eildon could reduce this amount. If required, it is most likely that Goulburn Valley Account water will be called by MDBA between December 2012 and April 2013. MDBA will liaise closely with the Goulburn Broken CMA and Goulburn-Murray Water during the 2012-13 water year to adaptively manage MDBA requests for the delivery of water from the Goulburn to meet irrigation demands along the River Murray, alleviate duration of high flows through the Barmah 'choke' and also, where possible, to meet the environmental aims along the Goulburn, Broken and Campaspe Rivers (see Section 6.4).					

RIVER OPERATIONS	'worst case'	Dry	Moderate	Near average	Wet	Very Wet
Use of Murrumbidgee Valley Account	At the start of July 2012, it is expected that there will be around 80 GL in the Murrumbidgee Valley Account (from net trade out of the valley). At 1 June 2012, the majority of this water was held in Snowy storages and may be 'called out' into either the Murray or Murrumbidgee. Any delivery of the Murrumbidgee Valley account via the Snowy Mountains Scheme (SMS) will be subject to actual and forecast storage volumes in Hume Reservoir and capacity constraints through the Barmah "Choke". If required, it is most likely that Murrumbidgee Valley Account water will be called by MDBA between December 2012 and April 2013. If there are significant volumes of trade to the Murray then MDBA will liaise closely with NSW in regard to delivery rates and timing.					
Operation of Weir pools (see Section 6.3 for details)	Normal weir pool variability. Potential for Lake Mulwala drawdown winter 2013. Possible operational manipulations at all weirs.	Normal weir pool variability. Potential for Lake Mulwala drawdown winter 2013. Possible operational manipulations at all weirs.	Some flood operations. Potential for Lake Mulwala drawdown winter 2013. Possible operational manipulations at all weirs.	Some flood operations. Potential for Lake Mulwala drawdown winter 2013. Possible operational manipulations at all weirs.	Flood operations. Potential for Lake Mulwala drawdown winter 2013. Possible operational manipulations at all weirs.	Flood operations. Potential for Lake Mulwala drawdown winter 2013. Possible operational manipulations at all weirs.
Lake Victoria Operating Strategy	Normal levels but may not fill	Normal levels and likely to fill.	Spilling until October	Spilling until November	Spilling for majority of year	Spilling for majority of year
Cultural Heritage	Operations will need to minimise the length of time that the Lake Victoria level is high and be consistent with the LVOS. Under wetter scenarios it may be possible to hold Lake Victoria at lower levels, if unregulated flows to South Australia are persisting.					
Lake Victoria 250 GL reserve at end May 2013.	May require additional release from upper storages. MDBA to advise BOC early in 2013 if alternative strategy proposed	Able to be met	Able to be met	Able to be met	Able to be met	Able to be met

TABLE 5 Summary of significant environmental operations under each scenario

ENVIRONMENTAL IMLICATIONS	'worst case'	Dry	Moderate	Near average	Wet	Very Wet
Assumed Environmental flow release from Hume	400 GL	500-700 GL	600-800 GL	600-700 GL	200-400 GL	200-400 GL
River Murray Increased Flows held in Snowy Storages	230 GL	230 GL	230 GL	230 GL	230 GL	230 GL
Assumed Environmental flow release from Tributaries	Goulburn River ~250 GL Murrumbidgee River ~200 GL	Goulburn River ~250 GL Murrumbidgee River ~200 GL	Goulburn River ~250 GL Murrumbidgee River ~200 GL	Goulburn River ~250 GL Murrumbidgee River ~200 GL	Goulburn River ~220 GL Murrumbidgee River ~130 GL	Goulburn River ~200 GL Murrumbidgee River ~100 GL
Barmah-Millewa Environmental Water Allocation In all scenarios the water may not need to be used and some carried over to the following year.	108 GL in EWA. May be borrowed and not available.	208 GL in EWA. Both NSW and Victorian shares become available but flow triggers for release not met.	208 GL in EWA. Both NSW and Victorian shares become available and triggers for release met.	208 GL in EWA. Both NSW and Victorian shares become available and triggers for release met.		208 GL in EWA. Both NSW and Victorian shares become available and triggers met
Below minimum flow/height levels	Not expected to be required	Not expected to be required	Not expected to be required	Not expected to be required	Not expected to be required	Not expected to be required

ENVIRONMENTAL IMLICATIONS	'worst case'	Dry	Moderate	Near average	Wet	Very Wet
Lower Lakes	Without environmental water, may temporarily fall below 0.55 m AHD if very hot, dry summer	Operations, where possible, between 0.55 and 0.85m AHD to assist reducing salinity at Lake Albert, however wind and tidal affects may result in lake levels outside of this range				
River Salinity	Potential for high salinity levels following extensive flooding of the Lower Murray					
Overbank flows and flooding	In channel flows	Chance of overbank flow into Central Murray Forests, otherwise in channel.	Increased chance of overbank flows into Central Murray Forests.	Extensive overbank flows into Central Murray Forests and some other parts of the River Murray System	Extensive and prolonged overbank flows along large sections of River Murray System	Extensive and prolonged flooding along large sections of the River Murray System
Lower Murray Irrigation Area (LMRIA) Acid Drainage	Potential for water quality problems from acid drainage during summer and autumn if flow to SA is reduced to entitlement			Sufficient dilution from Additional Dilution Flow and unregulated flows to prevent water quality problems from acid drainage		
Blackwater	Unlikely	Potential for minor blackwater event but dissolved oxygen levels not too low		Potential for significant blackwater event with very low dissolved oxygen levels. MDBA may call on Murray Irrigation escapes and co-ordinate environmental water releases where possible to provide dilution		
Chance of blue-green algal blooms along river	There is always a chance of blue-green algal blooms forming somewhere along the River Murray System. Algal blooms generally form during the summer and persist into autumn and have been observed to form in both high flow and low flow years, however the more extensive blooms have been observed more often during dry years. River Murray Operations may be able to assist in dispersing algal blooms in some weir pools with 'pulsed' flows on some occasions. However, this is not always feasible, particularly when water is scarce.					

6 RIVER MURRAY SYSTEM OPERATIONS FOR 2012-13

6.1 Introduction

It is expected that 2012-13 will be yet another challenging year in terms of river operations. Water availability at the start of the season will be relatively high and it is expected that there will be high irrigation demand, especially if conditions are dry. It is also expected that there will be significant use of environmental water and this is discussed further in section 6.4.

Also, with storages close to full, and catchments still relatively wet from the late summer rain, the threat of flooding along the River Murray System remains high. It is likely that some parts of the River Murray System will experience overbank flows or flooding in 2012-13, however the location will be greatly influenced by the timing, location and intensity of rainfall events that cannot be forecast this far in advance. Further information on the potential for high flows and flooding is provided for each structure/reach in this section of the plan. However, as rain events unfold, the Bureau of Meteorology is responsible for issuing flood warnings for the River Murray System in NSW and Victoria, while the South Australian Department for Water has this responsibility for the River Murray in South Australia.

6.2 No changes to minimum flow rates expected

As part of drought operations between 2006 and 2010 the minimum flows or river levels were temporarily reduced at some locations to conserve water (TABLE 6). During 2012-13 it is ***not*** expected that flows will need to be reduced below normal minimum targets, unless there are unforeseen or emergency circumstances. However, if it is a very dry spring and summer then flow rates close to minimums may occur for extended periods in the River Murray System upstream of Wentworth, whilst MDBA preferentially draws on water from Menindee Lakes rather than Hume Reservoir to minimise evaporative losses.

TABLE 6 Minimum Flow rates at key locations

Standing Procedure	Normal minimum	Temporary minimum between 2006-2010
Minimum release from Hume Dam	600 ML/day	400 ML/day
Minimum target flow at Doctors Point	1200 ML/day	800 ML/day
Minimum release from Yarrawonga Weir	1800 ML/day	1500 ML/day
Minimum flow at Edward River off take	100 ML/day	80 ML/day
Minimum flow at Gulpa River off take	80 ML/day	30 ML/day
Minimum release from Stevens Weir	150 ML/day	130 ML/day
Minimum river height at Swan Hill	0.6 m local gauge height	0.5 m local gauge height
Minimum release from Euston Weir	2500 ML/day + Sunraysia Demand	1500 ML/ day

6.3 Weir pool level manipulation

Weir pool manipulations may be implemented for a number of reasons including;

- the need to supply downstream water requirements when there are very hot conditions and demands are high;
- to minimise evaporation rates;
- to temporarily store water rather than allow it to pass downstream;
- for construction and maintenance programs; and
- to provide variation in water levels to minimise bank erosion and to flood or dry adjacent wetlands.

The timing and extent of weir pool manipulations are difficult to predict as they are significantly influenced by short-term weather conditions. TABLE 7 outlines variations in weir pools that have occurred since 2005. It is possible that weir pool manipulations of these magnitudes will be implemented at some stage in 2012-13. It is also possible that larger weir pool manipulations, outside of these ranges, may be implemented. TABLE 7 also provides indicative levels (in brackets) that have the potential to impact on water quality and access. In the event that a weir pool needs to be manipulated outside its normal operating range then jurisdictional representatives would be notified via the WLWG. The public would be notified through the River Murray Weekly Report and in some circumstances via media releases.

Under high flow or flood events such as those observed during 2010-12 many structures may be inundated or removed, therefore the ability to undertake pool manipulations will be limited.

For Lake Mulwala it is expected that the lake level will be managed within its normal operating range (124.6 to 124.9 m AHD), except during periods of flooding or emergency situations or if it is required for the control of the invasive weed *Egeria Densa,* which depending on the amount of regrowth may be required in late autumn-winter of 2013.

