MURRAY SYSTEM

Drought Update

ISSUE 15: SEPTEMBER 2008

IN BRIEF

System inflows remain critically low. August rainfall was below average and the monthly system inflow of 275 GL was less than a fifth of the long term average of 1,550 GL. The combined inflow for the three winter months (of 670 GL) was the equal 5th lowest in 117 years of records.

In the two years ending August 2008, Murray system inflows were 3,540 GL which is just over half of the previous two year minimum prior to this drought (6,800 GL in 1943-45).

Storage levels also remain extremely low. Active storage in the Murray system is only 1,690 GL (or 20 % of capacity), which is well below the August long term average of 5,600 GL (or 62 % capacity).

A persistent rainfall deficiency during the past 7 years, particularly in the alpine areas, has been the main cause for the record low inflows to the Murray system. Above average temperatures have exacerbated the situation.

A target flow of 900 ML/day along the Murray past Wellington, combined with local rainfall and reduced evaporative losses during the winter months, has allowed the water level in Lake Alexandrina to gradually rise to its current level of -0.26 m AHD (or 1.0 m below Full Supply Level). This has provided some short term relief and has delayed the potential for acidification. However, with the arrival of warmer weather in spring, evaporative losses will start to increase, and the water level is expected to start falling again.

The outlook for the Murray system remains very serious. Critical human needs can now be met through to next winter but water available for irrigation remains very low. Prospects for the coming season are dependent on rainfall and run-off that is yet to happen. Water use is likely to be well below average and similar to the last two years.

Even with above average rainfall in the coming months, inflows would likely remain well below average. Recovery of the system is likely to take several years of above average rainfall.

RAINFALL AND SYSTEM INFLOWS

After a very dry autumn and a record low inflow in June, rainfall in the upper Murray and its tributaries was slightly above average for July. However, due to the very dry catchments, the July system inflow of 300 GL remained well below the long term July average of 1,180 GL (see Figure 1). August rainfall was once again below average and the monthly inflow decreased to 275 GL which is less than a fifth of the long term average of 1,550 GL. The three monthly inflow for winter (of 670 GL) was the equal 5th lowest in 117 years of records.

