

# Murray-Darling Basin Water Resources Fact Sheet

The Murray-Darling Basin has an area of 1,060,000 km<sup>2</sup> and extends into Queensland, New South Wales, Victoria, South Australia and the Australian Capital Territory.



**Figure 1. The Murray-Darling Basin**

## Available Water Resources

### *Rainfall*

Average Rainfall = 480 mm/year = 508,000 GL/year.

(Derived from Bureau of Meteorology rainfall data interpolated across the Murray-Darling Basin using the ESOCIM climate model run by CRES at the Australian National University)

### *Runoff*

Most of the Rain falling on the Basin is evaporated and transpired by plants. The potential evaporation from the Basin is almost four times the rainfall.

Potential Evaporation = 1,968 mm/year or 2,070,000 GL/year across the Basin.  
(Derived from Bureau of Meteorology data interpolated across the Murray-Darling Basin using the ESOCLIM climate model run by CRES at the Australian National University)

Of the rainfall not evaporated or transpired, some recharges the groundwater and the remainder flows into streams as runoff. The total runoff in the upper reaches of all the streams in the Basin has been estimated as part of the National Land and Water Audit, 2000.

Average Run-off = 23,850 GL/year  
(Source: Table 3 Page 25, National Land and Water Resources Audit, 2000)

#### *Inter-Basin Transfers*

In addition to runoff from within the Basin, water is also transferred in from the outside the Basin. Inter-Basin transfers occur from the Snowy River to the Murray and Murrumbidgee and from the Glenelg River to the Wimmera River.

Average Inter-Basin transfers = 1,200 GL/year.  
(Derived from Snowy Hydro Limited model runs and historical data from Wimmera-Mallee Water.)

## **Average Annual Water Use**

Use from surface water is also referred to as diversions or extractions. For the purposes of accounting for the Murray-Darling Basin Ministerial Council's Cap on diversions, a Register of Diversion Definitions has been adopted which specifies how diversions are recorded. Generally the average annual water use figures quoted in **Table 1** are net of return flows, however some returns via drains or groundwater are not taken into account. The data in **Table 1** are mostly the average diversions permitted in each valley under the Cap on diversions. For most valleys the Cap is defined as the diversion that could have occurred under the 1993/94 level of development. The average Cap diversions are determined using computer models of the rivers and are averaged over the period from 1891 to 2000. In some valleys the size of the Cap has yet to be determined. In these valleys the figures quoted are the average diversion since the commencement of Cap accounting in 1997/98. Both the average Cap volumes and the annual diversions are published each year in the Murray-Darling Basin Commission's Water Audit Monitoring Reports.

Note that in some New South Wales valleys, the draft water sharing plans are proposing plan limits for diversion which are less than the Cap.

Estimates of Groundwater use in the Murray-Darling Basin are published each year in the Murray-Darling Basin Commission's Water Audit Monitoring Report. The groundwater use estimates are the average of the diversions in the three years from 1999/2000 to 2001/02.

**Table 1. Average Annual Water Use (GL/year)**

<b>System</b>	<b>Surface Water Use (GL/year)</b>	<b>Ground- water Use (GL/year)</b>	<b>Total Water Use (GL/year)</b>
<b>New South Wales</b>			
Border Rivers*	204	65	269
Gwydir	344	91	435
Namoi/Peel	320	243	563
Macquarie/Castlereagh/Bogan	468	92	560
Barwon-Darling Lowwer Darling	310	9	319
Lachlan	334	132	466
Murrumbidgee	2358	224	2583
Murray	1926	79	2005
<b>Total NSW</b>	<b>6265</b>	<b>935</b>	<b>7200</b>
<b>Victoria</b>			
Goulburn Broken Loddon	2058	49	2107
Campaspe	122	16	139
Wimmera-Mallee	129	26	155
Kiewa Ovens Murray	1665	28	1693
<b>Total Victoria</b>	<b>3975</b>	<b>119</b>	<b>4094</b>
<b>South Australia</b>			
Metro-Adelaide & Associated Country Areas*	126		126
Lower Murray Swamps	104		104
Country Towns	50		50
All Other Uses of Water from the River Murray	441	30	470
<b>Total South Australia</b>	<b>720</b>	<b>30</b>	<b>750</b>
<b>Queensland</b>			
Condamine/Balonne*	379	136	514
Border Rivers /MacIntyre Brook*	186	9	195
Moonie*	12	0	13
Warrego*	7	3	10
Paroo*	0	0	0
<b>Total Queensland*</b>	<b>584</b>	<b>148</b>	<b>731</b>
<b>Australian Capital Territory*</b>	<b>33</b>	<b>1</b>	<b>34</b>
<b>Total Murray-Darling Basin</b>	<b>11576</b>	<b>1233</b>	<b>12809</b>