A lowering of Lock 15 (Euston Weir) is possible in the upcoming summer to facilitate remedial works at Lock 15. At the time of writing, it is believed that the lowering would only be up to 30 cm below full supply level which is in the normal range of pool manipulation.

There is the potential for raising of the pool upstream of Lock 8 during the 2012-13 by up to 50cm. This action would be undertaken in conjunction with TLM works currently being constructed on Mulcra Island to assist in delivering environmental water to that area of the floodplain. The implementation of this action would depend on the availability of environmental water and the completion of the Mulcra Island works. There are also preliminary investigations into raising Lock 9 in 2012-13 if conditions are conducive.

TABLE 7 **Variations in weir pool levels since 2005. Values in brackets refer to weir pool level variations that may have significant impacts on river management such as water quality and water access.**

Weir	FSL	Weir Pool Lowering	Weir Pool Raising
Lake Mulwala	124.9 m	30 cm (20 cm)	25 cm
Torrumbarry Weir (Lock 26)	86.05 m	40 cm (25 cm)	no surcharge
Euston Weir (Lock 15)	47.6 m	30 cm (25 cm)	no surcharge
Mildura Weir (Lock 11)	34.4 m	10 cm (10 cm)	5 cm
Wentworth Weir (Lock 10)	30.8 m	10 cm (10 cm)	10 cm
Kulnine (Lock 9)	27.4 m	20 cm (25 cm)	25 cm (15 cm)
Wangumma (Lock 8)	24.6 m	50 cm (50 cm)	60 cm (50 cm)
Rufus River (Lock 7)	22.1 m	15 cm (15 cm)	25 cm
Murtho (Lock 6)	19.25 m	10 cm (8 cm)	15 cm (10 cm)
Renmark (Lock 5)	16.3 m	10 cm (8 cm)	50 cm (35 cm)
Bookpurnong (Lock 4)	13.2 m	10 cm (4 cm)	30 cm
Overland Corner (Lock 3)	9.8 m	10 cm (3 cm)	15 cm
Waikerie (Lock 2)	6.1 m	10 cm (8 cm)	20 cm
Blanchetown (Lock 1)	3.2 m	10 cm (10 cm)	15 cm

6.4 Delivering environmental water

The scenarios in this plan rely on assumptions on the location and timing of water use along the river system. For irrigation and urban water supplies there is a long history of use that can be analysed to develop forecasts under the different scenarios. However, at this stage, there is limited history of use available to assist the forecasting of recently acquired environmental water.

The scenarios in this plan are based on assumptions, after consultation with the Commonwealth and States, of how the environmental water will be used. The actual use will most likely differ from the assumed use although the scenarios should give an indication of what

may be possible. Broadly speaking this plan looks at delivering bulk environmental water in two ways, both assuming a significant volume of environmental water being delivered to South Australia.

The first type of bulk environmental water delivery applies to the 'worst case' scenario, although this type of environmental water delivery may occur in wetter cases. In this case, inflows upstream of Lake Mulwala are insufficient to cause overbank flow through the Barmah-Millewa Forest and on the advice from environmental water managers for these scenarios, Barmah-Millewa would be kept in a drying phase (see also SECTION 6.8). As a result, a higher reliance on water from Menindee Lakes is needed to supply South Australia with environmental water and this may have impacts on ADF (see SECTION 6.10).

In the wetter scenarios, overbank flow into the Barmah-Millewa Forest will occur which may then be supplemented by environmental water releases from Hume Reservoir to provide a multi-site environmental watering along the entire River Murray System all the way to the Coorong and Murray Mouth in South Australia. The higher release from Hume will mean a reduced volume may be needed from Menindee Lakes to supply South Australia with environmental water. In the wetter scenarios there may be limited opportunity to release environmental water due to very high flow rates. However as in recent years, environmental water may be released to fill in gaps between high flow events, to ensure appropriate recession rates, to promote successful waterbird breeding and provide flow variability to assist fish migration and spawning. Some environmental water may also be used to dilute blackwater, if it occurs. In May 2012, the Basin Official Committee approved the water accounting and delivery arrangements for such a large multi-site environmental watering in 2012-13.

For all but the wet scenarios in this Operating Plan it is assumed that between 400 and 800 GL of environmental water would be released from Hume Reservoir as part of the multi-site watering. The environmental water has been assumed to be released, in the 'near average' and wetter scenarios, at relatively low flow rates, between and following flood peaks, to primarily target low lying wetland systems. In the 'worst case' scenario releases are made at relatively low rates to ensure a consistently higher than entitlement flow to South Australia.

The environmental water releases are also planned to be made in a manner that minimises the potential for delays to the significant works program that is being undertaken along the River Murray System (see section 6.11). However, if these works are already suspended or delayed due to flooding by unregulated flows then this may provide an opportunity to release environmental water at higher flow rates.

The environmental water holders have also provided an indication of how some smaller parcels of their water are expected to be used, however these do not have a big impact on overall river operations. Further information can be found in The Living Murray (TLM) Annual Watering Plan 2012-13 (*http://www.mdba.gov.au*) and on the Commonwealth Environmental Water Holder website (*http://www.environment.gov.au/ewater/index.html*).

Barmah-Millewa Environmental Water Allocation (B-M EWA)

NSW and Victoria will carry over about 29 GL of B-M EWA into 2012-13. In addition, on 1 July 2012 both NSW and Victoria need to credit the B-M EWA with a further 25 GL due to the

triggering of the lower security water as a result of the Hume Natural inflow between 1 January 2010 and 1 July 2012 being about 11,500 GL, which is greater than the 8,650 GL trigger level.

As a result, both States will have an initial commitment of 54 GL (108 GL in total) to the B-M EWA on 1 July 2012. Then for every 2% that Victorian HRWS increases, each State will need to contribute another 1 GL to the B-M EWA. When the Victorian HRWS reaches 100%, then the maximum volume that both NSW and Victoria will need to allocate to the B-M EWA in 2012-13 will be 104 GL each (29 + 25 + 50), which provides a total of 208 GL.

As there was a temporary borrow by Victoria of the B-M EWA in 2011-12, all 104 GL of the Victorian B-M EWA is protected from spill from Hume in 2012-13. NSW did not borrow its share of B-M EWA in 2011-12 and as such 4 GL of the 104 GL is subject to spill from Hume.

NSW is unlikely to temporarily borrow B-M EWA in 2012-13. However, Victoria has indicated that it is possible that it may again need to temporarily borrow the B-M EWA in 2012-13. It is probable that the B-M EWA would be fully repaid under all but the 'worst case' scenario and would be triggered for use under the average and wetter scenarios.

In all but the dry scenarios, the release of the B-M EWA (to be approved by NSW and Victoria) combined with a large multi-site watering proposal described above, could provide significant environmental benefits along the entire river system, including the Coorong and Murray Mouth in South Australia.

Environmental inflows from the Goulburn River

This plan acknowledges and will, where possible, assist in the implementation of the Goulburn River Seasonal Watering Proposal for 2012-13 developed by the Goulburn-Broken Catchment Management Authority. This watering proposal aims "*to continue to pursue fish, macroinvertebrate and vegetation ecological objectives established for the Goulburn River by implementing minimum and fresh flow recommendations, particularly in winter and spring".*

This involves providing *"a minimum flow of 830 or 940 ML/day at Murchison and McCoys Bridge respectively and winter/spring and summer/autumn freshes of 5,600 ML/day*". The proposal also notes that "Overbank flows occurred in 2010-2011 and 2011-2012 and are therefore not required in 2012-2013". Estimated environmental water volumes needed to support the proposal range from 130 to 225 GL (depending on rainfall and runoff), additional water may also be used to achieve the proposal's objectives during 2012-13.

The environmental inflows to the River Murray from the Goulburn River during spring as described above are also expected to provide ecological outcomes along the River Murray downstream of the confluence between the two rivers.

This plan also acknowledges and will, where possible, assist in the implementation of the lower Broken Creek Seasonal Watering Proposal for 2012-13 developed by the Goulburn-Broken Catchment Management Authority.

MDBA River Operations staff will liaise closely with the Goulburn Broken CMA and Goulburn-Murray Water during the 2012-13 water year to adaptively manage the delivery of inter valley trade water from the Goulburn River to assist, where possible, meeting environmental objectives along the Goulburn and Campaspe Rivers and the lower Broken Creek.

Environmental inflows from the Murrumbidgee River

This plan acknowledges the potential for a significant inflow of environmental water from the Murrumbidgee River of approximately 200 GL. Most of this environmental water is expected to enter the Murray sometime between September and November as part of a 'spring pulse' to assist fish recruitment along the Murrumbidgee River. Where practical, this inflow would be co-ordinated with environmental releases from Hume Reservoir as part of the multi-site environmental watering to provide a pulsed flow into South Australia during spring.

6.5 Snowy Mountains Scheme

Each year the Murray and Murrumbidgee Rivers receive water from the Snowy Mountains Scheme (SMS) from releases for power generation. The annual volume of water to be released from the Snowy Mountains Scheme is outlined in Schedule F of the Murray-Darling Basin Agreement.

Assumptions have been made for inflows from the Snowy Mountains Scheme in each of the six scenarios but for commercial reasons these cannot be disclosed in a public document.

6.6 Dartmouth Reservoir

Key considerations when operating Dartmouth Reservoir are the holding of reserves for later years and the transfer of this water to Hume Reservoir within the channel capacity of the Mitta Mitta River. Based on the storage level on 31 May 2012, indicative storage volume and monthly releases for Dartmouth Reservoir under the six scenarios are shown in FIGURE 7 and FIGURE 8.

