

# **WATER USE ON AUSTRALIAN FARMS**

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For further information about these and related statistics, contact the National Information and Referral Service on 1300 135 070.

## NOTES

### BACKGROUND

This publication presents estimates of agricultural water use, including pastures and crops irrigated, irrigation water sources, irrigation methods, irrigation water management and irrigation expenditure and assets. Data are available for a range of sub-state geographic levels, including Natural Resource Management (NRM) region, Statistical Division (SD) and Murray–Darling Basin (MDB). The data are based on a response rate of 88% from a sample of approximately 38 thousand agricultural businesses selected for the 2008–09 Agricultural Survey.

Climatic conditions affect both the availability of water for irrigation and the need to irrigate in order to supplement rainfall. Information from the Bureau of Meteorology outlining climatic conditions over the period July 2008 to June 2009 are presented as an appendix to assist in interpreting the data in this publication.

Further data from the 2008–09 Agricultural Survey collection are available in *Agricultural Commodities, Australia* (cat. no. 7121.0).

### CHANGES IN THIS ISSUE

The 2008–09 Agricultural Survey collected a greater range of agricultural commodities and livestock breakdowns than was collected in the 2007–08 Agricultural Resource Management Survey (ARMS). In addition, some irrigation crop categories have been altered. More information is available in the Explanatory Notes or upon request.

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Australian Statistician

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## ABBREVIATIONS .....

<b>\$'000</b>	thousand dollars
<b>ABR</b>	Australian Business Register
<b>ABS</b>	Australian Bureau of Statistics
<b>ABSBR</b>	Australian Bureau of Statistics Business Register
<b>ACT</b>	Australian Capital Territory
<b>ATO</b>	Australian Taxation Office
<b>Aust.</b>	Australia
<b>BAS</b>	Business Activity Statement
<b>EVAO</b>	Estimated Value of Agricultural Operations
<b>ha</b>	hectare
<b>MDB</b>	Murray-Darling Basin
<b>ML</b>	megalitre
<b>ML/ha</b>	megalitres per hectare
<b>no.</b>	number
<b>NRM</b>	natural resource management
<b>NSW</b>	New South Wales
<b>NT</b>	Northern Territory
<b>Qld</b>	Queensland
<b>RSE</b>	relative standard error
<b>SA</b>	South Australia
<b>SD</b>	statistical division
<b>SE</b>	standard error
<b>Tas.</b>	Tasmania
<b>Vic.</b>	Victoria
<b>WA</b>	Western Australia
<b>°C</b>	degrees Celsius

AGRICULTURAL WATER USE

The agriculture industry remained a major consumer of water in the Australian economy in 2008–09.

The volume of water used for irrigation, and application rates, rose slightly in 2008–09, the first increase since 2005–06.

Australia's total agricultural water use in 2008–09 rose 4% to 7,286 gigalitres, driven by increased water use in New South Wales (up 14%) and Queensland (up 13%).

However, compared to 2005–06, total agricultural water use in 2008–09 was down in almost every state, particularly New South Wales (down 56%) and Victoria (down 49%).

**1.1** AGRICULTURAL WATER USE, by State—2008–09

	WATER USE			
	<i>Agricultural businesses</i>	<i>Irrigation</i>	<i>Other agricultural uses</i>	<i>Total water use</i>
	no.	ML	ML	ML
NSW(a)	43 212	1 910 033	198 070	2 108 103
Vic.	32 973	1 194 501	139 351	1 333 852
Qld	28 142	2 058 471	237 211	2 295 681
SA	14 454	827 230	74 419	901 649
WA	12 658	226 085	92 310	318 395
Tas.	4 000	262 296	22 634	284 930
NT	558	21 962	21 062	43 023
<b>Aust.</b>	<b>135 996</b>	<b>6 500 577</b>	<b>785 056</b>	<b>7 285 634</b>
MDB	54 098	3 492 407	260 129	3 752 535
Non-MDB	81 899	3 008 170	524 928	3 533 098

(a) Includes ACT.

IRRIGATION WATER USE

Of the 409.0 million hectares of agricultural land in Australia in 2008–09, less than 1% were irrigated. However, 29% of all agricultural businesses undertook irrigation during 2008–09.

The amount of irrigation water used by Australia's 40 thousand irrigating agricultural businesses increased 3% to 6,501 gigalitres in 2008–09. Water use increased 14% in New South Wales and 12% in Queensland, with these increases partly offset by a decline in Victoria, down 10%, Western Australia, down 21%, and South Australia, down 6%.

Queensland continued to be the largest irrigating state, using 2,058 gigalitres of water for irrigation in 2008–09. Western Australia had the highest application rate at 4.7 ML/ha of irrigated land.

## IRRIGATION WATER USE

*continued*

Nationally, the application rate increased to 3.7 ML/ha from 3.4 ML/ha in 2007–08. The application rate had been declining since 2002–03, with the exception of 2005–06 where the rate remained steady at 4.2 ML/ha.

Of the states and territories, Victoria and New South Wales had the greatest number of irrigating agricultural businesses in 2008–09, accounting for 51% of all of Australia's irrigating businesses. Tasmania had the highest proportion of irrigated agricultural land (5%) and the highest proportion of irrigators (49%).

The area of irrigated agricultural land decreased in most states/territories with the exception of Queensland (up 7%) and the Northern Territory (up 25%). The largest decrease in the area irrigated was in Victoria, down 13% to 371 thousand hectares.

**1.2** IRRIGATION ACTIVITY, by State—2003–04 to 2008–09

	<i>Agricultural businesses</i> no.	<i>Agricultural businesses irrigating</i> no.	<i>Area of agricultural holding</i> ha	<i>Area irrigated</i> ha	<i>Volume applied</i> ML	<i>Application rate</i> ML/ha
<b>AUSTRALIA</b>						
<b>Old basis(a)</b>						
2003–04	130 526	40 400	440 109 578	2 402 137	10 441 515	4.3
2004–05	129 934	35 244	445 148 804	2 404 864	10 084 596	4.2
<b>New basis(b)</b>						
2005–06	154 681	44 826	434 924 814	2 546 318	10 737 364	4.2
2006–07	150 817	41 787	425 449 341	1 922 982	7 636 194	4.0
2007–08	140 704	39 637	417 287 562	1 850 937	6 284 799	3.4
2008–09	135 996	39 940	409 028 747	1 760 758	6 500 577	3.7
<b>2008–09</b>						
<b>New basis(b)</b>						
NSW(c)	43 212	10 128	57 309 461	503 630	1 910 033	3.8
Vic.	32 973	10 080	12 090 736	370 957	1 194 501	3.2
Qld	28 142	8 805	141 209 793	547 949	2 058 471	3.8
SA	14 454	5 821	49 126 060	196 215	827 230	4.2
WA	12 658	2 865	93 645 885	47 804	226 085	4.7
Tas.	4 000	1 962	1 630 432	88 028	262 296	3.0
NT	558	278	54 016 380	6 176	21 962	3.6

(a) Derived using ABS-maintained frame. Refer to the Explanatory Notes.

(b) Derived using ABSBR. Refer to the Explanatory Notes.

(c) Includes ACT.

**1.3** IRRIGATION ACTIVITY, Murray–Darling Basin(a)—2008–09

	<i>Agricultural businesses</i>	<i>Agricultural businesses irrigating</i>	<i>Area of agricultural holding</i>	<i>Area irrigated</i>	<i>Volume applied</i>	<i>Application rate</i>
	no.	no.	ha	ha	ML	ML/ha
NSW MDB(b)	26 488	5 371	52 781 814	445 964	1 734 698	3.9
Vic. MDB	16 729	6 392	7 796 470	253 037	797 172	3.2
Qld MDB	6 924	1 317	30 292 434	171 308	665 290	3.9
SA MDB	3 957	1 996	5 170 337	58 765	295 247	5.0
<b>MDB</b>	<b>54 098</b>	<b>15 077</b>	<b>96 041 055</b>	<b>929 074</b>	<b>3 492 407</b>	<b>3.8</b>
Non-MDB	81 899	24 863	312 987 692	831 684	3 008 170	3.6
<b>Aust.</b>	<b>135 996</b>	<b>39 940</b>	<b>409 028 747</b>	<b>1 760 758</b>	<b>6 500 577</b>	<b>3.7</b>

(a) Based on NRM regions. Refer to the Explanatory Notes for further information. (b) Includes ACT.

IRRIGATION WATER USE  
*continued*

In 2008–09 the Murray–Darling Basin (MDB) accounted for 38% of Australia's irrigating agricultural businesses, 53% of all irrigated agricultural land and 54% of irrigation water applied.

Increases in volumes of irrigation water applied in 2008–09 were recorded by the northern reaches of the MDB, with Queensland MDB up 64% and New South Wales MDB up 17%. The southern parts of the MDB however, recorded decreases in volumes of irrigation water applied in 2008–09, with Victoria MDB down 15%, and South Australia MDB down 6%.

PASTURES AND CROPS  
IRRIGATED

*Australia*

Australian agricultural businesses applied 3% more irrigation water to agricultural land in 2008–09 than in the previous year. However, the area irrigated decreased 5% to 1,761 thousand hectares. As a result, the application rate increased from 3.4 ML/ha to 3.7 ML/ha.

Pasture for grazing accounted for the greatest amount of irrigated land (419 thousand hectares) in Australia in 2008–09, with the volume of irrigation water applied representing 21% of the national total.

The cotton industry showed signs of recovery following the falls in volume of 2007–08 due to the effects of dry conditions. The irrigation activity was similar to the 2006–07 season, with 880 gigalitres of irrigation water applied to 142 thousand hectares. This was in contrast to the 309 gigalitres used for irrigation and 58 thousand hectares irrigated in 2007–08, which was a very poor year historically.

In 2008–09 the rice industry faced similar conditions, but did not exhibit the same level of recovery as the cotton industry. Although the number of irrigators increased sevenfold to 161 while the volume of water applied more than trebled to 101 gigalitres in 2008–09, the levels remained historically low.

*State/Territory*

Cotton and cereal crops for grain or seed were the main uses of irrigation water in New South Wales in 2008–09, accounting for 916 gigalitres of irrigation water, or just under half of all irrigation water in the state.

In Victoria, the main use of irrigation water was pasture for grazing (591 gigalitres), using just under half of all irrigation water used in the state, with most users in the dairy sector. Other major irrigation water uses were fruit trees, nut trees, plantation or berry fruits (159 gigalitres), and grapevines (153 gigalitres). These results were similar to those recorded in 2007–08.