Note: The average surface water use has been taken as the Cap figure where available and as the average surface water use over five years 1997/98-2001/02, where the Cap figure is not available (\*). The average groundwater use figure is the average groundwater use over 3 years from 1999/00-2001/02 for which groundwater use figures over the Basin are available. The sources of this data are the annual MDBC Water Audit Monitoring Reports.

## Use of Available Water in Each Valley

The use of the available water (Runoff and Inter-Basin transfers) in each river valley is listed in **Table 2**.

**Table 2. Average Annual Runoff and Inter-Basin Transfer and Their Degree of Use**

System	Runoff <sup>1</sup> (GL/year)	Inter-Basin Transfers <sup>2</sup> (GL/year)	Surface Water Use <sup>3</sup> (GL/year)	% of Runoff + Transfer Diverted (%)
<b>New South Wales</b>				
Border Rivers	586		204	35%
Gwydir	910		344	38%
Namoi/Peel	716		320	45%
Macquarie/Castlereagh/Bogan	1656		468	28%
Barwon-Darling Lowwer Darling	106		310	292%
Lachlan	1054		334	32%
Murrumbidgee	4184	550	2358	50%
Murray	2084	284	1926	81%
<b>Total NSW</b>	<b>11295</b>	<b>834</b>	<b>6265</b>	<b>52%</b>
<b>Victoria</b>				
Goulburn Broken Loddon	4243		2058	49%
Campaspe	305		122	40%
Wimmera-Mallee	316	79	129	33%
Kiewa Ovens Murray	4455	284	1665	35%
<b>Total Victoria</b>	<b>9319</b>	<b>363</b>	<b>3975</b>	<b>41%</b>
<b>South Australia</b>				
Metro-Adelaide & Associated Country Areas			126	
Lower Murray Swamps			104	
Country Towns			50	
All Other Uses of Water from the River Murray			441	
<b>Total South Australia</b>	<b>132</b>	<b>0</b>	<b>720</b>	<b>548%</b>
<b>Queensland</b>				
Condamine/Balonne	1500		379	25%
Border Rivers /MacIntyre Brook	586		186	32%
Moonie	116		12	10%
Warrego	419		7	2%
Paroo	483		0	0%
<b>Total Queensland</b>	<b>3104</b>	<b>0</b>	<b>584</b>	<b>19%</b>
<b>Australian Capital Territory</b>		<b>0</b>	<b>33</b>	
<b>Total Murray-Darling Basin</b>	<b>23850</b>	<b>1196</b>	<b>11576</b>	<b>46%</b>

<sup>1</sup> The Runoff data was prepared for the National Land and Water Audit 2000.

<sup>2</sup> Average Inter-Basin Transfers from modelled output from Snowy Hydro Limited and historical data from Wimmera-Mallee Water.

<sup>3</sup> Average Surface Water Use from MDBC Water Audit Monitoring reports as described above.

## River Losses and End of System Flows

Most of the Murray-Darling Basin is arid and considerable volumes of water are lost as the rivers flow from their upper tributaries to the sea. The Avoca, Gwydir, Macquarie, Narran, Warrego, Paroo and Lachlan all flow into large wetland systems in which much of the flow is evaporated or transpired and water is also evaporated and transpired from floodplains and floodplain lakes. Using computer models, it has been estimated that, under natural conditions, almost 11,000 GL/year was consumed in wetlands, on the floodplains or by evaporation from the river surface and that only 12,890 GL/year or 54% of the runoff reached the sea.