During 2011-12, storage in Dartmouth Reservoir increased from 63.4% to 83.7% capacity, which was an improvement of about 785 GL. On 1 June 2012 there was still about 626 GL of airspace remaining. After taking into consideration minimum releases, greater than average inflows (~700 GL) would be required for the storage to spill in 2012-13.

Dartmouth Reservoir last spilled in October and November 1996 (16 years ago). To prepare new staff for a possible spill from Dartmouth in 2012-13, MDBA and GMW have recently undertaken joint flood simulation training exercises.

Dartmouth Dam has a large flood mitigation effect. This is due to the significant volumes of water which can be stored above the full supply level during large flood events. Flood inflows are temporarily stored and, as water levels rise, they flow over the spillway crest at reduced peak flow rates (but longer durations). For example, during the flood of October 1993, calculated inflows to Dartmouth exceeded 70,000 ML/day whilst peak flow over the spillway was less than 17,000 ML/day.

Under the 'very wet' and 'wet' scenario, the storage is expected to reach 100% capacity (3,856 GL), and this assumes about 400 and 300 GL respectively, of spill and/or 'harmony' transfer (see below) from Dartmouth to Hume Reservoir.

When storage in Dartmouth is high, 'harmony' transfers to Hume Reservoir may be made over summer to provide the Mitta Mitta Valley higher in channel flows and increased flood protection for the following year. Harmony transfers can also benefit the operations of the Dartmouth power station and benefit recreation and tourism at Lake Hume through raised lake levels over summer.

Pre-releases from Dartmouth are considered in conjunction with the operation of Hume in its spilling or flood phase and may be required in 2012-13 if conditions are wet. Pre-releases at Dartmouth should not unnecessarily reduce Hume's share of the total available airspace, or aggravate flooding if it is already occurring downstream of Hume. The method of calculating what is appropriate is generally based on the aim of having the two storages full at about the same time in late spring. In 2012-13, priority will be given to providing airspace in Hume Reservoir in view of the large flood mitigation capacity afforded by the free overflow spillway of Dartmouth Dam (note that much less flood mitigation is possible at Hume Dam as storage levels approach FSL).

Under the 'near average' and 'moderate' scenario, inflows are not sufficient to spill Dartmouth reservoir. Under these scenarios, it is expected that releases above minimums (200 ML/day at Colemans) would not be required to meet diversion requirements in 2012-13. However, there may be pulsed releases at less than 5,000 ML/day by the power station operator for electricity generation or there may be greater than minimum releases if the flow at Tallandoon is expected to be below 600 ML/day, which can lead to insufficient flow to enable diversions along the Mitta Mitta River. In these scenarios, and as was done in 2011-12, there may also be an increase of the minimum release if there are water quality issues in the Mitta Mitta River below Dartmouth.

Under the 'worst case' scenario, there may need to be up to 1,250 GL released from Dartmouth and the storage volume would reduce to about 50% capacity at the end of the year. In this 'worst case' scenario, inflows are set low and the demand, both for irrigation and the environment has been set high.

Where possible, any significant transfers from Dartmouth to Hume Reservoir will be made as a series of pulsed releases following the environmental guidelines recently developed by MDBA and Charles Sturt University, to enhance the ecological values of the Mitta Mitta River.

The pulsed releases, where required, will aim to be less than 5,000 ML/day, but higher releases of up to 10,000 ML/day at Tallandoon cannot be ruled out. Both the timing and release rates from Dartmouth will be greatly dependent on inflow and usage patterns and the storage volume in Hume Reservoir, however it is likely that they would not commence until September 2012.

Storage in Dartmouth Reservoir is expected to be above the operating level of the main Power Station in all scenarios and dam maintenance and improvement works are not expected to significantly affect river operations in the 2012-13 water year.

FIGURE 7 Dartmouth Reservoir storage outlook

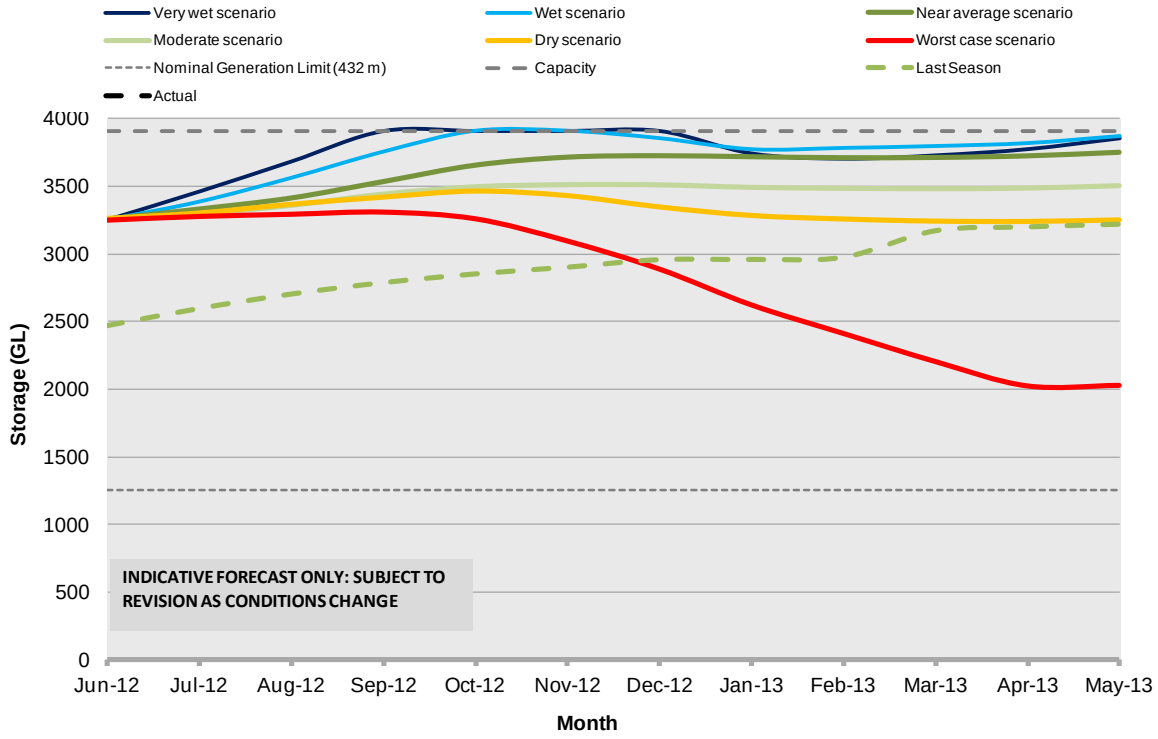
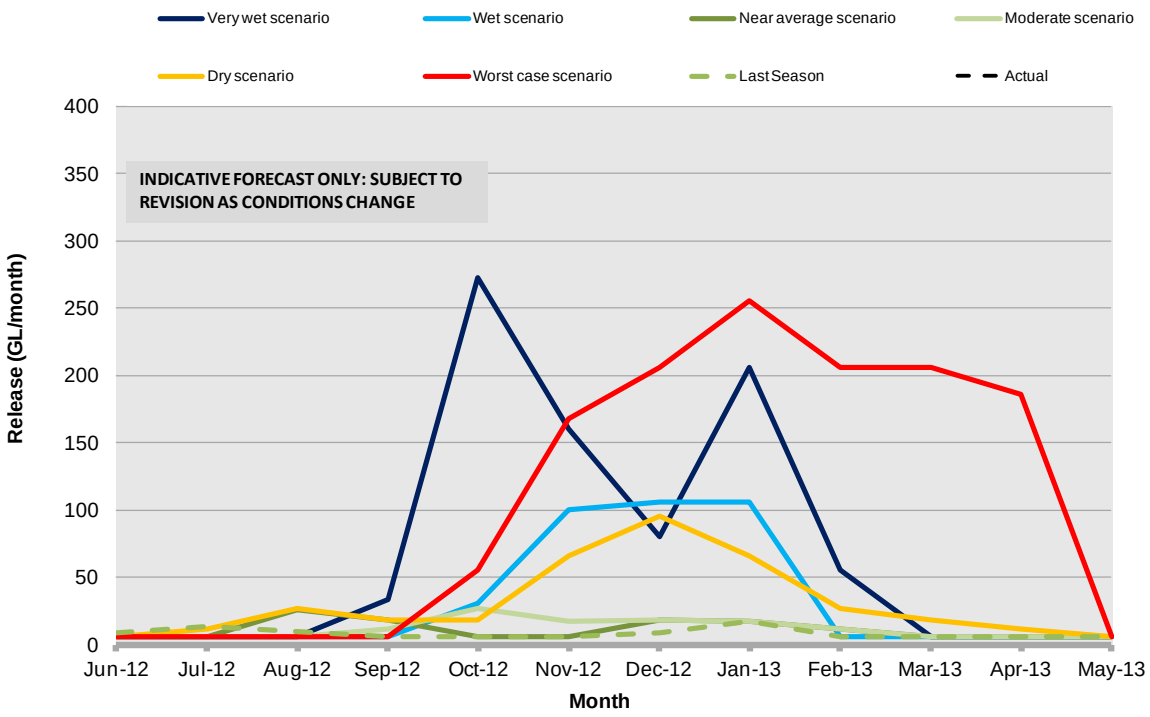


FIGURE 8 Dartmouth Reservoir release outlook



6.7 Hume Reservoir and flow at Doctors Point

Hume Reservoir is the primary regulating structure in the River Murray System. It stores inflows from the upper Murray catchment as well as water released from the Snowy Mountains Scheme and Dartmouth Reservoir. It then releases this water as needed, to supplement downstream tributary inflows, to meet the needs of NSW, Victoria and South Australia.