Sugar cane producers continued to be the largest irrigators in Queensland in 2008–09, using 37% of the state's irrigation water at an application rate of 4.0 ML/ha. Queensland saw large increases in the area under crop for cotton, up to 78 thousand hectares, with 71 thousand hectares irrigated. The volume of irrigation water applied increased fourfold for cotton, up to 414 gigalitres, but did not return to the levels of 2005–06.

Grapevines were the largest irrigation water use in South Australia in 2008–09 (23% of irrigation water in the state), followed by pasture for grazing (21%), and fruit trees, nut trees, plantation or berry fruits (16%). Approximately 78 thousand hectares of grapevines were irrigated at 2.4 ML/ha while 33 thousand hectares of pasture for grazing were irrigated at 5.4 ML/ha. Approximately 18 thousand hectares of fruit trees, nut trees, plantation or berry fruits were irrigated at 7.3ML/ha.

*State/Territory continued*

In Western Australia, pasture for grazing used 28% of all irrigation water in the state while vegetables for human consumption used another 25%, and fruit trees, nut trees, plantation or berry fruits consumed a further 21%.

Just over 57% of irrigation water in Tasmania was used on pasture for grazing, with a further 16% used on vegetables for human consumption. The volume of irrigation water used on fruit trees, nut trees, plantation or berry fruits increased 52% in 2008–09 compared to the previous year.

Irrigation of fruit trees, nut trees, plantation fruit or berries, the main crop irrigated in the Northern Territory, increased from 7 gegalitres in 2007–08, to 10 gegalitres in 2008–09, an increase of 42%.

*Murray–Darling Basin*

Despite the volume of water applied to agricultural land in the Murray–Darling Basin increasing 11% in 2008–09, the area of agricultural land irrigated in the Basin continued to decrease, to 929 thousand hectares, down 3% from 2007–08. Since 2005–06, the area irrigated and the volume of irrigation water applied in the Murray–Darling Basin have decreased 44% and 53% respectively.

In contrast, irrigation water use outside the Murray–Darling Basin decreased in 2008–09, down 4% from the previous year, with the area irrigated dropping 7%. Irrigation water use outside the Murray–Darling Basin fell 11% from 2005–06 to 2008–09 and the area irrigated 7% in the same period.

Approximately 89% of Australia's cotton growers were located in the Murray–Darling Basin in 2008–09, irrigating 75 thousand hectares more land than in 2007–08 (up 141%). The large increase in volume of irrigation water used was due to improved water allocations in the region. Similarly, Australia's rice producers, all located in the Basin, used an increased volume of irrigation water in 2008–09.

In 2008–09, cotton accounted for the highest proportion of irrigation water used in the Murray–Darling Basin (23%), followed by cereal crops for grain or seed (20%) and pasture for grazing (15%).

## 2.1 PASTURES AND CROPS IRRIGATED(a), Australia—2005–06 to 2008–09 .....

	<i>Agricultural businesses</i>	<i>Agricultural businesses irrigating</i>	<i>Area under pasture or crop</i>	<i>Area irrigated</i>	<i>Volume applied</i>	<i>Application rate</i>
	no.	no.	ha	ha	ML	ML/ha
<b>TOTAL</b>						
2005–06	154 681	44 826	434 924 814	2 546 318	10 737 364	4.2
2006–07	150 817	41 787	425 449 341	1 922 982	7 636 194	4.0
2007–08	140 704	39 637	417 287 562	1 850 937	6 284 799	3.4
2008–09(b)	(c)135 996	(c)39 940	(d)409 028 747	1 760 758	6 500 577	3.7
<b>2008–09</b>						
Pasture for grazing	80 949	12 632	(e)60 429 340	418 750	1 336 980	3.2
Pasture for hay	25 873	5 042	739 614	99 490	362 804	3.6
Pasture for silage	8 519	^ 1 325	296 950	^ 33 802	^ 101 371	3.0
Pasture for seed production	1 615	^ 696	^ 135 835	^ 39 721	^ 179 515	4.5
Cereal crops for hay	14 739	^ 838	810 528	^ 23 240	^ 57 457	2.5
Cereal crops for grain or seed	36 081	2 305	20 925 049	292 722	823 556	2.8
Cereal crops not for grain, seed or hay	12 147	^ 1 009	1 062 644	^ 24 601	^ 54 254	^ 2.2
Rice	^ 161	^ 161	^ 7 194	^ 7 194	^ 101 474	14.1
Sugar cane	4 130	1 984	417 302	191 865	761 086	4.0
Cotton	498	446	158 715	141 923	880 003	6.2
Other broadacre crops(f)	15 265	922	3 385 103	51 800	144 683	2.8
Fruit trees, nut trees, plantation or berry fruits(g)	9 732	6 627	172 773	128 046	597 535	4.7
Vegetables for human consumption	5 832	4 651	114 982	99 583	420 181	4.2
Vegetables for seed	930	^ 425	^ 9 221	^ 5 027	^ 12 912	2.6
Nurseries, cut flowers and cultivated turf	3 253	2 645	17 250	12 904	65 425	5.1
Grapevines	8 307	7 615	179 270	172 344	543 252	3.2

^ estimate has a relative standard error of 10% to less than 25% and should be used with caution

(a) The number of agricultural businesses and the area under pasture or crop are included for irrigation crop categories where available. See the Explanatory Notes for further information.

(b) Totals include other pastures or crops not elsewhere classified.

(c) Total does not equal the sum as many establishments grow or irrigate more than one crop or pasture.

(d) Total includes area of agricultural land. This does not equal the sum of area under pasture or crop as not all land on agricultural holdings is under pasture or crop. Also, pasture for grazing refers to improved pasture only.

(e) Refers to improved pasture only.

(f) Excludes cereals, sugar cane and cotton.

(g) Excludes grapevines.

## 2.2 PASTURES AND CROPS IRRIGATED(a), New South Wales(b)—2005–06 to 2008–09

	<i>Agricultural businesses</i>	<i>Agricultural businesses irrigating</i>	<i>Area under pasture or crop</i>	<i>Area irrigated</i>	<i>Volume applied</i>	<i>Application rate</i>
	no.	no.	ha	ha	ML	ML/ha
<b>TOTAL</b>						
2005–06	48 937	11 604	62 164 155	994 199	4 534 109	4.6
2006–07	47 869	10 689	58 660 611	680 011	2 605 019	3.8
2007–08	44 521	8 974	58 154 425	525 021	1 677 083	3.2
2008–09(c)	(d)43 212	(d)10 128	(e)57 309 461	503 630	1 910 033	3.8
<b>2008–09</b>						
Pasture for grazing	26 361	2 948	(f)13 986 549	90 461	253 453	2.8
Pasture for hay	5 249	^ 1 642	125 324	^ 31 324	^ 124 526	4.0
Pasture for silage	1 822	^ 326	43 127	^ 9 469	^ 22 641	2.4
Pasture for seed production	^ 389	^ 147	*40 260	*8 987	^ 22 858	2.5
Cereal crops for hay	3 579	^ 277	144 166	^ 5 281	^ 13 918	2.6
Cereal crops for grain or seed	11 973	1 101	6 024 929	164 757	450 122	2.7
Cereal crops not for grain, seed or hay	5 196	^ 382	^ 502 526	^ 10 395	^ 19 999	^ 1.9
Rice	^ 161	^ 161	^ 7 194	^ 7 194	^ 101 474	14.1
Sugar cane	447	—	^ 16 096	—	—	—
Cotton	237	205	80 281	70 328	465 833	6.6
Other broadacre crops(g)	3 764	^ 228	692 132	^ 18 283	^ 54 100	3.0
Fruit trees, nut trees, plantation or berry fruits(h)	3 094	1 599	44 809	24 800	120 683	4.9
Vegetables for human consumption	1 494	1 200	14 122	12 721	60 505	4.8
Vegetables for seed	^ 263	*47	*1 849	*731	^ 860	**1.2
Nurseries, cut flowers and cultivated turf	1 108	916	4 464	3 809	^ 21 883	5.7
Grapevines	1 669	1 494	^ 42 214	^ 41 210	^ 166 923	4.1

^ estimate has a relative standard error of 10% to less than 25% and should be used with caution

\* estimate has a relative standard error of 25% to 50% and should be used with caution

\*\* estimate has a relative standard error greater than 50% and is considered too unreliable for general use

— nil or rounded to zero (including null cells)

(a) The number of agricultural businesses and the area under pasture or crop are included for irrigation crop categories where available. See the Explanatory Notes for further information.

(b) Includes ACT.

(c) Totals include other pastures or crops not elsewhere classified.

(d) Total does not equal the sum as many establishments grow or irrigate more than one crop or pasture.

(e) Total includes area of agricultural land. This does not equal the sum of area under pasture or crop as not all land on agricultural holdings is under pasture or crop. Also, pasture for grazing refers to improved pasture only.

(f) Refers to improved pasture only.

(g) Excludes cereals, sugar cane and cotton.

(h) Excludes grapevines.

**2.3****PASTURES AND CROPS IRRIGATED(a), Victoria—2005–06 to 2008–09** .....

	<i>Agricultural businesses</i>	<i>Agricultural businesses irrigating</i>	<i>Area under pasture or crop</i>	<i>Area irrigated</i>	<i>Volume applied</i>	<i>Application rate</i>
	no.	no.	ha	ha	ML	ML/ha
<b>TOTAL</b>						
2005–06	37 146	11 621	12 313 994	647 729	2 448 485	3.8
2006–07	37 429	10 557	13 250 203	437 654	1 648 914	3.8
2007–08	34 177	10 309	12 535 698	427 584	1 332 045	3.1
2008–09(b)	(c)32 973	(c)10 080	(d)12 090 736	370 957	1 194 501	3.2
<b>2008–09</b>						
Pasture for grazing	23 236	5 000	(e)5 138 082	190 094	^ 591 242	3.1
Pasture for hay	10 494	^ 1 273	303 798	^ 26 260	^ 69 218	2.6
Pasture for silage	4 409	^ 553	175 663	*12 985	*35 749	^ 2.8
Pasture for seed production	^ 284	*111	*24 719	^ 4 034	*12 306	3.1
Cereal crops for hay	4 405	*282	285 145	*8 938	*23 015	^ 2.6
Cereal crops for grain or seed	8 175	^ 305	2 994 899	*16 327	*25 170	1.5
Cereal crops not for grain, seed or hay	2 527	*371	137 489	*8 851	*18 514	^ 2.1
Other broadacre crops(f)	3 239	*62	561 485	*2 227	*4 621	^ 2.1
Fruit trees, nut trees, plantation or berry fruits(g)	1 541	1 194	40 879	34 980	159 302	4.6
Vegetables for human consumption	^ 923	677	27 707	21 979	79 049	3.6
Vegetables for seed	^ 315	^ 211	^ 4 038	*2 761	*5 677	2.1
Nurseries, cut flowers and cultivated turf	652	540	4 722	2 691	11 376	4.2
Grapevines	2 365	2 156	^ 39 650	^ 36 559	^ 152 588	4.2

^ estimate has a relative standard error of 10% to less than 25% and should be used with caution

\* estimate has a relative standard error of 25% to 50% and should be used with caution

(a) The number of agricultural businesses and the area under pasture or crop are included for irrigation crop categories where available. See the Explanatory Notes for further information.