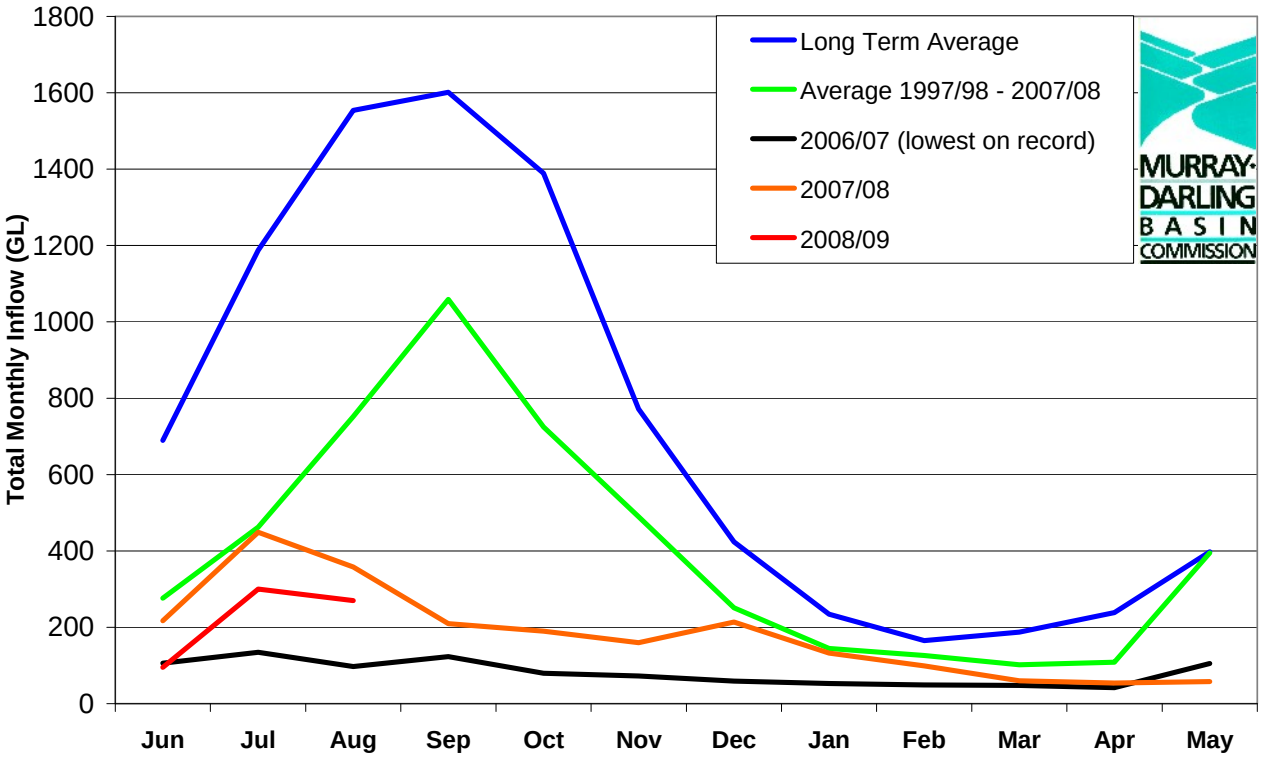

Figure 1. Murray system monthly inflows (excluding Darling inflows and Snowy releases)

SYSTEM STORAGE

The current volume of active storage in the Murray system (Hume Reservoir, Dartmouth Reservoir and Lake Victoria), is 1,690 GL or 20 % of capacity (Figure 2). This is similar to the storage level of 1,710 GL at the end of August 2007 but well below the August long term average of 5,600 GL (or 62 % capacity). There is an additional 500 GL in Menindee Lakes (which remains under control of NSW) some of which (about 220 GL) NSW plans to release into the Murray system between September and December 2008.

All the water currently in storage and under Commission control is fully committed for critical human needs, individual carryover, announced allocations, and the river and storage losses that will occur while supplying this water. A total of 990 GL is currently committed to South Australia, of which about 350 GL is expected to pass through to the Lower Lakes. However, as this is only about half the net annual evaporation for the Lower Lakes, it is expected that the water level in the Lower Lakes will continue to fall if extreme dry conditions persist.

Elsewhere in the Basin, storage levels are also very low. The total volume of water in all Basin storages managed by the MDBC and State governments, is about 5,300 GL, or 23 % of capacity. In most valleys, the small volumes of water held in government storages are already earmarked for town water, stock and domestic supplies, carryover or to meet system losses. Storages in the Snowy Mountains (which are managed by Snowy Hydro) also remain at record low levels, similar to this time last year.

Current storage levels across the Basin are publicly available at the following websites;

MDBC storages; http://www.mdbc.gov.au/subs/rmw_backup/riverdata/imagemaps/default.htm