At the end of May 2012, the Hume Reservoir pre-release procedures were being implemented and 140 GL of airspace was being actively targeted (~95% capacity). However, the target volume of airspace will be reviewed regularly in accordance with pre-release procedures and may change over time depending on a range of factors such as forecast inflows and downstream demands.

With Lake Hume relatively full and catchments of the Upper Murray 'primed' there is an increased probability of significant flooding this winter/spring. The timing and duration of flood events cannot be predicted this far in advance and the flow rates presented in this plan, for example Doctors Point in FIGURE 10, are monthly averages and therefore **do not** reflect what may occur on a daily basis with flood peaks.

Due to the potential for irrigation demand to be high over late winter and early spring, the dam is expected to be operated with a relatively small volume of airspace. There is also limited ability to surcharge the storage under normal flood operations. Therefore, as in 2011-12, operations will aim to preserve what airspace is available to protect downstream communities from substantial damage caused by moderate and major floods. This will be achieved by passing smaller flow events though Lake Hume with possibly little or no attenuation if rainfall and streamflow conditions show this to be prudent. Such an operation aims to provide improved flood mitigation outcomes in subsequent larger flood events

Based on the storage level on 1 June 2012, indicative storage volumes for Hume Reservoir under the six scenarios are shown in FIGURE 9. Under all but the 'worst case' scenario, Hume Reservoir will be effectively full (99% capacity) before the demand for water (irrigation and/or environmental requirements) at the start of the 2012-13 irrigation season. In all cases above the 'near average' scenario, Hume is expected to be effectively full at the end of December 2012. In the 'worst case' and 'dry' scenarios, the volume in Hume Reservoir may be below 10% by May 2013.

Remedial works at the southern training wall have commenced and will continue until the end of 2013. These works will require a coffer dam in front of the southern training wall. MDBA will consider the works whilst undertaking flood operations and will liaise with BoM and advise NSW State Water in an effort to provide early warning (48 hours) of the potential for flood flows which may overtop the coffer dam (release in excess of 120,000 ML/day).

FIGURE 9 Hume Reservoir storage outlook

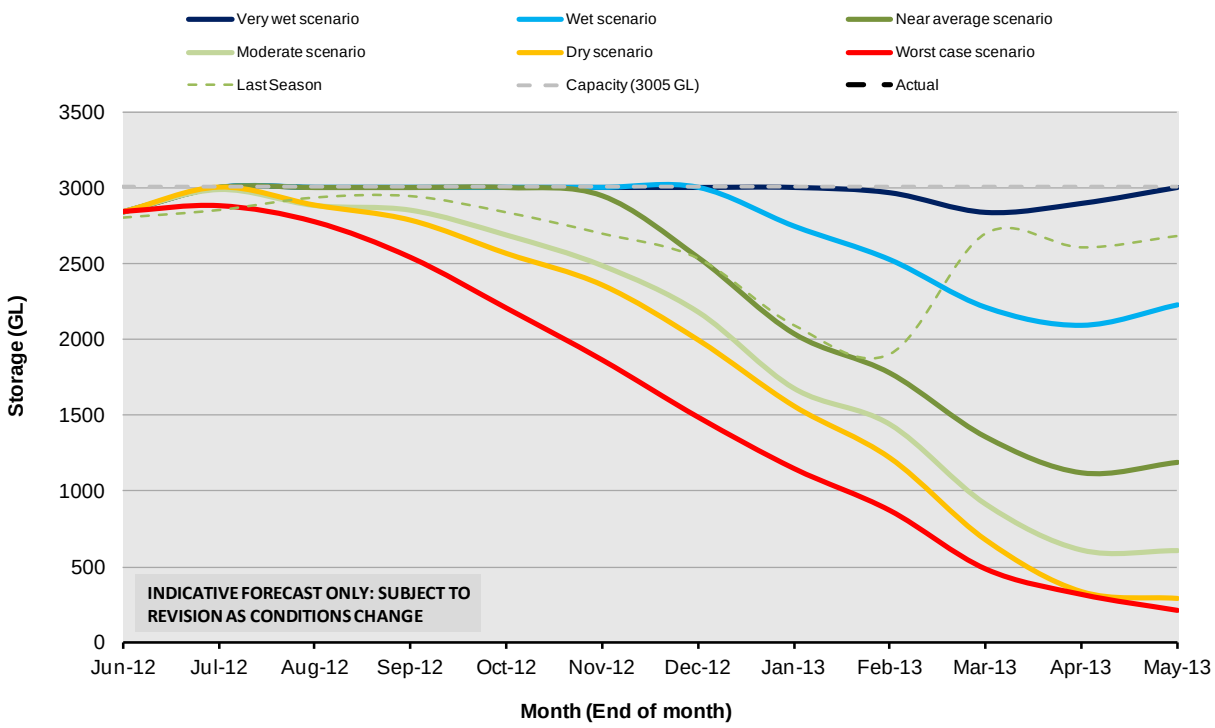
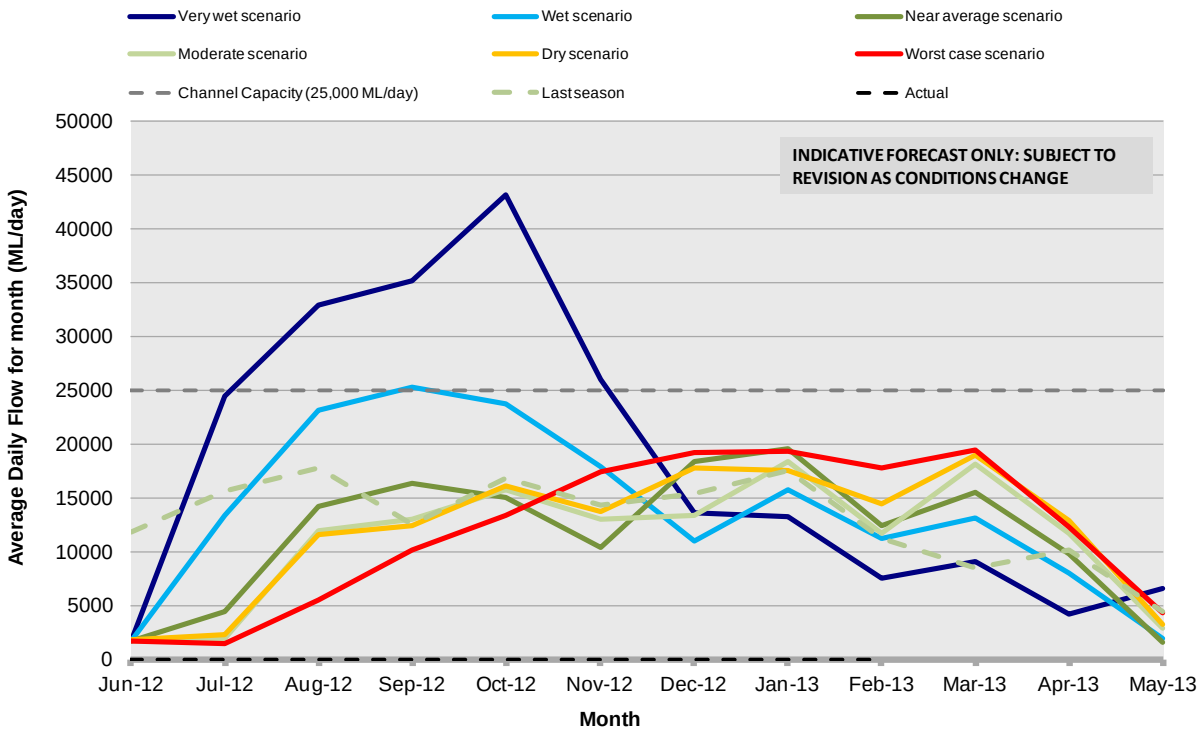


FIGURE 10 Hume Reservoir release outlook – flow at Doctors Point



6.8 Lake Mulwala and the Barmah Choke

The 'Barmah Choke' is a section of the River Murray (between Yarrawonga and Torrumbarry Weirs) that has the least capacity of any section of the river downstream of Hume Dam. The Barmah Choke is within an area of high ecological value, the Barmah-Millewa Forest.

Releases from Yarrawonga Weir in excess of 10,400 ML/day are sufficient to cause over bank flooding within the forest. When 'in channel' flows are occurring, about 2,000 ML/day of the 10,400 ML/day is directed to the north via the Edward River and Gulpa Creek, with the remainder (about 8,000 ML/d) flowing south along the Murray past Picnic Point and towards Echuca.

Winter and spring

In 'worst case' scenario, the release from Yarrawonga Weir will be kept below channel capacity at the Barmah choke (FIGURE 11) during winter and spring, where possible, to facilitate a drying phase in the Barmah-Millewa Forest, which has experienced several flood events since August 2010. In this scenario, the delivery of environmental water to South Australia (commencing in August 2012) heavily draws on Menindee first allowing flows downstream of Yarrawonga to remain well below channel capacity at the Barmah Choke.

In the 'dry' and 'moderate' scenarios, some flooding of the Barmah-Milewa Forest will be beneficial. This allows environmental water to be released from Hume to maintain flows above channel capacity for limited periods during spring.

Under the wetter scenarios there will be a significant overbank event in the forest at some stage during winter/spring and this may be followed up with environmental water to provide a gradual recession during spring and early summer. As such, the storage volume in Lake Mulwala and the release from Yarrawonga Weir during spring and early summer will be managed, where possible, to assist in achieving these environmental outcomes whilst meeting other diversion commitments.