(b) Totals include other pastures or crops not elsewhere classified.

(c) Total does not equal the sum as many establishments grow or irrigate more than one crop or pasture.

(d) Total includes area of agricultural land. This does not equal the sum of area under pasture or crop as not all land on agricultural holdings is under pasture or crop. Also, pasture for grazing refers to improved pasture only.

(e) Refers to improved pasture only.

(f) Excludes cereals, sugar cane and cotton.

(g) Excludes grapevines.

## 2.4 PASTURES AND CROPS IRRIGATED(a), Queensland—2005–06 to 2008–09 . . . . .

	<i>Agricultural businesses</i>	<i>Agricultural businesses irrigating</i>	<i>Area under pasture or crop</i>	<i>Area irrigated</i>	<i>Volume applied</i>	<i>Application rate</i>
	no.	no.	ha	ha	ML	ML/ha
<b>TOTAL</b>						
2005–06	32 212	9 861	145 519 376	539 157	2 325 003	4.3
2006–07	30 650	8 757	143 870 532	457 822	1 840 252	4.0
2007–08	29 121	9 047	141 057 855	512 774	1 842 729	3.6
2008–09(b)	(c)28 142	(c)8 805	(d)141 209 793	547 949	2 058 471	3.8
<b>2008–09</b>						
Pasture for grazing	13 212	2 033	(e)31 040 505	^ 45 383	^ 100 470	^ 2.2
Pasture for hay	2 762	1 365	68 174	^ 21 886	^ 82 256	3.8
Pasture for silage	^ 324	^ 179	*9 740	*5 094	*19 525	*3.8
Pasture for seed production	^ 193	^ 60	^ 14 793	3 036	^ 8 755	^ 2.9
Cereal crops for hay	^ 934	^ 187	^ 31 739	^ 5 124	*11 241	^ 2.2
Cereal crops for grain or seed	4 091	578	1 740 006	100 458	323 155	3.2
Cereal crops not for grain, seed or hay	2 658	^ 217	233 912	^ 3 989	*12 722	^ 3.2
Sugar cane	3 683	1 984	401 206	191 865	761 086	4.0
Cotton	261	242	78 434	^ 71 595	414 170	5.8
Other broadacre crops(f)	1 470	^ 343	177 811	^ 20 721	^ 50 288	2.4
Fruit trees, nut trees, plantation or berry fruits(g)	2 401	1 543	49 500	34 902	119 060	3.4
Vegetables for human consumption	1 541	1 215	34 216	29 192	92 660	3.2
Vegetables for seed	*72	*38	*388	**238	**780	3.3
Nurseries, cut flowers and cultivated turf	722	600	4 418	3 906	15 808	4.0
Grapevines	132	^ 109	^ 3 224	*3 081	*15 906	5.2

^ estimate has a relative standard error of 10% to less than 25% and should be used with caution

\* estimate has a relative standard error of 25% to 50% and should be used with caution

\*\* estimate has a relative standard error greater than 50% and is considered too unreliable for general use

(a) The number of agricultural businesses and the area under pasture or crop are included for irrigation crop categories where available. See the Explanatory Notes for further information.

(b) Totals include other pastures or crops not elsewhere classified.

(c) Total does not equal the sum as many establishments grow or irrigate more than one crop or pasture.

(d) Total includes area of agricultural land. This does not equal the sum of area under pasture or crop as not all land on agricultural holdings is under pasture or crop. Also, pasture for grazing refers to improved pasture only.

(e) Refers to improved pasture only.

(f) Excludes cereals, sugar cane and cotton.

(g) Excludes grapevines.

## 2.5 PASTURES AND CROPS IRRIGATED(a), South Australia—2005–06 to 2008–09 ..

	<i>Agricultural businesses</i>	<i>Agricultural businesses irrigating</i>	<i>Area under pasture or crop</i>	<i>Area irrigated</i>	<i>Volume applied</i>	<i>Application rate</i>
	no.	no.	ha	ha	ML	ML/ha
<b>TOTAL</b>						
2005–06	16 455	6 298	55 408 492	216 749	897 197	4.1
2006–07	15 835	6 447	50 064 634	200 594	966 057	4.8
2007–08	14 996	6 114	47 075 615	225 716	880 268	3.9
2008–09(b)	(c)14 454	(c)5 821	(d)49 126 060	196 215	827 230	4.2
<b>2008–09</b>						
Pasture for grazing	6 810	1 148	(e)3 915 701	^ 32 849	^ 175 928	5.4
Pasture for hay	2 556	^ 408	88 913	^ 13 926	^ 64 898	^ 4.7
Pasture for silage	^ 601	*158	^ 19 494	^ 4 119	*14 523	^ 3.5
Pasture for seed production	^ 438	^ 276	^ 39 040	^ 20 997	^ 128 679	^ 6.1
Cereal crops for hay	2 978	*51	178 302	*2 945	**4 890	*1.7
Cereal crops for grain or seed	5 943	*153	3 582 982	*5 712	*11 865	^ 2.1
Cereal crops not for grain, seed or hay	966	*10	102 066	np	np	np
Other broadacre crops(f)	2 786	*109	483 471	*2 998	*9 094	^ 3.0
Fruit trees, nut trees, plantation or berry fruits(g)	1 126	994	18 859	17 960	131 280	7.3
Vegetables for human consumption	673	555	14 484	13 853	84 862	6.1
Vegetables for seed	^ 91	^ 34	*1 745	^ 695	^ 3 744	5.4
Nurseries, cut flowers and cultivated turf	^ 270	173	*1 271	np	np	np
Grapevines	2 987	2 879	79 126	77 662	^ 188 369	2.4

^ estimate has a relative standard error of 10% to less than 25% and should be used with caution

\* estimate has a relative standard error of 25% to 50% and should be used with caution

\*\* estimate has a relative standard error greater than 50% and is considered too unreliable for general use

np not available for publication but included in totals where applicable, unless otherwise indicated

(a) The number of agricultural businesses and the area under pasture or crop are included for irrigation crop categories where available. See the Explanatory Notes for further information.

(b) Totals include other pastures or crops not elsewhere classified.

(c) Total does not equal the sum as many establishments grow or irrigate more than one crop or pasture.

(d) Total includes area of agricultural land. This does not equal the sum of area under pasture or crop as not all land on agricultural holdings is under pasture or crop. Also, pasture for grazing refers to improved pasture only.

(e) Refers to improved pasture only.

(f) Excludes cereals, sugar cane and cotton.

(g) Excludes grapevines.

## 2.6 PASTURES AND CROPS IRRIGATED(a), Western Australia—2005–06 to 2008–09

	<i>Agricultural businesses</i>	<i>Agricultural businesses irrigating</i>	<i>Area under pasture or crop</i>	<i>Area irrigated</i>	<i>Volume applied</i>	<i>Application rate</i>
	no.	no.	ha	ha	ML	ML/ha
<b>TOTAL</b>						
2005–06	14 526	3 173	98 652 515	60 336	306 284	5.1
2006–07	13 608	2 935	96 741 958	53 268	293 186	5.5
2007–08	13 084	2 720	93 034 706	63 364	284 878	4.5
2008–09(b)	(c)12 658	(c)2 865	(d)93 645 885	47 804	226 085	4.7
<b>2008–09</b>						
Pasture for grazing	8 032	^ 553	(e)4 324 937	^ 11 537	^ 63 815	5.5
Pasture for hay	2 650	*85	94 709	^ 1 144	^ 5 268	^ 4.6
Pasture for silage	^ 394	**15	^ 17 163	**115	**1 059	*9.2
Pasture for seed production	^ 203	**21	*13 895	np	np	np
Cereal crops for hay	2 704	**18	169 157	*422	**3 184	^ 7.5
Cereal crops for grain or seed	5 391	*35	6 556 464	1 833	7 595	4.1
Cereal crops not for grain, seed or hay	^ 550	**4	^ 80 917	np	np	np
Other broadacre crops(f)	3 465	*20	1 454 902	1 427	10 536	7.4
Fruit trees, nut trees, plantation or berry fruits(g)	1 088	911	10 601	8 472	47 936	5.7
Vegetables for human consumption	550	464	9 359	8 340	56 043	6.7
Vegetables for seed	^ 55	*22	^ 380	*125	*257	^ 2.1
Nurseries, cut flowers and cultivated turf	^ 363	^ 309	^ 1 894	1 449	12 565	8.7
Grapevines	997	851	13 546	^ 12 511	^ 16 060	1.3

- ^ estimate has a relative standard error of 10% to less than 25% and should be used with caution
- \* estimate has a relative standard error of 25% to 50% and should be used with caution
- \*\* estimate has a relative standard error greater than 50% and is considered too unreliable for general use
- np not available for publication but included in totals where applicable, unless otherwise indicated
- (a) The number of agricultural businesses and the area under pasture or crop are included for irrigation crop categories where available. See the Explanatory Notes for further information.

- (b) Totals include other pastures or crops not elsewhere classified.
- (c) Total does not equal the sum as many establishments grow or irrigate more than one crop or pasture.
- (d) Total includes area of agricultural land. This does not equal the sum of area under pasture or crop as not all land on agricultural holdings is under pasture or crop. Also, pasture for grazing refers to improved pasture only.
- (e) Refers to improved pasture only.
- (f) Excludes cereals, sugar cane and cotton.
- (g) Excludes grapevines.