Some of the water that would have been consumed by wetlands and the floodplain under natural conditions is now consumed by irrigation or is evaporated from reservoirs. For this reason, there is not a one-for-one relationship between an increase in diversion and a reduction in outflow to the sea. **Table 3** summarises the water balance in the rivers of the Murray-Darling Basin under natural and current conditions.

**Table 3. Average Annual Water Balance for Murray-Darling Basin Rivers**

	<b>Natural Conditions (GL/year)</b>	<b>Current Conditions (GL/year)</b>
Runoff <sup>1</sup>	23,850	23,850
Inter-Basin Transfers <sup>2</sup>	0	1,200
Diverted <sup>3</sup>	0	11,580
Evaporated from Reservoirs <sup>4</sup>	0	1,430
Consumed by wetlands, floodplains etc	10,960	6,970
Outflow to Sea <sup>5</sup>	12,890	5,070
Outflow to Sea as a % of Runoff	54 %	21 %

<sup>1</sup> Table 3 Page 25, National Land and Water Resources Audit, 2000.

<sup>2</sup> Average Inter-Basin Transfers from modelled output from Snowy Hydro Limited and historical data from Wimmera-Mallee Water.

<sup>3</sup> MDBC Water Audit Monitoring Reports as for Table 1 of this paper.

<sup>4</sup> Average for 1998-2002 from MDBC Water Audit Monitoring Reports.

<sup>5</sup> Output from the MDBC MSM\_Bigmod model May 2003.

Average Annual End-of-System flows for other streams are presented in **Table 4**.

**Table 4. Average Annual Flows at Selected Sites in the Murray-Darling Basin**

System	Current Conditions Average Flow (GL/year)	Natural Conditions Average Flow (GL/year)	Current Average/Natural Average (%)
<b>Hume Reservoir Inflows (Including Snowy Transfers)</b>	4750	4183	114%
<b>New South Wales Tributaries</b>			
Border Rivers <sup>1 2</sup>	155	258	60%
Gwydir at Yaraman, Garah and Collarenebri less d/s use	439	726	60%
Namoi River at Mollee Weir less d/s use	598	833	72%
Darling River at Wilcannia	2150	3590	60%
Lachlan River at Oxley + Willandra	338	439	77%
Murrumbidgee System - Balranald + Darlot	1476	2782	53%
Lower Darling River at Burtundy	1137	2120	54%
<b>Victorian Tributaries</b>			
Kiewa River at Bandiana	672	682	99%
Ovens River at Wangaratta	1614	1640	98%
Goulburn River at McCoys Bridge	1428	3538	40%
Campaspe River at Rochester	162	300	54%
Loddon River at Loddon Weir	120	241	50%
<b>Queensland Tributaries</b>			
Culgoa	231	512	45%
Bokhara	32	53	61%
Narran Lake Outflow	61	156	39%
Border Rivers <sup>1 2</sup>	155	258	60%
Moonie River <sup>1</sup>	98	140	70%
Warrego River <sup>1</sup>	63	71	89%
<b>River Murray</b>			
Albury	5402	4907	110%
Yarrowonga	4988	6463	77%
Euston	6646	12588	53%
South Australian Border	6702	13871	48%
Barrages	5071	12896	39%

<sup>1</sup> Draft Water Resource Plan Limits

<sup>2</sup> Half outflow attributed to NSW and half to Qld

Note: The average annual current or natural conditions flow is the average of 109 years (1891-2000) of modelled current or natural conditions flow. The modelled information comes from the MDBC River Murray model and the States' tributary models.