NSW storages; http://www.waterinfo.nsw.gov.au/

Victorian storages; http://www.g-mwater.com.au/water-resources/storage-levels/

Queensland storages; http://www.sunwater.com.au/water_store.htm

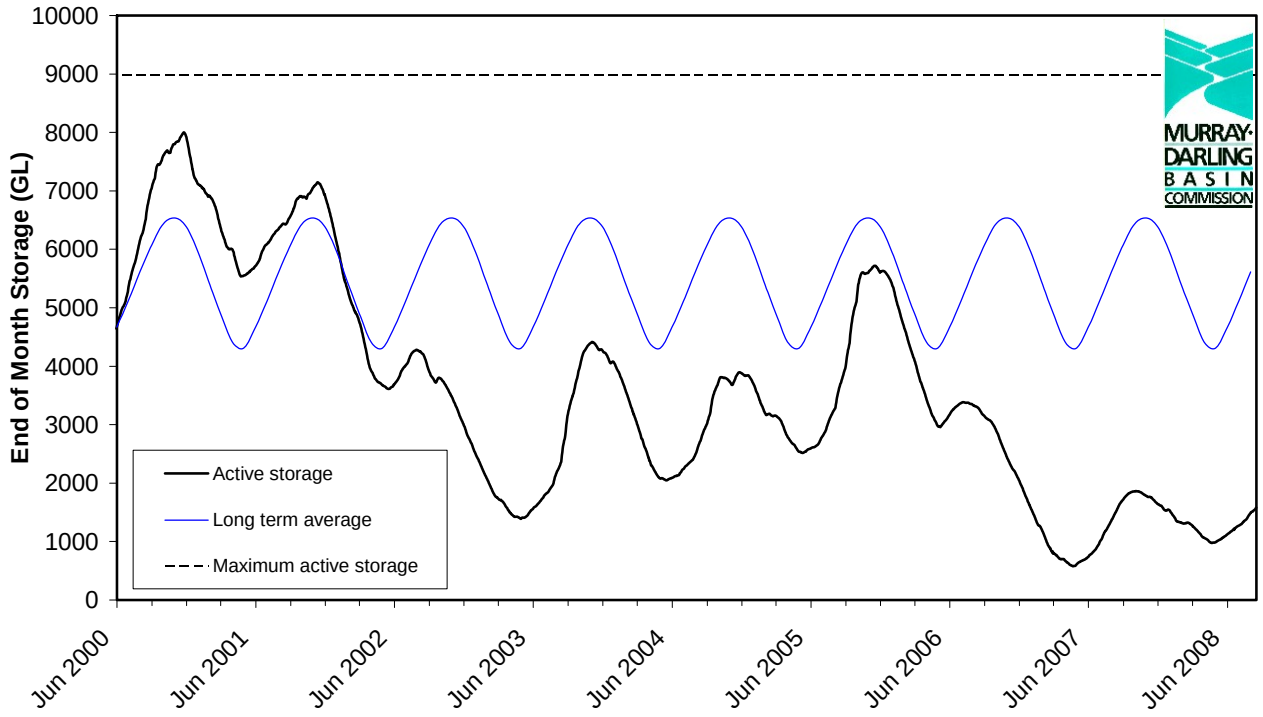

Figure 2. MDBC active storage, June 2000 to August 2008.

THE CURRENT DROUGHT

For large parts of southern and eastern Australia, dry conditions have persisted since October 1996, a total of almost 12 years. During the last 7 years in particular, the Murray-Darling Basin has experienced severe rainfall deficiencies, and from September 2001 to August 2008 was the 2nd driest seven-year period (the driest was from 1939 to 1946). This rainfall deficiency, particularly in the alpine areas, has been the main cause for the record low inflows to the Murray system.

Other factors that have a potential impact on inflows include the 2003 bushfires, the increased number of farm dams, groundwater extraction and the increasing area of plantation forestry. Initial evidence however, suggests that these have had much less impact than the severe rainfall deficit combined with increased temperatures.

The current dry period and low water availability can be put into perspective by comparisons with similar extended droughts in the early and mid twentieth century. The average annual inflow of 3,800 GL/yr during the current drought (2002 to 2008) is lower than that experienced in the previous worst two droughts on record; 4,900 GL/yr in 1897 to 1904, and 5,600 GL/yr in 1938 to 1946. The current drought has also recorded the lowest inflows for virtually all periods from one month to ten years. In particular, for the two years ending August 2008, Murray system inflows were 3,540 GL which is almost half the previous two year minimum prior to this drought (of 6,800 GL in 1943-45).

MURRAY FLOODS AND DROUGHTS – AN HISTORICAL PERSPECTIVE

Australia's inland rivers, including those in the Murray-Darling Basin, can have highly variable flows from one year to the next, as a result of highly erratic rainfall patterns. Floods and droughts are the extremes of this variability, and both occur along the Murray and its tributaries. In 1956, major floods in both the Murray and the Darling arrived at Wentworth simultaneously, resulting in a very large flood downstream. Other major flood years for the Murray include 1867, 1870, 1917, 1931, 1974, and 1975. Droughts are more difficult to define and, unlike flooding, the onset can be very gradual. Dry periods which resulted in abnormally low flows along the Murray include 1897-04, 1914-15, 1938-46, 1967-68, 1982-83 and 2002-08. Extended dry periods are a recurring event and communities along the river have dealt with such episodes in the past (Figure 3). However, this current period of record low inflows, combined with the level of water entitlements, has placed unprecedented stress on communities, agricultural enterprises and the environment.

DID THE MURRAY EVER STOP FLOWING?

Yes. It was reported to have stopped flowing between Tocumwal and Moama in 1850, and in 1902 during the Federation drought it stopped flowing for about 6 months. Again in the 1914-1915 drought, flows in the Murray reached very low levels (see Figure 3).