## 2.7 PASTURES AND CROPS IRRIGATED(a), Tasmania—2005–06 to 2008–09 .....

	<i>Agricultural businesses</i>	<i>Agricultural businesses irrigating</i>	<i>Area under pasture or crop</i>	<i>Area irrigated</i>	<i>Volume applied</i>	<i>Application rate</i>
	no.	no.	ha	ha	ML	ML/ha
<b>TOTAL</b>						
2005–06	4 745	1 919	1 739 161	80 912	203 931	2.5
2006–07	4 783	2 060	1 659 163	87 472	263 029	3.0
2007–08	4 200	2 185	1 541 487	91 538	252 113	2.8
2008–09(b)	(c) 4 000	(c) 1 962	(d) 1 630 432	88 028	262 296	3.0
<b>2008–09</b>						
Pasture for grazing	3 189	928	(e) 785 309	47 902	150 376	3.1
Pasture for hay	2 101	^ 261	47 758	^ 4 183	^ 12 822	3.1
Pasture for silage	969	^ 94	31 763	^ 2 021	^ 7 874	3.9
Pasture for seed production	102	80	2 891	np	np	np
Cereal crops for hay	^ 138	*23	^ 1 944	*529	^ 1 209	^ 2.3
Cereal crops for grain or seed	506	132	25 639	3 634	5 649	1.6
Cereal crops not for grain, seed or hay	^ 247	^ 26	5 684	^ 723	^ 1 734	2.4
Other broadacre crops(f)	533	159	15 101	6 143	16 044	2.6
Fruit trees, nut trees, plantation or berry fruits(g)	290	221	4 362	^ 3 350	^ 9 448	2.8
Vegetables for human consumption	577	472	14 139	12 550	43 064	3.4
Vegetables for seed	^ 128	^ 73	^ 808	^ 476	^ 1 594	3.4
Nurseries, cut flowers and cultivated turf	^ 104	77	375	np	np	np
Grapevines	^ 149	^ 120	1 243	1 055	^ 1 177	1.1

^ estimate has a relative standard error of 10% to less than 25% and should be used with caution

\* estimate has a relative standard error of 25% to 50% and should be used with caution

np not available for publication but included in totals where applicable, unless otherwise indicated

(a) The number of agricultural businesses and the area under pasture or crop are included for irrigation crop categories where available. See the Explanatory Notes for further information.

(b) Totals include other pastures or crops not elsewhere classified.

(c) Total does not equal the sum as many establishments grow or irrigate more than one crop or pasture.

(d) Total includes area of agricultural land. This does not equal the sum of area under pasture or crop as not all land on agricultural holdings is under pasture or crop. Also, pasture for grazing refers to improved pasture only.

(e) Refers to improved pasture only.

(f) Excludes cereals, sugar cane and cotton.

(g) Excludes grapevines.

## 2.8 PASTURES AND CROPS IRRIGATED(a), Northern Territory—2005–06 to 2008–09

	<i>Agricultural businesses</i>	<i>Agricultural businesses irrigating</i>	<i>Area under pasture or crop</i>	<i>Area irrigated</i>	<i>Volume applied</i>	<i>Application rate</i>
	no.	no.	ha	ha	ML	ML/ha
<b>TOTAL</b>						
2005–06	659	351	59 127 121	7 235	22 356	3.1
2006–07	643	342	61 202 240	6 161	19 737	3.2
2007–08	605	288	^ 63 887 775	^ 4 940	^ 15 683	^ 3.2
2008–09(b)	(c) 558	(c) 278	(d) 54 016 380	6 176	21 962	3.6
<b>2008–09</b>						
Pasture for grazing	110	^ 23	(e) 1 238 257	^ 523	^ 1 697	3.2
Pasture for hay	61	^ 8	10 938	* 768	^ 3 816	^ 5.0
Pasture for seed production	^ 6	—	^ 235	—	—	—
Cereal crops for hay	^ 1	—	^ 75	—	—	—
Cereal crops for grain or seed	* 3	—	^ 130	—	—	—
Cereal crops not for grain, seed or hay	^ 3	—	52	—	—	—
Other broadacre crops(f)	^ 7	—	* 201	—	—	—
Fruit trees, nut trees, plantation or berry fruits(g)	192	164	3 762	3 582	9 825	2.7
Vegetables for human consumption	74	69	955	946	3 998	4.2
Vegetables for seed	* 3	—	* 14	—	—	—
Nurseries, cut flowers and cultivated turf	33	30	107	90	397	4.4
Grapevines	^ 7	^ 7	^ 267	^ 267	^ 2 229	8.4

^ estimate has a relative standard error of 10% to less than 25% and should be used with caution

\* estimate has a relative standard error of 25% to 50% and should be used with caution

— nil or rounded to zero (including null cells)

(a) The number of agricultural businesses and the area under pasture or crop are included for irrigation crop categories where available. See the Explanatory Notes for further information.

(b) Totals include other pastures or crops not elsewhere classified.

(c) Total does not equal the sum as many establishments grow or irrigate more than one crop or pasture.

(d) Total includes area of agricultural land. This does not equal the sum of area under pasture or crop as not all land on agricultural holdings is under pasture or crop. Also, pasture for grazing refers to improved pasture only.

(e) Refers to improved pasture only.

(f) Excludes cereals, sugar cane and cotton.

(g) Excludes grapevines.

## 2.9 PASTURES AND CROPS IRRIGATED (a), Murray–Darling Basin(b)—2005–06 to 2008–09

	<i>Agricultural businesses</i>	<i>Agricultural businesses irrigating</i>	<i>Area under pasture or crop</i>	<i>Area irrigated</i>	<i>Volume applied</i>	<i>Application rate</i>
	no.	no.	ha	ha	ML	ML/ha
<b>TOTAL</b>						
2005–06	61 033	18 634	88 827 650	1 653 788	7 369 807	4.5
2006–07	59 685	17 062	97 160 318	1 101 410	4 458 279	4.1
2007–08	56 586	15 479	95 561 754	957 752	3 141 659	3.3
2008–09(c)	(d)54 098	(d)15 077	(e)96 041 055	929 074	3 492 407	3.8
<b>2008–09</b>						
Pasture for grazing	32 703	5 225	(f)23 666 222	190 621	517 601	2.7
Pasture for hay	7 908	2 254	204 980	43 772	152 843	3.5
Pasture for silage	1 927	^ 613	64 932	^ 18 806	^ 49 247	2.6
Pasture for seed production	^ 549	^ 235	*68 350	^ 14 144	^ 40 070	2.8
Cereal crops for hay	8 098	^ 525	453 203	^ 16 424	^ 42 536	^ 2.6
Cereal crops for grain or seed	21 441	1 712	10 640 648	254 867	707 221	2.8
Cereal crops not for grain, seed or hay	7 896	^ 686	771 492	^ 20 030	^ 39 649	^ 2.0
Rice	^ 161	^ 161	^ 7 194	^ 7 194	^ 101 474	14.1
Cotton	441	391	143 805	127 822	793 429	6.2
Other broadacre crops(g)	6 399	410	1 196 706	^ 32 614	^ 89 531	2.7
Fruit trees, nut trees, plantation or berry fruits(h)	3 211	2 540	81 151	68 846	374 310	5.4
Vegetables for human consumption	1 024	712	27 945	24 800	119 731	4.8
Vegetables for seed	*225	*126	^ 1 217	*642	^ 1 755	^ 2.7
Nurseries, cut flowers and cultivated turf	^ 382	^ 309	2 895	^ 1 723	^ 8 514	^ 4.9
Grapevines	4 299	4 018	105 222	101 595	439 259	4.3

^ estimate has a relative standard error of 10% to less than 25% and should be used with caution

\* estimate has a relative standard error of 25% to 50% and should be used with caution

(a) The number of agricultural businesses and the area under pasture or crop are included for irrigation crop categories where available. See the Explanatory Notes for further information.

(b) Based on NRM regions. Refer to the Explanatory Notes for further information.

(c) Totals include other pastures or crops not elsewhere classified.

(d) Total does not equal the sum as many establishments grow or irrigate more than one crop or pasture.

(e) Total includes area of agricultural land. This does not equal the sum of area under pasture or crop as not all land on agricultural holdings is under pasture or crop. Also, pasture for grazing refers to improved pasture only.

(f) Refers to improved pasture only.

(g) Excludes cereals, sugar cane and cotton.

(h) Excludes grapevines.

## 2.10 PASTURES AND CROPS IRRIGATED (a), Non-Murray Darling Basin(b)—2005–06 to 2008–09

	<i>Agricultural businesses</i>	<i>Agricultural businesses irrigating</i>	<i>Area under pasture or crop</i>	<i>Area irrigated</i>	<i>Volume applied</i>	<i>Application rate</i>
	no.	no.	ha	ha	ML	ML/ha
<b>TOTAL</b>						
2005–06	93 648	26 192	346 097 164	892 530	3 367 557	3.8
2006–07	91 132	24 725	328 289 023	821 572	3 177 915	3.9
2007–08	84 118	24 158	321 725 808	893 185	3 143 140	3.5
2008–09(c)	(d)81 899	(d)24 863	(e)312 987 692	831 684	3 008 170	3.6
<b>2008–09</b>						
Pasture for grazing	48 246	7 407	(f)36 763 118	228 129	819 379	3.6
Pasture for hay	17 964	2 787	534 634	55 718	209 962	3.8
Pasture for silage	6 591	^ 712	232 019	^ 14 996	^ 52 124	^ 3.5
Pasture for seed production	1 066	^ 461	^ 67 484	^ 25 578	^ 139 445	5.5
Cereal crops for hay	6 641	^ 313	357 325	^ 6 816	*14 921	^ 2
Cereal crops for grain or seed	14 640	^ 593	10 284 401	^ 37 855	^ 116 336	3.1
Cereal crops not for grain, seed or hay	4 251	^ 323	291 152	^ 4 571	*14 605	^ 3.2
Sugar cane	4 129	1 984	417 301	191 865	761 086	4.0
Cotton	^ 56	^ 55	^ 14 910	^ 14 101	^ 86 574	6.1
Other broadacre crops(g)	8 866	^ 512	2 188 397	19 186	55 152	2.9
Fruit trees, nut trees, plantation or berry fruits(h)	6 521	4 087	91 622	59 200	223 225	3.8
Vegetables for human consumption	4 807	3 939	87 037	74 782	300 450	4.0
Vegetables for seed	^ 704	^ 299	^ 8 004	^ 4 385	^ 11 156	2.5
Nurseries, cut flowers and cultivated turf	2 871	2 336	14 356	11 181	56 911	5.1
Grapevines	4 008	3 598	74 048	70 749	^ 103 993	1.5

^ estimate has a relative standard error of 10% to less than 25% and should be used with caution

\* estimate has a relative standard error of 25% to 50% and should be used with caution

(a) The number of agricultural businesses and the area under pasture or crop are included for irrigation crop categories where available. See the Explanatory Notes for further information.

(b) Based on NRM regions. Refer to the Explanatory Notes for further information.

(c) Totals include other pastures and crops not elsewhere classified.