As in other years, it is expected that the environmental flows will mainly focus on maintaining critical flow rates between flood peaks, providing flow pulses to assist fish spawning and migration and implementing gradual recession rates to minimise bank slumping and allow waterbirds to complete nesting cycles.

During larger flood events, the level of Lake Mulwala and releases from Yarrawonga Weir will be managed in accordance with flood operating procedures, but again being mindful of the environmental water proposals and the potential release of the Barmah-Millewa EWA. Generally speaking, large inflow events can be expected to be passed 'straight through' Lake Mulwala in winter – spring with little mitigation as is the normal practice.

Summer and Autumn

In summer and autumn 2012-13, it is expected that Lake Mulwala will be operated within its normal operating range (124.6 to 124.9 m AHD) during the irrigation season.

In some scenarios there is potential for flows being at channel capacity for extensive periods in order to meet all demands along the river system. These high flow rates increase the chances

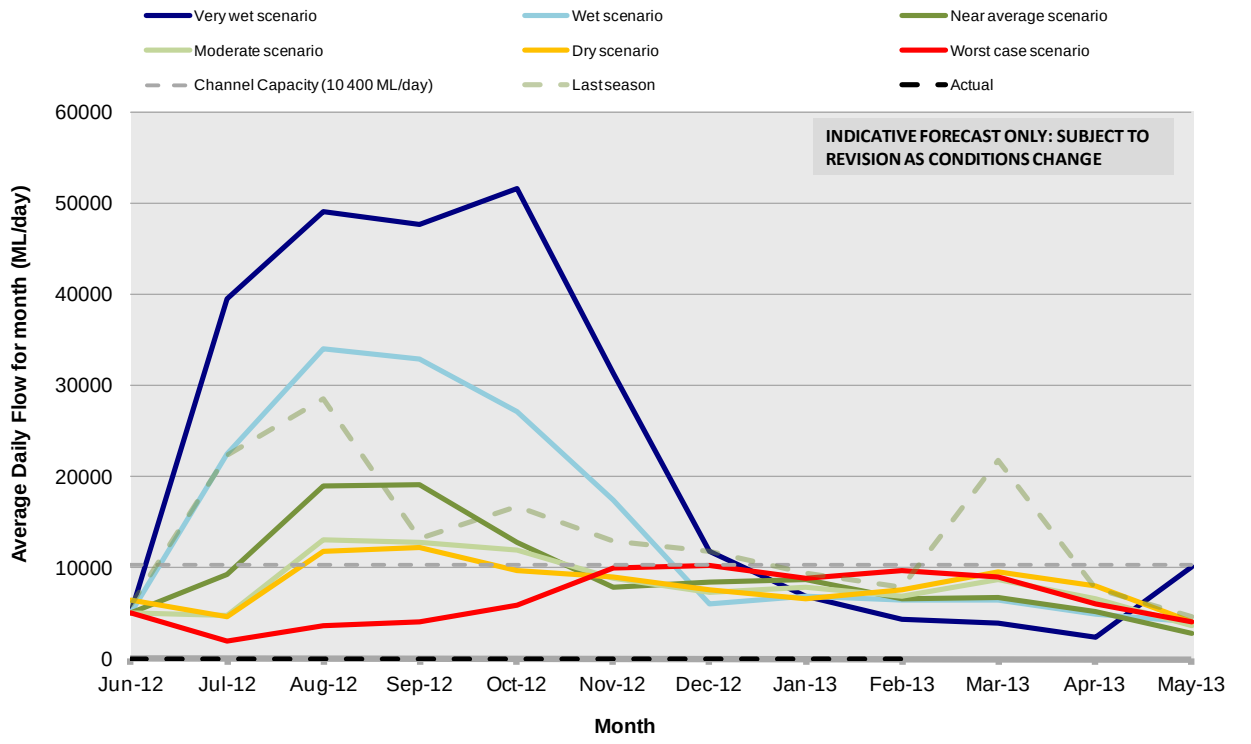
of summer flooding in the forest if there is a rainfall event that leads to a 'rain rejection' of ordered water. If there are summer inflow peaks and rain rejection events then they will be mitigated, as per past practice, when flooding of the forest is not desirable (i.e. there is a potential to increase the lake level to 125.15 m AHD for short periods, a potential to draw down lake levels to 124.6 m AHD prior to rain events and also to utilise irrigation canals where possible).

The Barmah Choke can also create river operation issues during summer and autumn as the restricted channel capacity, when flooding of the forest is undesirable, may limit the amount of water that can be delivered downstream (e.g. to the Torrumbarry Irrigation Area, Sunraysia, and South Australia). These issues are likely to arise when there is a lot of water in Dartmouth and Hume reservoirs, and hence allocations and demand are high, but the tributary inflows downstream of the Barmah Choke (eg from the Goulburn and Murrumbidgee Rivers) are low and there is little water available in the downstream storages (Lake Victoria and the Menindee Lakes).

With large volumes of water currently held in Menindee Lakes, the rule preventing trade of allocations from above to below the Choke continues to be relaxed. However MDBA will undertake fortnightly reviews of the relaxation, which may result in the need to reinstate restrictions to trade across the Choke at anytime during the water season.

There is a possibility that to assist in controlling the water weed *Egeria densa,* the MDBA may drawdown Lake Mulwala in late autumn or early winter 2013.

FIGURE 11 Yarrawonga Weir release outlook



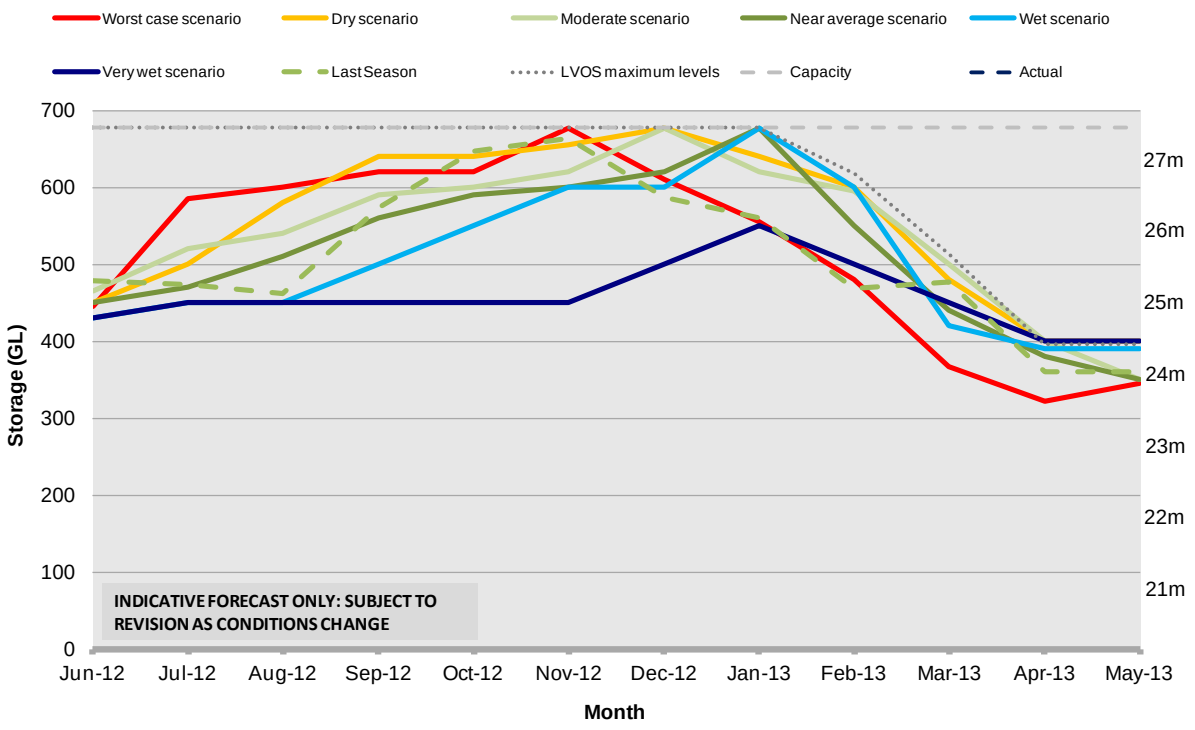
6.9 Lake Victoria

A critical constraint on the use of Lake Victoria is that it must be operated and managed to minimise disturbance to Aboriginal cultural heritage and to protect burials that may be exposed by erosion of the foreshore. MDBA will fulfil the intent of the Lake Victoria Operating Strategy (LVOS) (MDBC, 2002) and the Lake Victoria Cultural Landscape Plan of Management (revised 2007) that were developed under the Section 90 consent and Section 87 Permit issued by the NSW Department of Environment and Heritage.

Lake Victoria is expected to effectively fill at some stage during the spring/early summer under most scenarios (FIGURE 12). Storage is expected to be in excess of 24.5 m AHD (≈400 GL) in June 2012 and then be filled as late as possible in a manner that is consistent with the LVOS. In the wetter scenarios the lake may not be filled.

Unregulated flows to South Australia were occurring at the commencement of the water year. The persistence and magnitude of further unregulated flows will depend on seasonal rainfall. In the 'moderate' and wetter scenarios unregulated flows could last for prolonged periods of time. The lake is expected to be gradually drawn down during the autumn in a manner that is consistent with the LVOS.

FIGURE 12 Lake Victoria storage outlook



Clause 103 of the M-DB Agreement requires that the first 250 GL of minimum reserve be held in Lake Victoria at the end of May each year. This could be implemented under all scenarios, however, to save water under a 'worst case' scenario or for other operational reasons, MDBA may seek Ministerial Council approval to store some of this minimum reserve in upstream storages.