Modelling has also been used to simulate flows in the Murray under natural conditions; in other words if all dams and weirs did not exist and no water was extracted from the system. This modelling demonstrates that under natural conditions the Murray would have ceased flowing during the more severe droughts, including the current dry period. In the last couple of years a continuous flow along the length of the Murray has been maintained by drawing upon water stored upstream, particularly in Hume and Dartmouth Reservoirs when other tributary inflows are low.

Figure 3. Murray River at Wentworth, NSW during the 1914 drought. (Photo courtesy of the State Library of South Australia)

THE ENVIRONMENT

The prolonged dry period across the southern half of the Basin continues to severely impact on wetland and floodplain ecosystems. Whilst portions of the Barmah-Millewa Forest have received limited flooding as recently as 2005, the last significant flooding of the mid and lower floodplains of the Murray downstream of Euston was 12 years ago (see Figure 4). Floodplain vegetation is under severe stress. The 2007 Living Murray Icon Site condition report indicates that up to 80 % of River Red Gums are declining or dead at significant wetlands along the Murray, such as Koondrook-Perricoota Forest and the Chowilla floodplain.

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.

In May 2008 a small volume of environmental water (7.7 GL) was delivered to Gunbower Forest and this has stimulated an encouraging response from plant and animal life. Monitoring teams have reported that tortoises are breeding, frogs are spawning and ducks have arrived to feed. This response emphasizes the importance of using the small volumes of environmental water available, to maintain drought refuges along the river and avoid loss of threatened species.

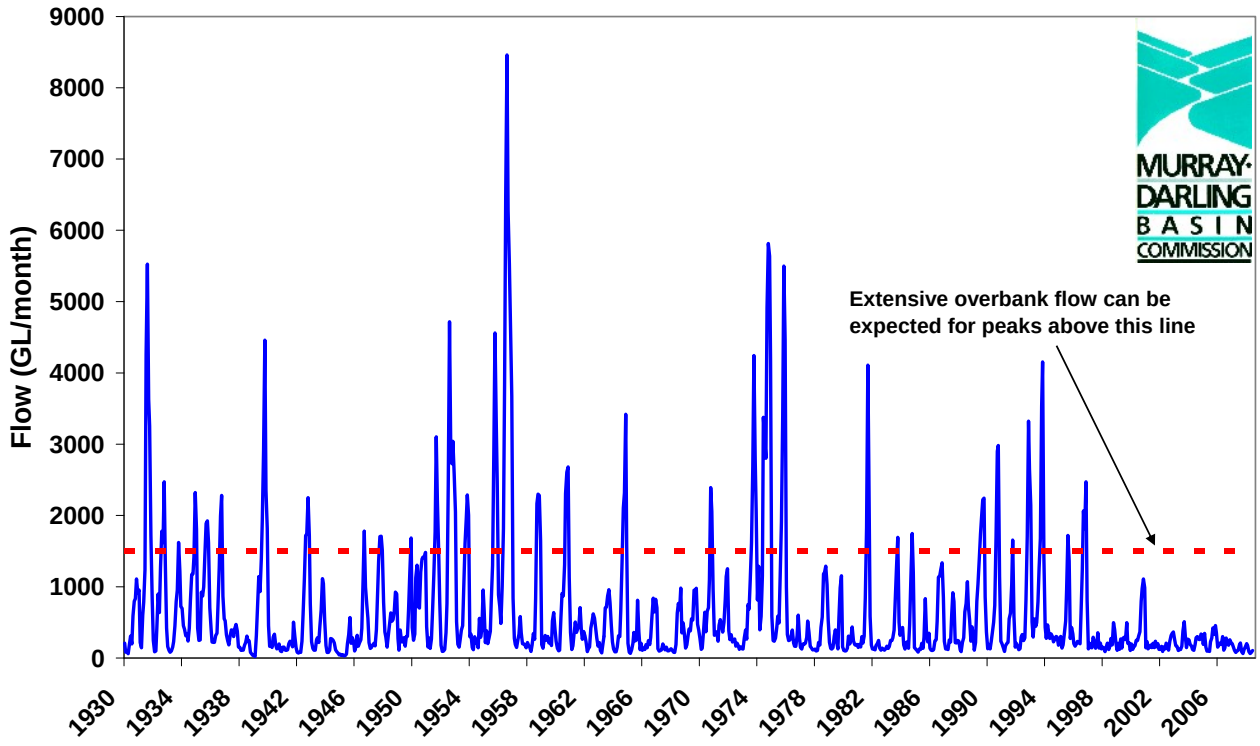

Figure 4. Monthly flows past Euston in the mid-Murray, indicating that extensive overbank flow last occurred in 1996

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.