(d) Total does not equal the sum as many establishments grow or irrigate more than one crop or pasture.

(e) Total includes area of agricultural land. This does not equal the sum of area under pasture or crop as not all land on agricultural holdings is under pasture or crop. Also pasture for grazing refers to improved pasture only.

(f) Refers to improved pasture only.

(g) Excludes cereals, sugar cane and cotton.

(h) Excludes grapevines.

SOURCES OF  
AGRICULTURAL WATER  
*Australia*

The main sources of Australia's water for agriculture in 2008–09 were government or private irrigation schemes, groundwater and surface water. Falls in overall use were reflected in falls in each of the major water sources, although the relative importance of these sources was comparable to 2006–07.

Government or private irrigation schemes accounted for 2,605 gigalitres, or 36% of all agricultural water. Compared to 2006–07, the amount of water supplied by government or private irrigation schemes in 2008–09 decreased by 20%. Groundwater accounted for 34% of agricultural water use nationally in 2008–09 (2,490 gigalitres), a 9% decrease compared to 2006–07. Surface water made up a further 27% of the total volume of water from all sources in 2008–09 (1,976 gigalitres), a 12% decrease compared to 2006–07.

Increases in the volume of water for agricultural purposes were recorded for town or country reticulated mains supply (up 27% in 2008–09 compared to 2006–07), and recycled or re-used water from off-farm sources (up 5% in the same period).

*State/Territory*

Groundwater was the major source of agricultural water in New South Wales (40% of all water for agricultural purposes), South Australia (62%), Western Australia (43%), and Northern Territory (81%).

Water supplied by government or private irrigation schemes was the main source of agricultural water in Victoria (57%), and Queensland (41%) while in Tasmania, the main source was surface water (73%).

*Murray–Darling Basin*

In 2008–09, water supplied by government or private irrigation schemes was the major source of water for agriculture in the Murray–Darling Basin, accounting for 42% of agricultural water sourced in the region. Groundwater supplied 28% of the total volume, while surface water also supplied 28%. Outside the Murray–Darling Basin, ground water was the major source of water for agriculture (40%).

PURCHASES AND SALES  
OF IRRIGATION WATER

In 2008–09, the volume of extra irrigation water purchased on a permanent basis amounted to 75 gigalitres, at a value of \$107.2 million, with New South Wales purchasing the greatest volume (42%) and accounting for a third of the national value. The volume of extra irrigation water purchased on a temporary basis was 553 gigalitres, at a value of \$146.7 million, with Victoria accounting for just over a third of the national volume and nearly half of the national value.

The volume of irrigation water sold on a permanent basis in Australia in 2008–09 totalled 302 gigalitres, with a value of \$420.3 million. The volume of irrigation water sold on a temporary basis totalled 496 gigalitres, with a value of \$138.6 million. New South Wales accounted for the majority of the volume and value of irrigation water sold on both a permanent and temporary basis in 2008–09.

PURCHASES AND SALES  
OF IRRIGATION WATER  
*continued*

In the Murray–Darling Basin in 2008–09, 501 gigalitres of extra irrigation water were purchased on a temporary basis, valued at \$138.2 million. Of irrigation water sold on a temporary basis nationally, the Murray–Darling Basin accounted for 91% of the total volume and 97% of the national value.

### 3.1 SOURCES OF AGRICULTURAL WATER, by State—2008–09

	NSW(a)	Vic.	Qld	SA	WA	Tas.	NT	Aust.
	ML	ML	ML	ML	ML	ML	ML	ML
Water supplied by government or private irrigation schemes	588 312	755 489	949 194	182 396	^ 90 159	^ 39 088	*284	2 604 922
Surface water	602 465	231 790	713 958	^ 129 765	83 173	207 030	7 901	1 976 082
Groundwater	851 296	297 040	577 167	559 437	137 722	^ 32 907	34 776	2 490 346
Town or country reticulated mains supply	^ 16 669	^ 16 374	^ 2 251	^ 15 906	4 826	^ 2 492	^ 41	58 560
Recycled/re-used water from off-farm sources	^ 33 605	*26 560	^ 34 189	*12 074	366	^ 2 877	—	109 671
Other	^ 15 755	*6 599	*18 922	^ 2 071	*2 149	^ 536	*20	^ 46 053
<b>Total all sources</b>	<b>2 108 103</b>	<b>1 333 852</b>	<b>2 295 681</b>	<b>901 649</b>	<b>318 395</b>	<b>284 930</b>	<b>43 023</b>	<b>7 285 634</b>

^ estimate has a relative standard error of 10% to less than 25% and should be used with caution

— nil or rounded to zero (including null cells)

(a) Includes ACT.

\* estimate has a relative standard error of 25% to 50% and should be used with caution

### 3.2 SOURCES OF AGRICULTURAL WATER, by Murray–Darling Basin(a)—2008–09

	MDB	Non-MDB	Aust.
	ML	ML	ML
Water supplied by government or private irrigation schemes	1 572 750	1 032 172	2 604 922
Surface water	1 032 187	943 895	1 976 082
Groundwater	1 068 906	1 421 440	2 490 346
Town or country reticulated mains supply	^ 16 816	41 744	58 560
Recycled/re-used water from off-farm sources	^ 40 888	^ 68 783	109 671
Other	*20 989	^ 25 064	^ 46 053
<b>Total all sources</b>	<b>3 752 535</b>	<b>3 533 098</b>	<b>7 285 634</b>

^ estimate has a relative standard error of 10% to less than 25% and should be used with caution

\* estimate has a relative standard error of 25% to 50% and should be used with caution

(a) Based on NRM regions. Refer to the Explanatory Notes for further information.

### 3.3 PURCHASES AND SALES OF IRRIGATION WATER, by State—2008–09

	NSW(a)	Vic.	Qld	SA	WA	Tas.	NT	Aust.
NUMBER OF AGRICULTURAL BUSINESSES (NO.)								
<b>Purchases of extra water</b>								
On a temporary basis	^ 512	1 788	^ 228	^ 1 203	*70	^ 96	—	3 896
On a permanent basis	^ 123	*129	np	*94	np	*69	—	^ 467
<b>Sales of water</b>								
On a temporary basis	1 376	^ 1 092	*75	^ 75	*38	*29	—	2 684
On a permanent basis	^ 199	*276	np	**92	np	—	—	^ 620
VOLUME (ML)								
<b>Purchases of extra water</b>								
On a temporary basis	^ 192 478	196 157	^ 36 537	116 593	*3 457	7 308	—	552 529
On a permanent basis	*31 704	^ 23 883	9 272	*3 981	**547	^ 5 885	—	^ 75 272
<b>Sales of water</b>								
On a temporary basis	383 919	^ 70 424	^ 26 166	*8 015	**6 545	**1 276	—	496 346
On a permanent basis	^ 220 219	**59 457	*12 092	np	np	—	—	^ 301 772
VALUE (\$'000)								
<b>Purchases of extra water</b>								
On a temporary basis	^ 29 669	71 724	^ 3 261	41 012	^ 137	881	—	146 686
On a permanent basis	^ 35 667	49 632	10 625	*4 736	**569	^ 5 992	—	107 222
<b>Sales of water</b>								
On a temporary basis	113 922	^ 19 988	*1 985	*2 409	*189	*130	—	138 623
On a permanent basis	^ 292 786	**88 013	np	*22 697	np	—	—	^ 420 332
^	estimate has a relative standard error of 10% to less than 25% and should be used with caution		—	nil or rounded to zero (including null cells)				
*	estimate has a relative standard error of 25% to 50% and should be used with caution		np	not available for publication but included in totals where applicable, unless otherwise indicated				
**	estimate has a relative standard error greater than 50% and is considered too unreliable for general use		(a)	Includes ACT.				

**3.4****PURCHASES AND SALES OF IRRIGATION WATER, by Murray–Darling**

Basin(a)—2008–09

	<i>MDB</i>	<i>Non-MDB</i>	<i>Aust.</i>
.....			
NUMBER OF AGRICULTURAL BUSINESSES (NO.)			
<b>Purchases of extra water</b>			
On a temporary basis	2 992	^ 904	3 896
On a permanent basis	^ 201	^ 266	^ 467
<b>Sales of water</b>			
On a temporary basis	2 434	*250	2 684
On a permanent basis	^ 511	*109	^ 620
.....			
VOLUME (ML)			
<b>Purchases of extra water</b>			
On a temporary basis	500 850	^ 51 679	552 529
On a permanent basis	^ 60 767	^ 14 506	^ 75 272
<b>Sales of water</b>			
On a temporary basis	452 018	*44 328	496 346
On a permanent basis	^ 282 384	*19 389	^ 301 772
.....			
VALUE (\$'000)			
<b>Purchases of extra water</b>			
On a temporary basis	138 166	^ 8 520	146 686
On a permanent basis	90 189	^ 17 033	107 222
<b>Sales of water</b>			
On a temporary basis	134 209	*4 414	138 623
On a permanent basis	^ 402 315	*18 017	^ 420 332

^ estimate has a relative standard error of 10% to less than 25% and should be used with caution

\* estimate has a relative standard error of 25% to 50% and should be used with caution

(a) Based on NRM regions. Refer to the Explanatory Notes for further information.

IRRIGATION METHODS

*Australia*

Above-ground drip or trickle irrigation was the most common method of irrigation in Australia in 2008–09, used by 11 thousand agricultural businesses. Surface irrigation was used by 7,674 agricultural businesses and microspray sprinklers used by 5,915 agricultural businesses.

In 2008–09, the main irrigation method was surface irrigation, irrigating 804 thousand hectares. Large mobile machines were used to irrigate 253 thousand hectares and above-ground drip or trickle irrigation was used to irrigate 217 thousand hectares.

*State/Territory*

Above-ground drip or trickle irrigation was used by 23% of all agricultural businesses who irrigated in New South Wales in 2008–09 (used by 2,337 agricultural businesses). This method was used by 52% of irrigating agricultural businesses in South Australia (3,034) and 45% in Western Australia (1,284).

In Victoria, surface irrigation was the most common irrigation method, used by 3,600 agricultural businesses while hose irrigation was the main method in Queensland (2,286) and Tasmania (821).

The most common method of irrigation in the Northern Territory was microspray sprinklers, used by 152 agricultural businesses.

Of all the irrigation methods used in 2008–09, surface irrigation covered the largest areas of irrigated land in New South Wales (308 thousand hectares), Victoria (197 thousand hectares), and Queensland (263 thousand hectares). Above-ground drip or trickle irrigation covered the largest areas of irrigated land in South Australia (80 thousand hectares) and Western Australia (17 thousand hectares) while hose irrigators covered the largest area of irrigated land in Tasmania (30 thousand hectares) and microspray sprinklers covered the largest area of irrigated land in Northern Territory (3,008 hectares).