At the time of writing, a proposal for an upgrade of the Lake Victoria outlet was being discussed. Many options are being considered, however if works occur, they may take some months and could constrict the outlet capacity of Lake Victoria.

The Menindee Lakes and Lake Victoria harmony rules will influence the volume in Lake Victoria and this is discussed further in SECTION 6.10.

6.10 Menindee Lakes

As at 31 May 2012 the Menindee Lakes had a stored volume of 1,925 GL and were being managed by NSW as part of flood operations. Under the 'worst case' to 'moderate' scenarios, the plan assumes inflows of 100 GL in June/July and then no further inflows for the remainder of the year. However higher inflows are assumed in the wetter cases from August onwards (FIGURE 13).

Under the 'moderate' to 'very wet' scenarios, Menindee Lakes may be in flood operation and be surcharged for considerable periods of time over the coming year, noting that the lakes should not be surcharged between 1 January and 1 March unless the flow at Weir 32 would otherwise exceed the downstream channel capacity of 20,000 ML/d. Under the 'wet' and 'very wet' scenarios it may be necessary to draw the lakes down to FSL by the end of December, even though such releases would spill at Lake Victoria.

As a general practice further inflows to Menindee Lakes can be expected to be stored preferentially in Lakes Wetherell and Pamamaroo (up to their surcharge level) then in Lakes Menindee and Cawndilla.

Under the 'moderate' and drier scenarios, the storage in Menindee Lakes is expected to be gradually drawn down to meet downstream requirements.

Releases from Menindee Lakes

Releases from Menindee Lakes (FIGURE 14) will be attributed to the respective allocations of NSW and Victoria according to Clause 120 of M-DB Agreement. The Lakes will be operated in harmony with Lake Victoria and this combined operation aims to reduce evaporative losses, whilst minimising the chance of spill from Lake Victoria. Further considerations affecting the operation will include the need to protect cultural heritage at Lake Victoria as well as longer-term security of water supply in the Lower Darling under a return to extreme dry conditions. Harmony transfers may be releases in a 'pulsed' pattern in order to benefit the ecology of the Lower Darling River.

FIGURE 13 Menindee Lakes storage outlook

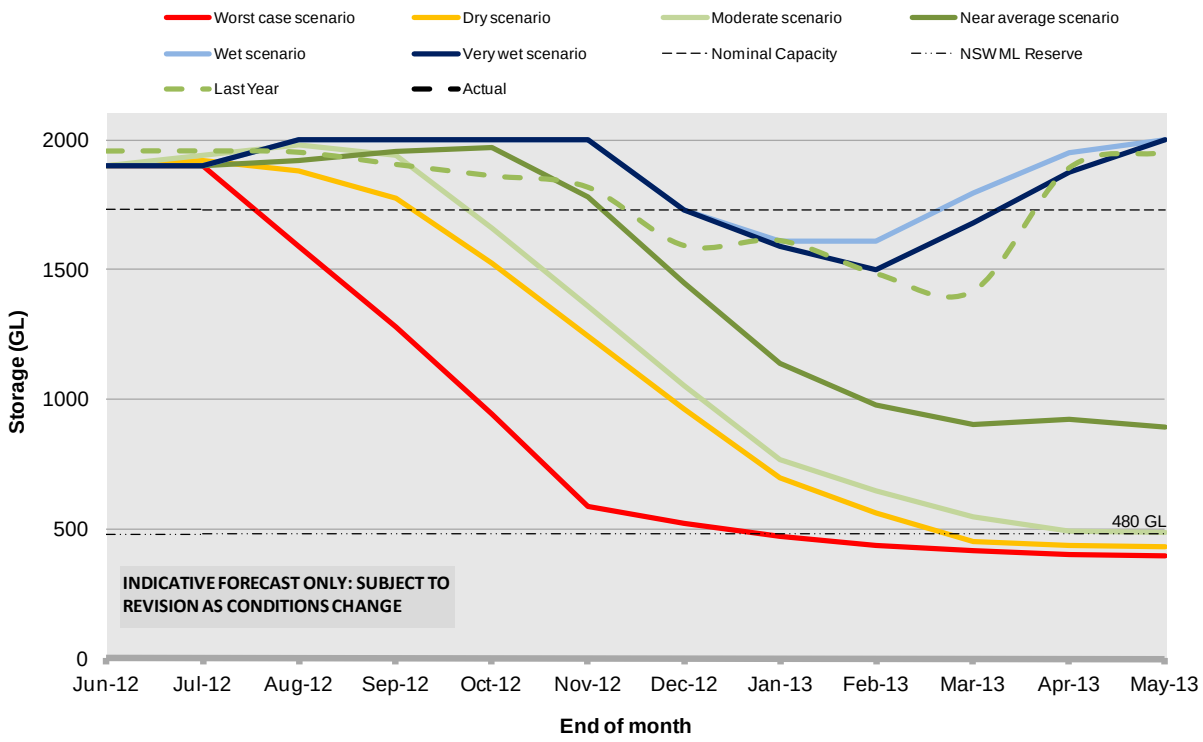
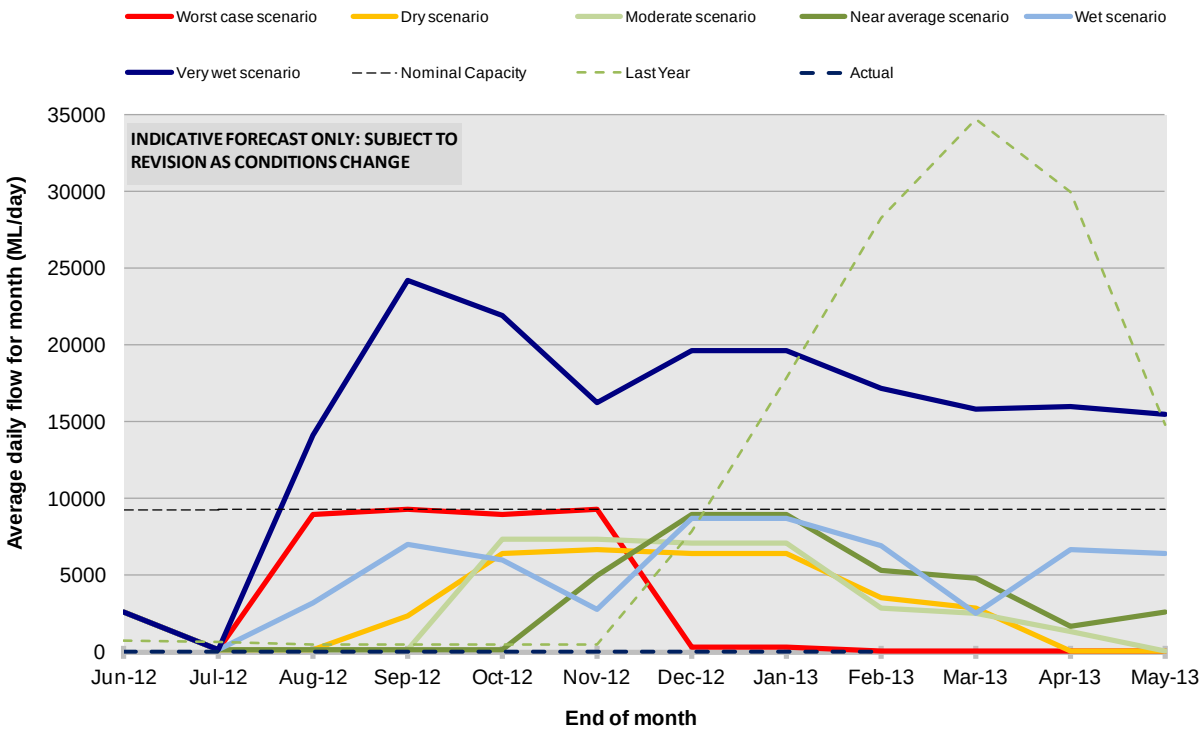


FIGURE 14 Menindee Lakes release outlook



Whilst Menindee Lakes are surcharged, the average minimum release of 500 ML/day (compared with 200 ML/day when Menindee is not surcharged) will be targeted until higher releases are needed for demand or triggered by the 'Harmony Rules between Menindee Lakes and Lake Victoria'. These rules set out 'trigger' storage volumes in Lake Victoria for the end of each month (TABLE 8). If Lake Victoria storage is forecast to be below these volumes, due to insufficient flow in the River Murray, then releases from Menindee Lakes may be made to achieve the required storage volume in Lake Victoria.

TABLE 8 End of Month 'Trigger' storage volumes (GL) in Lake Victoria

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
660	500	140	180	180	180	180	340	500	680	680	680

The actual releases made from Menindee Lakes, and the subsequent levels in Lake Victoria will consider demands for water in South Australia and also the needs of the Lake Victoria Operating Strategy (LVOS). The LVOS requires the period of time that water level in Lake Victoria is held high to be minimised. The LVOS aims to minimise erosion at high lake levels and allow for revegetation to protect important cultural heritage.

Additional Dilution Flow (ADF) will also influence the operation of Menindee Lakes and Lake Victoria in 2012-13. The ADF rules were developed in 1989 using modelling of historical inflow sequences, prior to the most recent drought sequence, with the aim of reducing river salinities in South Australia. The intent of the rules is a 'use it or lose it' principle whereby additional water is delivered to South Australia rather than be lost as evaporation from Menindee Lakes. The ADF rules have a set of triggers described below:

South Australia will receive 3,000 ML/day above the daily equivalent of the monthly entitlement flow, whenever both of the following conditions are satisfied

a. the storage in Menindee Lakes exceeds the volumes within the given month as listed under Trigger Storage below (TABLE 9);
b. the combined storage in Hume and Dartmouth Reservoirs exceeds 2000 GL.