In the northern Basin, the benefits of good summer rainfall and associated flooding are still evident at some sites. For instance, at Narran Lakes it has been estimated that over 80,000 chicks (mostly Straw-necked Ibis) have successfully fledged, and although the water is receding, the lakes are now dominated by thousands of

ducks and teal. Most wetlands and lakes along the Warrego and Paroo Rivers are also drying up, but those still containing some water are supporting large concentrations of waterbirds.

BASIN-WIDE DIVERSIONS

Figure 5 shows Basin-wide diversions for 1997-98 to 2007-08. Total Basin diversions for 2007-08 were only 3,910 GL which is the lowest in the past 11 years, and well below the average of 8,870 GL.

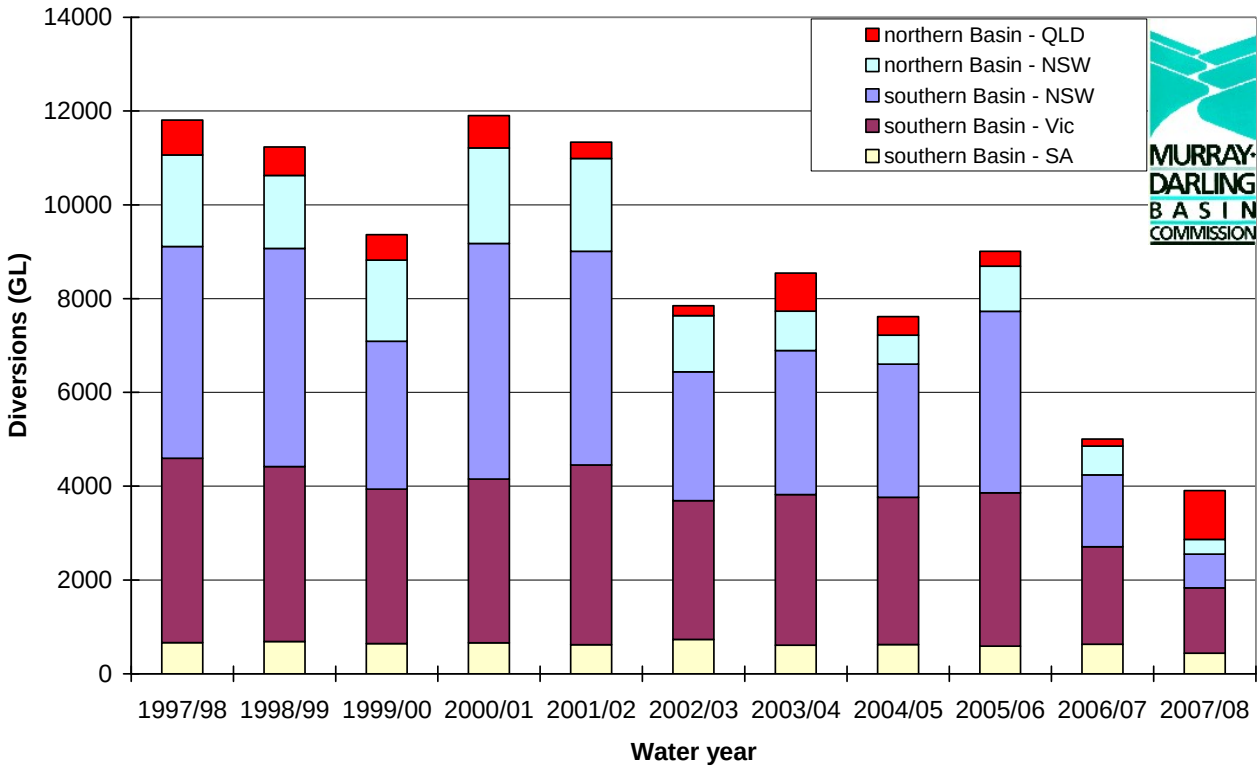

Figure 5. Basin-wide diversions for the years 1997-98 to 2007-08.