*Murray–Darling Basin*

Surface irrigation was the most common method of irrigation in the Murray–Darling Basin in 2008–09, utilised by 5,296 agricultural businesses. These businesses accounted for 69% of all agricultural businesses in Australia using surface irrigation. Above-ground drip or trickle irrigation was the next most common method (3,688), followed by microspray sprinklers (1,891).

The method covering the largest area of land in the Murray–Darling Basin in 2008–09 was surface irrigation (596 thousand hectares), followed by above-ground drip or trickle irrigation (115 thousand hectares), and large mobile machines (95 thousand hectares).

Outside the Murray–Darling Basin, above-ground drip or trickle irrigation was the most common method of irrigation, but as for the Basin itself, surface irrigation covered the greatest area.

TOOLS USED IN  
IRRIGATION DECISION  
MAKING

The three most commonly used tools in irrigation decision-making were knowledge or observation (used by 36 thousand agricultural businesses), soil probes (6,266), and calendar/rotational scheduling (5,604).

The main tools used in irrigation decision making in the Murray–Darling Basin in 2008–09 were the same as for Australia as a whole: knowledge or observation (used by 14 thousand agricultural businesses), soil probes (2,866), and calendar/rotational scheduling (2,357).

CHANGES MADE TO  
IRRIGATION PRACTICES

Of the 40 thousand agricultural businesses who irrigated in 2008–09, over 21 thousand (54%) reported making one or more changes to their irrigation practices. The three most common changes made included adopting more efficient irrigation techniques (8,770 agricultural businesses), adopting more efficient irrigation scheduling (6,459), and reducing the area under irrigation (5,618). One of these three changes was the most common change reported in each state/territory, with the exception of South Australia, where the purchase of extra water was the most commonly reported change.

In the Murray–Darling Basin, of the 11 thousand agricultural businesses who reported making one or more changes to their irrigation practices in 2008–09, the most commonly reported changes included the adoption of more efficient irrigation techniques (38% of irrigators making one or more changes), reducing the area under irrigation (35%), and purchasing extra water (31%).

CHANGES INTENDED TO  
BE MADE TO IRRIGATION  
PRACTICES

Of the 20 thousand agricultural businesses in Australia that indicated they intended to make changes to their irrigation practices after 30 June 2009, 41% indicated they would adopt more efficient irrigation techniques, while 29% indicated they would adopt more efficient irrigation scheduling, and 27% reported they intended increasing the area under irrigation. The most common intended change reported in each state/territory was one of these three intended changes.

In the Murray–Darling Basin, the most common intended changes to irrigation practices included the adoption of more efficient irrigation techniques (39%), the purchase of extra water (28%), and the adoption of more efficient irrigation scheduling (26%).

**4.1** IRRIGATION METHODS, by State—2008–09

	NSW(a)	Vic	Qld	SA	WA	Tas.	NT	Aust.
NUMBER OF AGRICULTURAL BUSINESSES (NO.)								
<b>Surface</b>	1 939	3 600	1 519	^ 320	^ 247	^ 43	*6	7 674
<b>Drip or trickle</b>								
Above-ground	2 337	2 224	1 254	3 034	1 284	320	62	10 515
Subsurface	^ 152	*193	332	*110	^ 78	*12	^ 10	886
<b>Sprinkler</b>								
Microspray	1 415	^ 1 131	1 548	937	^ 624	^ 107	152	5 915
Portable irrigators	^ 859	^ 601	^ 1 181	^ 164	*89	^ 345	*4	3 243
Hose irrigators	^ 1 179	^ 880	2 286	^ 283	*62	821	*4	5 515
Large mobile machines	^ 432	^ 565	^ 658	^ 618	^ 70	303	^ 8	2 653
Solid set	415	^ 920	716	^ 446	^ 314	97	^ 13	2 921
<b>Other</b>	2 649	1 636	^ 1 284	^ 720	^ 534	^ 323	42	7 188
AREA (HA)								
<b>Surface</b>	308 133	^ 196 978	262 673	^ 17 328	^ 13 919	*4 067	*542	803 640
<b>Drip or trickle</b>								
Above-ground	^ 45 309	48 935	21 914	79 511	^ 17 390	3 003	1 239	217 301
Subsurface	^ 4 995	*5 791	10 556	*2 459	^ 1 401	^ 45	338	25 584
<b>Sprinkler</b>								
Microspray	10 718	^ 22 004	28 181	^ 13 896	4 979	^ 2 033	3 008	84 820
Portable irrigators	^ 22 696	^ 14 816	^ 24 767	^ 1 372	^ 1 217	^ 16 297	*19	81 185
Hose irrigators	^ 36 919	^ 19 752	^ 118 634	*7 434	*356	30 442	*68	213 604
Large mobile machines	^ 52 027	^ 42 733	^ 62 310	^ 59 710	^ 6 161	29 469	^ 631	253 041
Solid set	^ 4 240	^ 17 361	^ 16 084	^ 6 841	4 251	*2 001	^ 21	50 800
<b>Other</b>	28 961	^ 19 551	^ 22 292	^ 11 548	^ 4 382	^ 7 955	357	95 047

^ estimate has a relative standard error of 10% to less than 25% and should be used with caution

\* estimate has a relative standard error of 25% to 50% and should be used with caution

(a) Includes ACT.

## 4.2 IRRIGATION METHODS, by Murray–Darling Basin(a)—2008–09 .....

	<i>MDB</i>	<i>Non-MDB</i>	<i>Aust.</i>
.....			
NUMBER OF AGRICULTURAL BUSINESSES (NO.)			
Surface	5 296	2 378	7 674
Drip or trickle			
Above-ground	3 688	6 827	10 515
Subsurface	^ 303	583	886
Sprinkler			
Microspray	1 891	4 023	5 915
Portable irrigators	^ 645	2 598	3 243
Hose irrigators	^ 855	4 660	5 515
Large mobile machines	^ 856	1 797	2 653
Solid set	^ 962	1 959	2 921
Other	2 616	4 572	7 188
.....			
AREA (HA)			
Surface	596 262	207 378	803 640
Drip or trickle			
Above-ground	115 452	101 849	217 301
Subsurface	^ 12 795	12 790	25 584
Sprinkler			
Microspray	33 853	50 967	84 820
Portable irrigators	^ 15 468	65 717	81 185
Hose irrigators	^ 27 433	186 171	213 604
Large mobile machines	94 588	158 453	253 041
Solid set	^ 17 514	^ 33 285	50 800
Other	43 324	51 723	95 047

^ estimate has a relative standard error of 10% to less than 25% and should be used with caution

(a) Based on NRM regions. Refer to the Explanatory Notes for further information.

**4.3** TOOLS USED IN IRRIGATION DECISION MAKING(a), by State—2008–09 .....

	NSW(b)	Vic.	Qld	SA	WA	Tas.	NT	Aust.
	no.	no.	no.	no.	no.	no.	no.	no.
Evaporation figures or graphs	^ 836	^ 778	^ 820	^ 749	^ 332	^ 306	^ 21	3 841
Tensiometers	^ 610	^ 935	^ 823	^ 618	^ 429	289	^ 35	3 739
Soil Probes	1 364	^ 1 025	1 027	2 090	^ 434	294	31	6 266
Government or Commercial Scheduling service	^ 170	*189	^ 404	*134	*101	*35	^ 16	^ 1 049
Calendar/ Rotational Scheduling	^ 1 337	^ 1 719	1 157	^ 566	^ 456	^ 312	^ 57	5 604
Knowledge or Observation	9 388	9 258	8 086	4 712	2 528	1 785	248	36 005
Other	^ 228	^ 260	^ 216	^ 176	*25	^ 36	^ 11	^ 952

- ^ estimate has a relative standard error of 10% to less than 25% and should be used with caution
- \* estimate has a relative standard error of 25% to 50% and should be used with caution
- (a) Number of agricultural businesses using tools.
- (b) Includes ACT.

**4.4** TOOLS USED IN IRRIGATION DECISION MAKING(a), by Murray–Darling Basin(b)—2008–09 .....

	MDB	Non-MDB	Aust.
	no.	no.	no.
Evaporation figures or graphs	1 681	2 161	3 841
Tensiometers	^ 1 368	2 372	3 739
Soil Probes	2 866	3 400	6 266
Government or Commercial Scheduling service	^ 370	^ 679	^ 1 049
Calendar/ Rotational Scheduling	2 357	3 246	5 604
Knowledge or Observation	13 508	22 497	36 005
Other	^ 407	^ 545	^ 952

- ^ estimate has a relative standard error of 10% to less than 25% and should be used with caution
- (a) Number of agricultural businesses using tools.
- (b) Based on NRM regions. Refer to the Explanatory Notes for further information.

## 4.5 CHANGES TO IRRIGATION PRACTICES(a), by State—2008–09

	NSW(b)	Vic.	Qld	SA	WA	Tas.	NT	Aust.
	no.	no.	no.	no.	no.	no.	no.	no.
Made no changes	4 990	3 468	4 391	2 500	1 907	1 082	185	18 523
Made one or more changes	5 138	6 613	4 414	3 321	958	881	93	21 417
Change								
Reduced the area under irrigation	1 433	2 190	^ 889	^ 709	^ 163	^ 214	^ 19	5 618
Increased the area under irrigation	^ 628	^ 812	^ 753	^ 281	^ 244	^ 295	21	3 035
Adopted more efficient irrigation techniques	2 180	^ 2 847	1 879	^ 1 186	^ 336	304	38	8 770
Adopted more efficient irrigation scheduling	1 280	^ 1 935	1 441	^ 1 132	^ 410	216	45	6 459
Purchased extra water	^ 594	^ 2 055	*202	^ 1 301	np	^ 98	np	4 289
Sold water	805	^ 818	*97	^ 59	**34	np	np	1 848
Installed piping and/or covered open channels to reduce water loss	^ 453	^ 721	^ 374	*77	*124	^ 101	*6	1 857
Laser levelled areas to improve water management	674	^ 1 119	^ 1 081	*113	np	np	—	3 025
Introduced reused or recycled water from on-farm sources	^ 645	^ 878	^ 468	^ 69	**51	*25	—	2 136
Introduced reused or recycled water from off-farm sources	^ 88	*68	^ 78	*37	—	^ 6	—	^ 276
Increased on-farm water storage capacity	^ 729	^ 951	^ 308	*276	*83	^ 192	—	2 539
Installed soil moisture sensors	^ 508	^ 621	328	^ 314	^ 117	^ 96	^ 9	1 992
Other changes	*32	^ 111	*58	*103	*18	^ 5	*6	^ 332

^ estimate has a relative standard error of 10% to less than 25% and should be used with caution

\* estimate has a relative standard error of 25% to 50% and should be used with caution

\*\* estimate has a relative standard error greater than 50% and is considered too unreliable for general use

— nil or rounded to zero (including null cells)

np not available for publication but included in totals where applicable, unless otherwise indicated

(a) Number of agricultural businesses.