TABLE 9 Volume in Menindee Lakes required to trigger ADF

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1300	1300	1300	1300	1300	1650	1650	1500	1300	1300	1300	1300

ADF was delivered to South Australia for all of 2011-12 water year. On 1 June 2012, storage in Menindee Lakes exceeded 1,650 GL and the combined storage in Dartmouth and Hume Reservoirs exceed 2,000 GL. Consequently ADF to South Australia of 3,000 ML/day above normal Entitlement Flow will continue into 2012-13.

The duration of the supply of ADF over the coming year will be driven by a number of factors, including:

- inflows from the upper Murray downstream of Hume;
- diversions by the upper States;
- the flow to South Australia;
- inflows to, and releases from, Menindee Lakes; and
- the impact of these factors on storage volumes at Lake Victoria and Menindee Lakes.

Two scenarios are described below in more detail to highlight potential outcomes.

ADF will be supplied and this is expected to reduce the forecast storage volume in Lake Victoria to below the target levels, which in turn will trigger releases from Menindee Lakes. This action will lower the volume in Menindee Lakes and consequently the ADF would cease when the storage in Menindee Lakes is below the ADF triggers (TABLE 9). Under the 'worst case' scenario, ADF is expected to cease in late October 2012.

Under the wetter scenarios the flow along the River Murray from tributaries downstream of Hume Reservoir may be sufficient to keep Lake Victoria above the End of Month trigger levels (TABLE 8) until later in the water year. In these scenarios, ADF may last for a longer timeframe (and if wet enough for all of 2012-13) as regulated releases from Menindee Lakes will be low and the storage volume will remain above the trigger levels for a longer period. This outcome could also eventuate if there are further inflows to Menindee Lakes throughout the year.

Generally, regulated release rates from Menindee Lakes will aim to be below about 6,000 ML/day at Weir 32 to minimise river losses and to preferentially draw from Lakes Menindee and Cawndilla, until the lakes return to NSW control. However, regulated releases of up to 9,000 ML/day at Weir 32 may be implemented if required. It is expected that, in all but the 'worst case' to 'moderate' scenarios, there will be water callable by MDBA in Menindee Lakes for all of 2012-13.

As part of the multi-site environmental watering trial, there may also be releases of environmental water from Menindee Lakes to 'boost' an unregulated flow in the Murray if the flow to South Australia is not sufficient to meet environmental target flow rates required at that time.

Flood releases are directed by NSW Office of Water and in general will pass inflows, whilst the Lakes are close to maximum surcharge level.

6.11 Maintenance/construction along RMS in 2012-13

A summary of the major works along the River Murray System are provided in TABLE 10 and TABLE 11. Most of the works were delayed for some time during 2011-12 and while some have recommenced, other works have been suspended until the risk of further flooding reduces. Some of the works may impede navigation and they may be an influencing factor on the target flows for environmental releases (see Section 6.4).

TABLE 10 Works on new structures to improve environmental outcomes

Site	Status as at 1 July 2012	Period of Construction	Critical Flow (ML/day) that may prevent or delay works
Koondrook Forest	Currently constructing	Until Nov 2012	17,000-19,000 ML/day @ Torrumbarry Weir
Gunbower – Lower Landscape	Scheduled to be completed	Effectively complete	N/A
Gunbower – Hipwells Road	Construction scheduled to commence	September 2012 – September 2013	Can be managed by irrigation offtakes
Hattah Lakes	Currently constructing	January 2012 – August 2012	50,000 ML/day @ Euston Weir
Mulcra Island	Remediation work required	January 2013 – June 2013	15,000 ML/day @ Lock 9
Lindsay Island (Upper Lindsay)	Construction scheduled to commence	Summer 2012-13	15,000 ML/day @ Lock 9
Chowilla Regulator	Currently constructing	May 2012 – August 2013	45,000 ML/day @ SA Border
Slaney and Pipeclay Weirs	Works to begin when flows allow	January 2013 – June 2013	18,000 ML/day @ SA Border
Yatco Lagoon	Works to begin when flows allow	July 2012 – September 2012	15,000 ML/day @ SA Border and Lock 3 pool <9.7m ADH

TABLE 11 Works to improve current structures

Site	Status as at 1 July 2012	Period of Construction	Critical Flow (ML/day) that may prevent or delay works
Hume Dam – Southern Training Wall	Currently constructing	Through to July 2014	Refer to Section 6.7
Edward River offtake	Refurbishment of gates scheduled	Early 2012-13	TBA
Stevens Weir - fishway	Currently constructing	Completed by Sept 2012	Approximately 3,000 ML/d
Lock 15 (Euston) - navigable pass and piers	Works suspended due to high flow	January to June 2013	7,000 to 35,000 ML/day (depending on task)
Lock 11 (Mildura) – fishway	Works suspended due to high flow	Jan to Feb 2012-13 (approx 3-4 months once recommence)	14,000 ML/day
Lock 9 – Lock refurbishment	Works currently underway	Aim to be completed by 7 September 2012	28,000 ML/day over Lock 9
Lock 7 – Lock refurbishment	Potential commencement late 2012-13	Approximately 12 weeks	12,000 ML/day over Lock 7
Lock 6 – Navigable Pass	Minor works to be completed at low flows	1-2 months when conditions allow	Entitlement flow @ SA Border
Lock 5 – Navigable pass	Minor works to be completed at low flows	1-2 months when conditions allow	Entitlement flow @ SA Border
Lock 4 - Navigable pass and fishway	Construction currently suspended	TBC- needs 4-5 months of low flows (likely January – June 2013)	20,000 @ SA Border
Lock 2 - Navigable pass and fishway	Construction currently suspended	TBC - needs 2 months of low flows (likely January – June 2013)	25,000 @ SA Border

6.12 Flow to South Australia

South Australia will have access to full entitlement flows for all of 2012-13, and will also receive Additional Dilution Flow (ADF), unregulated flow and the supply of water traded to South Australia (FIGURE 15). As indicated in Section 6.10, the supply of Additional Dilution Flow (ADF) of 3 000 ML/day is predicted under all water availability scenarios, although the total volume may vary between scenarios. ADF is expected to be delivered until October under the 'worst case' scenario, however in the wetter scenarios may last for all of 2012-13.

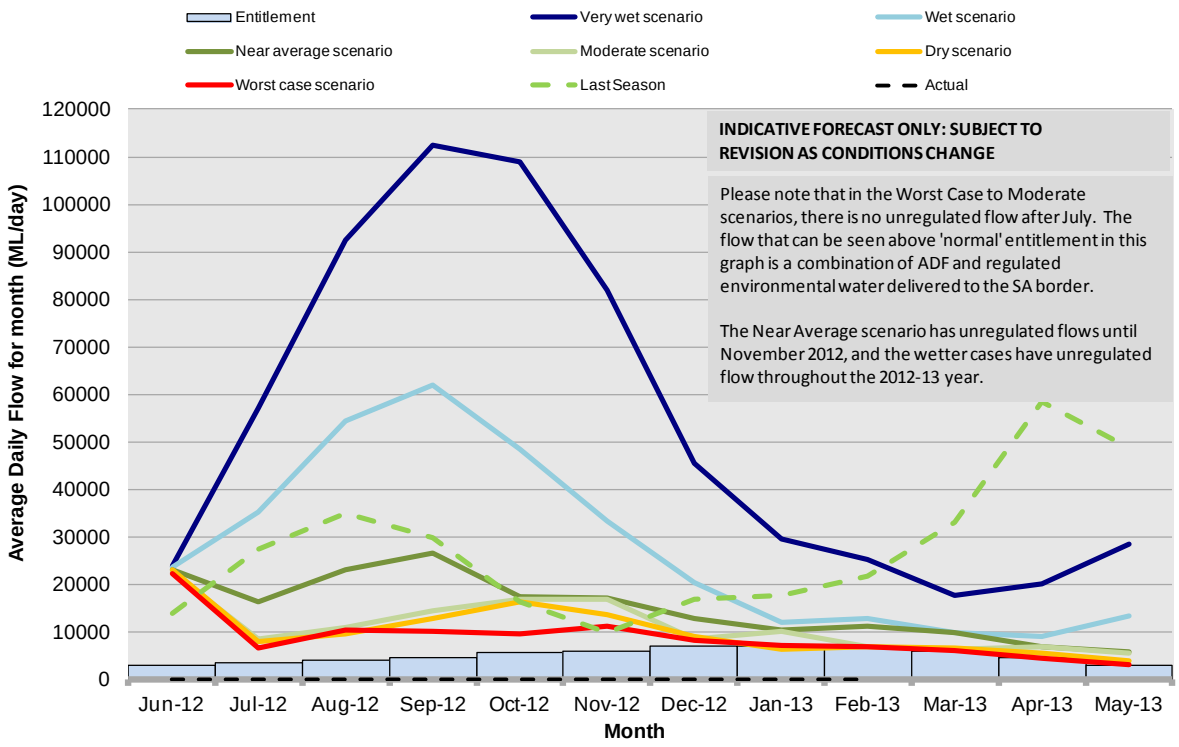
Under the 'worst case' scenario, unregulated flows are expected to cease in late July 2012 but would be extended until November under the 'moderate' scenario and could continue throughout 2012-13 under the wetter scenarios.