THE LOWER LAKES

The flow over Blanchetown Weir (Lock 1) is being carefully managed to maintain the water quality at the major urban pumping stations between Blanchetown and Wellington. Also, a target flow of 900 ML/day is passing downstream to Wellington and into the Lower Lakes. This flow, along with local rainfall and reduced evaporative losses during the winter months, has allowed the water level in Lake Alexandrina to gradually rise from its record low of -0.5 m AHD in April 2008 to its current level of -0.26 m AHD. This has provided some short term relief and has delayed the potential for acidification in Lake Alexandrina. To reduce the risk of acidification in Lake Albert, water continues to be pumped from Lake Alexandrina, and this has resulted in Lake Albert's water level increasing from about -0.6 m AHD in April 2008 to about -0.20 m AHD.

However, with the arrival of warmer weather in spring, evaporative losses will start to increase, and the level of Lake Alexandrina is expected to start falling again. This will be closely monitored while short and longer term management strategies are developed to maintain Lakes Alexandrina and Albert above acidification thresholds.

OUTLOOK

The Bureau of Meteorology's latest outlook for total spring (September to November) rainfall is neutral for much of south-eastern Australia, but there are moderate trends in the odds towards below normal rainfall in an area covering eastern South Australia and far south-western NSW (Figure 6).

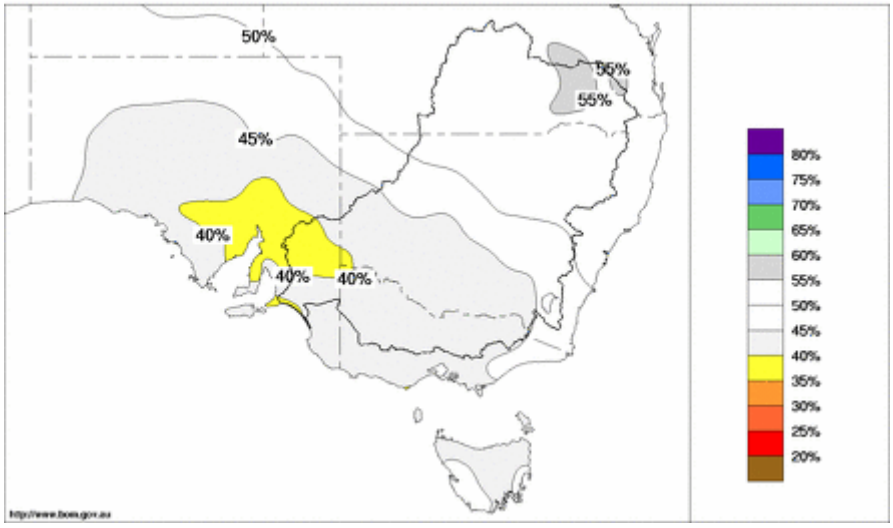

Figure 6. Chance of exceeding the median rainfall: September to November 2008. (source; Bureau of Meteorology)

The prospect for improved water availability in the Murray system is dependent on inflows during spring, which typically accounts for a large proportion of the annual total. However, the protracted nature of this current dry period, and the consistent above average temperatures, have dried out catchments and reduced base flows from groundwater systems to rivers. Analysis of the past 117 years of records indicates that there is a strong correlation between dry periods from April to June and continuing low inflows for the remainder of the water year. It can be expected, therefore, that even with above average rainfall in the coming months, inflows could remain well below average. Recovery of the system is likely to take several years of above average rainfall.

Figure 7 uses historical data to provide a forecast for the remainder of the 2008-09 water year.