(b) Includes ACT.

## 4.6 CHANGES TO IRRIGATION PRACTICES(a), by Murray–Darling Basin(b)—2008–09

	<i>MDB</i>	<i>Non-MDB</i>	<i>Aust.</i>
	no.	no.	no.
Made no changes	4 504	14 019	18 523
Made one or more changes	10 573	10 844	21 417
Change			
Reduced the area under irrigation	3 649	1 969	5 618
Increased the area under irrigation	^ 1 032	2 003	3 035
Adopted more efficient irrigation techniques	4 054	4 716	8 770
Adopted more efficient irrigation scheduling	2 784	3 675	6 459
Purchased extra water	3 315	^ 974	4 289
Sold water	^ 1 674	^ 174	1 848
Installed piping and/or covered open channels to reduce water loss	^ 977	^ 880	1 857
Laser levelled areas to improve water management	1 831	^ 1 194	3 025
Introduced reused or recycled water from on-farm sources	^ 1 020	^ 1 116	2 136
Introduced reused or recycled water from off-farm sources	^ 88	^ 189	^ 276
Increased on-farm water storage capacity	^ 1 089	^ 1 450	2 539
Installed soil moisture sensors	^ 1 148	^ 845	1 992
Other	*165	^ 167	^ 332

^ estimate has a relative standard error of 10% to less than 25% and should be used with caution

\* estimate has a relative standard error of 25% to 50% and should be used with caution

(a) Number of agricultural businesses.

(b) Based on NRM regions. Refer to the Explanatory Notes for further information.

## 4.7 INTENDED CHANGES TO IRRIGATION PRACTICES (a)(b), by State—2008–09

	NSW(c)	Vic.	Qld	SA	WA	Tas.	NT	Aust.
	no.	no.	no.	no.	no.	no.	no.	no.
No change intended	5 179	4 225	4 386	2 960	1 637	972	192	19 550
One or more changes intended	4 949	5 856	4 419	2 861	1 229	991	85	20 389
Change intended								
Reduce the area under irrigation	^ 692	^ 1 158	^ 516	^ 479	^ 156	^ 90	^ 13	3 106
Increase the area under irrigation	^ 1 320	^ 1 357	1 499	^ 316	^ 406	473	37	5 407
Adopt more efficient irrigation techniques	2 144	2 442	1 744	^ 977	^ 597	398	^ 33	8 334
Adopt more efficient irrigation scheduling	1 327	^ 1 483	1 461	^ 1 011	^ 445	^ 253	29	6 009
Purchase extra water	^ 761	^ 1 397	^ 284	^ 924	np	^ 256	np	3 712
Sell water	^ 505	^ 794	^ 178	^ 132	*57	np	np	1 700
Install piping and/or cover open channels to reduce water loss	^ 347	^ 821	^ 426	np	*116	^ 117	np	1 931
Laser level areas to improve water management	^ 677	^ 960	^ 1 185	*104	*85	^ 14	^ 6	3 029
Introduce reused or recycled water from on-farm sources	^ 669	^ 513	^ 639	*236	^ 61	*38	*9	2 165
Introduce reused or recycled water from off-farm sources	^ 76	*18	*163	**110	np	*4	np	*376
Increase on-farm water storage capacity	^ 1 054	^ 821	^ 753	*369	^ 221	^ 312	^ 6	3 537
Install soil moisture sensors	^ 800	^ 680	^ 671	^ 386	^ 254	^ 145	^ 11	2 946
Other changes	*17	*72	np	**85	**10	np	*7	^ 229

- ^ estimate has a relative standard error of 10% to less than 25% and should be used with caution
- \* estimate has a relative standard error of 25% to 50% and should be used with caution
- \*\* estimate has a relative standard error greater than 50% and is considered too unreliable for general use
- np not available for publication but included in totals where applicable, unless otherwise indicated
- (a) Number of agricultural businesses.
- (b) Changes intended to be made after 30 June 2009.
- (c) Includes ACT.

## 4.8 INTENDED CHANGES TO IRRIGATION PRACTICES (a)(b), by Murray–Darling Basin(c)—2008–09

	<i>MDB</i>	<i>Non-MDB</i>	<i>Aust.</i>
	no.	no.	no.
No change intended	6 361	13 189	19 550
One or more changes intended	8 715	11 674	20 389
Change intended			
Reduce the area under irrigation	^ 1 807	1 298	3 106
Increase the area under irrigation	1 875	3 532	5 407
Adopt more efficient irrigation techniques	3 433	4 901	8 334
Adopt more efficient irrigation scheduling	2 241	3 768	6 009
Purchase extra water	2 444	^ 1 268	3 712
Sell water	^ 1 406	^ 294	1 700
Install piping and/or cover open channels to reduce water loss	^ 910	^ 1 020	1 931
Laser level areas to improve water management	1 434	^ 1 595	3 029
Introduce reused or recycled water from on-farm sources	^ 859	^ 1 305	2 165
Introduce reused or recycled water from off-farm sources	^ 58	* 317	* 376
Increase on-farm water storage capacity	^ 1 187	2 350	3 537
Install soil moisture sensors	^ 1 299	1 646	2 946
Other	^ 61	* 168	^ 229

^ estimate has a relative standard error of 10% to less than 25% and should be used with caution

\* estimate has a relative standard error of 25% to 50% and should be used with caution

(a) Number of agricultural businesses.

(b) Changes intended to be made after 30 June 2009.

(c) Based on NRM regions. Refer to the Explanatory Notes for further information.

**EXPENDITURE**

Australian agricultural businesses spent \$1.4 billion on irrigation-related expenditure in 2008–09, which was similar to the total expenditure in 2006–07. Most of this (\$440.4 million) was irrigation operating expenses (which included items such as pump running expenses, repairs and maintenance, but did not include the costs associated with the purchase of water). The next largest irrigation outlay was the purchase of irrigation equipment (\$288.6 million), followed by annual irrigation charges (\$152.1 million).

In 2008–09, the highest reported irrigation-related expenditure for every state and territory, except for Tasmania, was irrigation operating expenses. In Tasmania, the highest outlay was the purchase of irrigation equipment.

Half of all expenditure on capital construction of irrigation earthworks and structures in Australia in 2008–09 occurred in Victoria (\$55.6 million). This state also recorded 49% of Australia's \$146.7 million expenditure on the purchase of extra water on a temporary basis.

Compared to 2006–07, the greatest change in irrigation expenditure in 2008–09 occurred for capital construction of irrigation earthworks and structures, where the 2008–09 expenditure fell 39% to \$110.9 million. Expenditure on water licences and annual irrigation charges in 2008–09 however, was 32% higher than that in 2006–07.

Of the \$819.3 million irrigation-related expenditure in the Murray–Darling Basin in 2008–09, 27% was irrigation operating expenses other than the costs associated with the purchase of water. The next highest outlay was the purchase of extra water on a temporary basis (\$138.2 million), followed by the purchase of irrigation equipment (\$126.5 million).

Of the total irrigation expenditure on the purchase of extra water on a temporary basis in Australia in 2008–09, 94% (or \$138.2 million) was spent in the Murray–Darling Basin.

**ASSETS**

The value of irrigation equipment and infrastructure on agricultural establishments in Australia in 2008–09 was \$8.5 billion. The highest value was in New South Wales (\$2.8 billion) which was a third of Australia's total value, followed by Queensland (\$2.2 billion) and Victoria (\$1.4 billion).

In 2008–09 the value of irrigation equipment and infrastructure on agricultural establishments in the Murray–Darling Basin totalled \$5.0 billion, which was 59% of the Australian total.

**5.1** IRRIGATION EXPENDITURE, by State—2008–09

	NSW(a)	Vic.	Qld	SA	WA	Tas.	NT	Aust.
	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
Water licence	52 054	37 935	30 180	^ 20 749	^ 4 463	1 651	^ 78	147 109
Annual irrigation charges	39 552	50 503	30 610	24 820	^ 4 578	1 964	*48	152 076
Purchase of extra water on a temporary basis	^ 29 669	71 724	^ 3 261	41 012	^ 137	881	—	146 686
Purchase of extra water on a permanent basis	^ 35 667	49 632	10 625	*4 736	**569	^ 5 992	—	107 222
Other irrigation operating expenditure	137 099	74 836	111 413	68 993	23 301	22 112	2 619	440 373
Purchase of irrigation equipment	^ 70 667	^ 65 022	^ 64 073	^ 43 248	^ 10 629	^ 32 903	2 080	288 623
Capital construction of irrigation earthworks and structures	^ 19 966	*55 553	16 661	^ 5 460	*2 353	^ 10 887	—	^ 110 879
<b>Total irrigation expenditure(b)</b>	<b>387 480</b>	<b>407 607</b>	<b>275 174</b>	<b>215 185</b>	<b>46 655</b>	<b>78 007</b>	<b>5 053</b>	<b>1 415 161</b>

^ estimate has a relative standard error of 10% to less than 25% and should be used with caution

\* estimate has a relative standard error of 25% to 50% and should be used with caution

\*\* estimate has a relative standard error greater than 50% and is considered too unreliable for general use

— nil or rounded to zero (including null cells)

(a) Includes ACT.

(b) Includes unspecified expenditure.

**5.2** IRRIGATION EXPENDITURE, by Murray–Darling Basin(a)—2008–09

	MDB	Non-MDB	Aust.
	\$'000	\$'000	\$'000
Water licence	88 052	59 057	147 109
Annual irrigation charges	92 080	59 996	152 076
Purchase of extra water on a temporary basis	138 166	^ 8 520	146 686
Purchase of extra water on a permanent basis	90 189	^ 17 033	107 222
Other irrigation operating expenditure	221 612	218 761	440 373
Purchase of irrigation equipment	126 510	162 113	288 623
Capital construction of irrigation earthworks and structures	^ 50 913	*59 966	^ 110 879
<b>Total irrigation expenditure(b)</b>	<b>819 280</b>	<b>595 881</b>	<b>1 415 161</b>

^ estimate has a relative standard error of 10% to less than 25% and should be used with caution

\* estimate has a relative standard error of 25% to 50% and should be used with caution

(a) Based on NRM regions. Refer to the Explanatory Notes for further information.