## Median Annual Flows

Because much of the flow occurs in relatively few flood years, some people prefer to consider the median annual flow rather than the average since the median corresponds to a 'typical' year. The median annual flow is the flow in the year which has the same number of years with greater flow as it has years with less flow. **Figure 2** shows the difference between the average and median values for the annual outflow from the Murray-Darling Basin to the sea. **Table 5** contains a comparison of natural and current median flows at selected sites throughout the Basin. The data for this table was derived by MDBC and State models for the 109 year period from 1891 to 2000.

Figure 2. Comparison of Average and Median Outflows from the Basin to the Sea

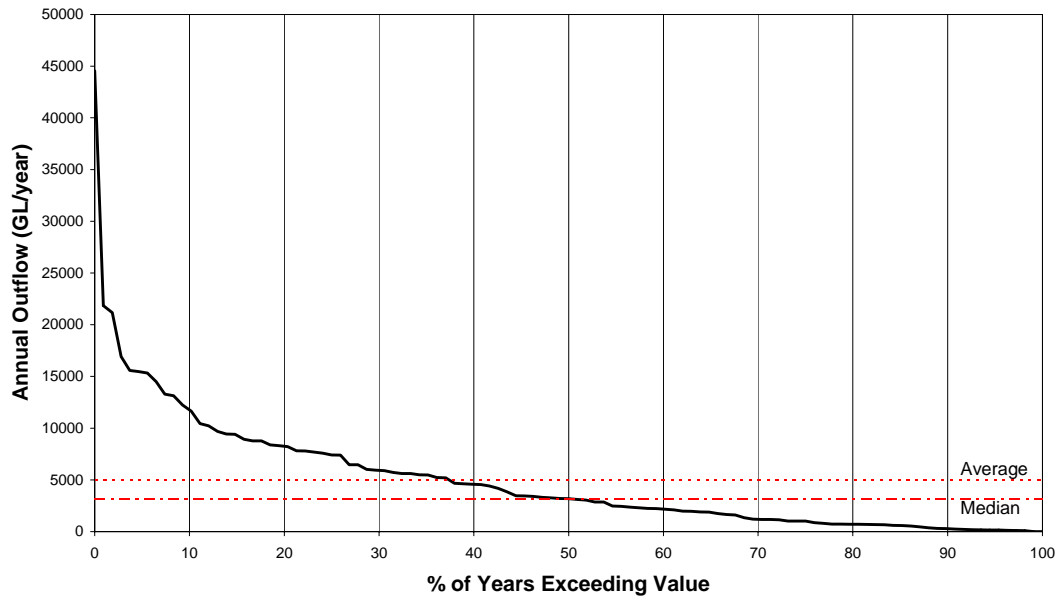


Table 5. Median Annual Flows at selected sites in the Murray-Darling Basin

System	Current Conditions Median Annual Flow (GL/year)	Natural Conditions Median Annual Flow (GL/year)	Current Median/ Natural Median (%)
<b>New South Wales Tributaries</b>			
Border Rivers <sup>1</sup>	77	164	47%
Gwydir at Yaraman, Garah and Collarenebri less d/s use	239	484	49%
Namoi River at Mollee Weir less d/s use	252	532	47%
Darling River at Wilcannia	1140	2660	43%
Lachlan River at Oxley + Willandra	215	341	63%
Murrumbidgee System - Balranald + Darlot	1027	2486	41%
Lower Darling River at Burtundy	489	1557	31%
<b>Victorian Tributaries</b>			
Kiewa River at Bandiana	601	649	93%
Ovens River at Wangaratta	1392	1419	98%
Goulburn River at McCoys Bridge	1035	3208	32%
Campaspe River at Rochester	77	242	32%
Loddon River at Loddon Weir	50	188	27%
<b>Queensland Tributaries</b>			
Culgoa	119	413	29%
Bokhara	13	32	41%
Narran Lake Outflow	0	0	
Border Rivers <sup>1</sup>	77	164	47%
<b>River Murray</b>			
Albury	4834	4324	112%
Yarrawonga	3918	5590	70%
Euston	4881	11030	44%
South Australian Border	4827	12385	39%
Barrages	3092	11318	27%

<sup>1</sup> Half outflow attributed to NSW and half to Qld