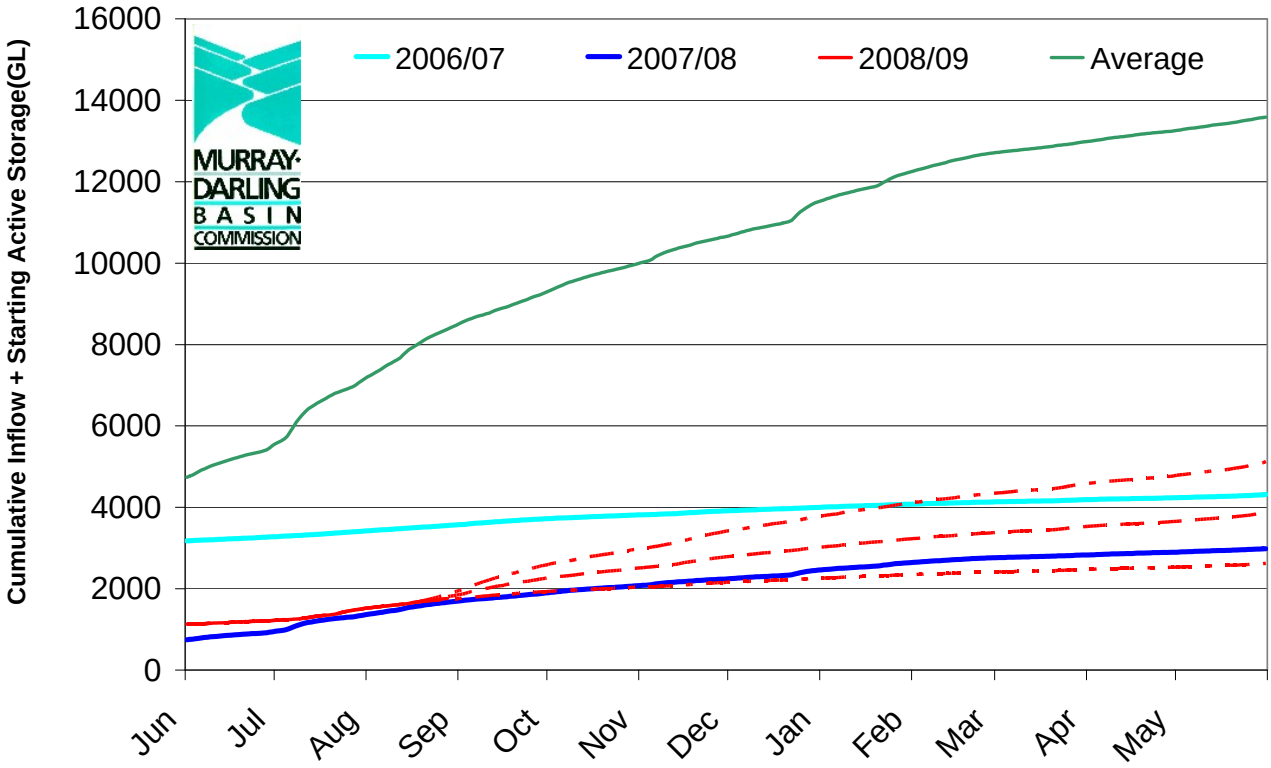

Figure 7. Cumulative System Inflows for selected years, and forecast for 2008-09 (excluding Snowy releases and Darling inflows)

It shows opening storage levels plus cumulative inflow and is a good indicator of likely water availability during very dry years. An average year would start at 4,700 GL and rise to about 13,500 GL. The 2006-07 water year started with about 3,200 GL in storage, and although inflows were at a record low, there was still more water available than in 2007-08. This year (2008-09) started with a little more water in storage than last year, due mainly to prudent management by the States to set aside water for critical human needs, and irrigators who carried over water from last year to underpin this year's watering, particularly of permanent horticulture. The dotted lines show the lower, median and upper range for future improvements, based on data from years following the driest 20 winters on record. As can be seen, the outlook for the Murray system remains very serious, with prospects for the coming season being almost entirely dependent on rainfall and run-off that is yet to happen. Water use is likely to be well below the long term average and similar to the last two years.

Critical human needs can now be met through to next winter but water available for irrigation remains very low. Further details about allocations and access to carryover are available on the following State water authority websites:

NSW; www.naturalresources.nsw.gov.au/water/state_mm_murr_water_quality.shtml#alloc

VIC; www.g-mwater.com.au/water-resources/allocations/current.asp

SA; www.dwlbc.sa.gov.au/media.html

ADDITIONAL INFORMATION

MDBC will provide further drought updates in the coming months. Additional information is available at www.mdbc.gov.au also from the relevant Australian and State Government Agencies. For media interviews with MDBC personnel, please contact Sam Leone, MDBC Media Liaison, telephone 0407 006 332.

ACKNOWLEDGEMENTS

The front cover photo of the Lower Lakes was taken by Arthur Mostead in February 2008.