Under the drier scenarios, South Australia may choose to manage monthly flows in order to build a reserve for critical human water needs of 201 GL and private carryover for 2013-14. In order to build this reserve, South Australia may defer some of its entitlement flow with the introduction of South Australia's Storage Right (Schedule G) and the introduction of formal carryover arrangements in South Australia.

Under the 'moderate' and wetter scenarios, there could be another significant flood along the Murray in South Australia.

Water quality monitoring by the EPA in February 2011 highlighted the presence of acid water in 14 of the 27 drainage discharges in the Lower Murray Irrigation Area (LMRIA) that may potentially pose a health risk under low flow conditions due to insufficient dilution. Preliminary modelling undertaken by SA Water indicates that a flow of between 4,000 and 7,000 ML/day may be required to provide sufficient dilution. This modelling is being refined and heavy metal concentrations may potentially increase under the worst case to moderate scenarios, which will require increased treatment by SA Water to protect public water supply. Under the near average to very wet scenarios, there should be sufficient dilution from, ADF, unregulated flows and the provision of environmental water.

FIGURE 15 Flow to South Australia outlook



6.13 Lower Lakes and Barrage operation in South Australia

Lakes Alexandrina and Albert (Lower Lakes) are located upstream of five barrages located at Goolwa, Tauwitchere, Boundary Creek, Ewe Island and Mundoo Island. Historically, the Lower Lakes were generally a freshwater environment with occasional periods of seawater ingress from the Murray Mouth and Coorong.

With full entitlement flow, ADF and unregulated flows it is expected that the level of the Lower Lakes will be managed between 0.50 and 0.85 m AHD, however wind and tidal influences may result in lake levels temporarily going outside this range.

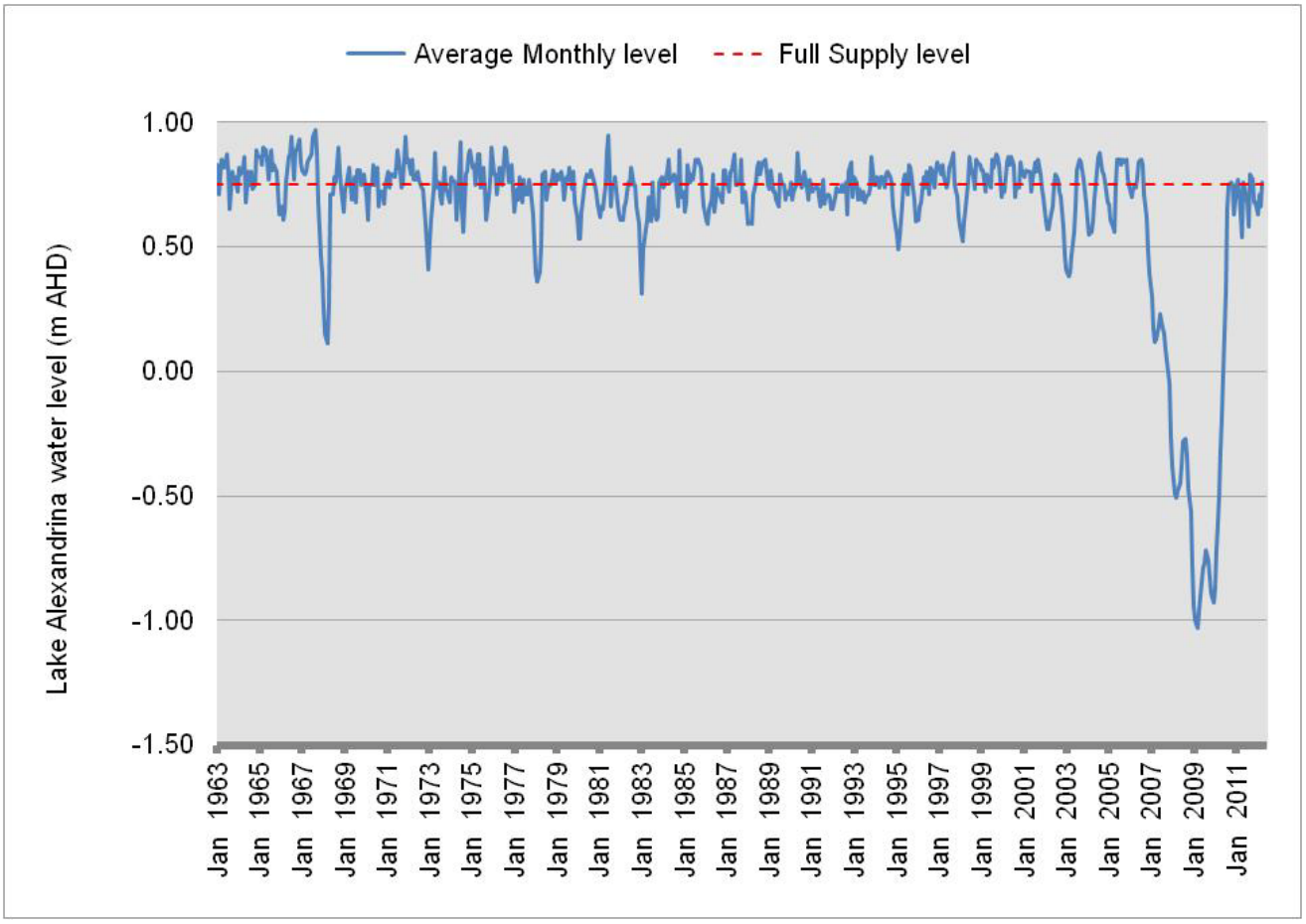
Since late 2011, there have been managed variations to the release of water through the barrages in such a way as to vary the level of the Lower Lakes between 0.60 and 0.85 m AHD (FIGURE 16). This action aimed to improve salinity levels in Lake Albert, however it was very difficult to implement due to high water levels in the Coorong as a result of extremely high tides and the relative size of the Murray Mouth compared to the flow through the Barrages. It is aimed to repeat this action several times over 2012-13 if water availability and weather conditions permit. The lakes may also be held around the 0.8 m AHD mark for longer periods than in 2011-12 to trial whether greater mixing of water between the lakes occurs.

It appears that operation to vary the level in the lakes has led to a reduction in salinity in Lake Albert. For instance at Meningie, the salinity has been slowly reducing, from over 6,000 EC at June 2011 to about 4,000 EC units at the end of June 2012. The salinity at Milang Jetty in Lake

Alexandrina at end May 2012 was about 550 EC units, which has been fairly steady over the past 12 months.

Salinity levels in the southern lagoon of the Coorong have been gradually falling from about 115,000 EC units in June 2011 to about 90,000 EC units in May 2012. Closer to the Murray mouth, the salinity at the end of June 2011 was about 10,000 EC units and at the end of May 2012 the salinity was around 5,000 EC units. This reduction in salinity, however, may only be short lived as the reduction is mainly due to the high amounts of fresh water currently flowing through the barrages and into the Coorong.

FIGURE 16 Behaviour of Lower Lakes 1962 to end May 2012



7 CALENDER OF EVENTS IN 2012-13

Month	Major Works or Actions	Community events
June	Commence filling Lake Victoria unless sufficient flows in transit	
July		
August	Expected increase in diversions as warmer weather arrives	
September	Possible pulsed releases in the Mitta Mitta River from Dartmouth Reservoir Possible commencement of construction at Gunbower-Hipwells road	
October	Harmony transfers from Menindee Lakes to Lake Victoria may commence if conditions are dry Earliest date that transfers from Dartmouth to Hume Reservoir would commence.	
November		
December	Possible lowering of Lock 15 (Euston Weir) from Dec to Feb	27–31 Dec 2012, Murray River Canoe Marathon, Yarrawonga to Swan Hill - http://www.murraymarathon.ymca.org.au 1 & 2 Dec 2012 2012 Yamaha Cod Classic
January	Possible commencement of Mulcra Island remediation work Possible commencement of Upper Lindsay Island work	27–28 Jan 2013, Milang – Goolwa sailing regatta 28 – 29 January Yarrawonga Yacht Club Australia Day Regatta
February		Southern 80 water ski race at Echuca— website not yet updated with 2013 dates http://www.southern80.com.au/
March		Robinvale-Euston water ski classic— website not yet updated with 2013 dates http://www.waterskiracing.com/Robinvale.html Mildura 100 water ski race— website not yet updated with 2013 dates http://www.milduraskiclub.org/ 10 – 12 March Yarrawonga Yacht Club Labour Day Regatta

Month	Major Works or Actions	Community events
April	Possible commencement of Lock 7 refurbishment	Annual Easter Fishing Competition—Moulamein SA Wooden Boat Festival (Goolwa wharf precinct) to be held in April 2013 21 – 22 April Yarrawonga Yacht Club Anzac Day Regatta
May	Normal end of irrigation season. Possible partial lowering of Torrumbarry Weir pool to minimise bank notching Possible lowering of Lake Mulwala to help in the control of the invasive aquatic week *Egeria densa*	

8 FURTHER INFORMATION ON RIVER MURRAY SYSTEM OPERATIONS

This annual operating plan will be reissued only if a significant amendment is required due to unforeseen circumstances.

Public updates on river operations within the water year will be provided in a number of forms, which can be accessed via the MDBA website (www.mdba.gov.au) including:

- the MDBA Weekly Report on river operations;
- live river data;
- water in storage;
- forecasts in relation to flows and salinity levels;
- media releases in relation to river operations; and
- special circumstances reports.

MDBA will update its routine monthly operational plan, which contains the outlooks of potential storage behaviours and release rates, regularly throughout 2012-13. These updates of the operational plan will be shared with the jurisdictions via Water Liaison Working Group and will be forwarded to Basin Officials Committee as necessary.