(b) Includes unspecified expenditure.

### 5.3 VALUE OF IRRIGATION EQUIPMENT AND INFRASTRUCTURE, by State—2008–09 ..

	<i>NSW(a)</i>	<i>Vic.</i>	<i>Qld</i>	<i>SA</i>	<i>WA</i>	<i>Tas.</i>	<i>NT</i>	<i>Aust.</i>
	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000

**Total value**    **2 818 198**    **1 431 789**    **2 243 400**    **1 291 843**    **318 803**    **359 049**    **27 968**    **8 491 049**

(a) Includes ACT.

### 5.4 VALUE OF IRRIGATION EQUIPMENT AND INFRASTRUCTURE, by Murray–Darling Basin—2008–09 ..

	<i>MDB</i>	<i>Non-MDB</i>	<i>Aust.</i>
	\$'000	\$'000	\$'000

**Total value**    **5 007 488**    **3 483 562**    **8 491 049**

## EXPLANATORY NOTES .....

### INTRODUCTION

**1** This publication contains estimates of water use from the 2008–09 Agricultural Survey. It contains detailed statistics on agricultural water use as well as pastures and crops irrigated. Data are available at the national and state/territory levels, as well as for the Murray-Darling Basin. Summary data on irrigation water use will also be presented by Natural Resource Management (NRM) regions and by Statistical Divisions as additional data cubes. These data cubes can be accessed via the Downloads tab of *Water Use on Australian Farms, 2008–09* (cat. no. 4618.0).

### GENERAL

**2** In 2007–08, an Agricultural Resource Management Survey (ARMS) was run with a reduced set of commodities compared to the Agricultural Survey/Census of previous years. The ARMS was a combination of a reduced Agricultural Survey and a benchmark survey of land management practices undertaken by agricultural businesses as well as a survey of management responses to adverse seasonal conditions experienced by affected agricultural businesses. In 2008–09, the Australian Bureau of Statistics (ABS) returned to the Agricultural Survey which collected a greater range of agricultural commodities and livestock breakdowns than the 2007–08 ARMS.

**3** Where figures for individual states/territories have been suppressed for reasons of confidentiality, they have been included in relevant totals.

**4** Australian Capital Territory data have been combined with New South Wales data.

**5** Where figures have been rounded, discrepancies may occur between sums of the component items and totals.

### SCOPE AND COVERAGE

**6** The scope of the 2008–09 Agricultural Survey was all agricultural businesses recorded on the ABS Business Register (ABSBR) above a minimum size cutoff. The ABSBR is based on the Australian Business Register (ABR) which is administered and maintained by the Australian Taxation Office (ATO).

**7** A minimum size cut-off of \$5,000 was applied to determine whether a business was in-scope for the 2008–09 Agricultural Survey. The measure of size was based on the ABS' Estimated Value of Agricultural Operations (EVAO) or a derived value based on Business Activity Statement (BAS) turnover.

**8** While the ABSBR does not include all agricultural businesses in Australia, it provides improved coverage from the former ABS-maintained Agricultural Survey frame as most businesses and organisations in Australia need to obtain an Australian Business Number (ABN) from the ATO for their business operations. The ABR-based register is also more up-to-date as it excludes agricultural businesses with cancelled ABNs and incorporates regularly updated information on agricultural businesses from the ATO.

**9** The key implication of the move to the ABR-based register is that the data from 2005–06 onwards are not directly comparable with the historical time series of agricultural water data presented for 2003–04 and 2004–05. Therefore, care should be taken in comparing 'Old basis' and 'New basis' estimates.

**10** For the 2008–09 Agricultural Survey, a response rate of approximately 88.3% was achieved from a sample of approximately 38,000 agricultural businesses selected from an in-scope population of approximately 171,000 agricultural businesses.

- AGRICULTURAL BUSINESSES AND AREA UNDER PASTURE OR CROP
- 11** The number of agricultural businesses and the area under pasture or crop are included for irrigation crop categories where these are available. In some cases, the number of agricultural businesses and the area under pasture or crop are not available or may not be directly comparable with the categories used for irrigated crops. More information is available upon request.
- COMPARABILITY WITH AGRICULTURAL COMMODITIES AUSTRALIA
- 12** The estimates of agricultural businesses and area under pasture or crop for 2003–04 have been drawn from *Agricultural Commodities, Australia* (cat. no. 7121.0). These estimates were compiled from the annual Agricultural Survey and Supplementary Collections (i.e. Apples and Pears, Vineyards, and Vegetable collections). The estimates of agricultural establishments and area under pasture or crop for 2004–05 to 2008–09 presented in this publication differ from *Agriculture Commodities, Australia*, in that the estimates for grapevines in this publication are derived from the Agricultural Survey and ARMS rather than the Vineyards Collection.
- MURRAY-DARLING BASIN GEOGRAPHY
- 13** Data for the Murray–Darling Basin (MDB) region were derived from a concordance of NRM regions falling mostly within the MDB region. The MDB data used in *Water Use on Australian Farms, 2005–06* (cat. no. 4618.0) were derived from geocoded data. Therefore, there will be small differences when comparing these data to 2006–07, 2007–08 and 2008–09 MDB data.
- RELIABILITY OF DATA SAMPLING ERRORS
- 14** The estimates in this publication are subject to sampling and non-sampling errors.
- 15** The estimates in this publication are based on information obtained from respondents to the Agricultural Survey for the year ended 30 June 2009 and are subject to sampling variability; that is, estimates may differ from figures that would be produced if all agricultural businesses had been included in the survey. One measure of the likely difference is given by the standard error (SE), which indicates the extent to which an estimate might vary by chance when not all units have responded, i.e. when a 'sample' of responses only is obtained. There are about two chances in three that a 'sample' estimate will differ by less than one SE from the figure that would have been obtained if all units had responded, and about nineteen chances in twenty that the difference will be less than two SEs.
- 16** In this publication, 'sampling' variability of the estimates is measured by the relative standard error (RSE) which is obtained by expressing the SE as a percentage of the estimate to which it refers.
- 17** Most published estimates have RSEs less than 5%. For some states/territories with limited irrigation of certain commodities or limited numbers of units reporting a particular source of agricultural water, RSEs are greater than 10%. Where the RSE of an estimate included in this publication falls in the range of 10% to less than 25%, it has been annotated with the symbol '^' indicating that the estimate should be used with caution as it is subject to sampling variability too high for some purposes. Where the RSE of an estimate is 25% to 50%, it has been annotated with the symbol '\*', indicating that the estimate should be used with caution as it is subject to sampling variability too high for most practical purposes. Where the RSE of an estimate exceeds 50%, it has been annotated with the symbol '\*\*', indicating that the sampling variability causes the estimate to be considered too unreliable for general use. Separate indication of the RSEs of all estimates is available on request.
- 18** The following table contains estimates of RSEs for a selection of the statistics presented in this publication:

RELATIVE STANDARD ERRORS OF SELECTED ESTIMATES, by State—2008–09

	NSW(a)	Vic.	Qld	SA	WA	Tas.	NT	Australia
	%	%	%	%	%	%	%	%
Total area irrigated (ha)	3.2	6.3	4.5	5.1	4.5	4.4	3.4	2.3
Total volume applied (ML)	3.2	6.5	5.0	6.5	4.2	5.6	3.6	2.3
Pasture for grazing area irrigated (ha)	8.3	8.6	14.1	10.7	12.4	7.6	16.1	5.1
Pasture for grazing volume applied (ML)	9.6	10.9	13.9	11.8	12.0	8.9	15.4	6.0
Rice area irrigated (ha)	10.4	—	—	—	—	—	—	10.4
Rice volume applied (ML)	11.9	—	—	—	—	—	—	11.9
Sugar cane area irrigated (ha)	—	—	8.6	—	—	—	—	8.6
Sugar cane volume applied (ML)	—	—	9.7	—	—	—	—	9.7
Cotton area irrigated (ha)	5.2	—	10.2	—	—	—	—	6.0
Cotton volume applied (ML)	6.1	—	8.5	—	—	—	—	5.3

— nil or rounded to zero (including null cells)

(a) Includes ACT.

NON-SAMPLING ERRORS

**19** Errors other than those due to sampling may occur because of deficiencies in the list of units from which the sample was selected, non-response, and errors in reporting by providers. Inaccuracies of this kind are referred to as non-sampling errors, which may occur in any collection, whether it be a census or a sample. Every effort has been made to reduce non-sampling error to a minimum by careful design and testing of questionnaires, operating procedures and systems used to compile the statistics.

ABS DATA AVAILABLE ON REQUEST

**20** As well as the statistics included in this and related publications, the ABS may have other relevant data available on request. Inquiries should be made to the National Information and Referral Service on 1300 135 070.

ACKNOWLEDGMENT

**21** ABS publications draw extensively on information provided freely by individuals, businesses, governments and other organisations. Their continued cooperation is very much appreciated. Without it, the wide range of statistics published by the ABS would not be available. The Bureau of Meteorology's contribution of the Climate Conditions Appendix in this publication is especially acknowledged. Information received by the ABS is treated in strict confidence, as required by the *Census and Statistics Act 1905*.

RELATED PUBLICATIONS

**22** A range of environmental and agricultural publications are produced by the ABS, including:

- *Agricultural Commodities, Australia* (cat. no. 7121.0)
- *Farm Management and Climate* (cat. no. 4625.0)
- *Land Management and Farming in Australia* (cat. no. 4627.0)
- *Natural Resource Management on Australian Farms* (cat. no. 4620.0)
- *Water Access Entitlements, Allocations and Trading* (cat. no. 4610.0.55.003)
- *Water Account, Australia* (cat. no. 4610.0)
- *Water and the Murray–Darling Basin - A Statistical Profile, 2000–01 to 2005–06* (cat. no. 4610.0.55.007)

**23** For more information on other products released by the ABS, please refer to the ABS website <<http://www.abs.gov.au>>. The ABS also issues a daily Release Advice on the website which details products to be released in the week ahead. All ABS publications are available free of charge from the ABS website.

AUSTRALIAN CLIMATE  
CONDITIONS - 2008-09

2008-09 was a wet period in much of northern Australia. Marginal *La Niña* conditions existed for a time in late 2008 and early 2009 before weakening; these were associated with a very active wet season in many parts of the tropics. It was, however, a relatively dry year in much of southern Australia, particularly the south-east. Temperatures were generally above normal, but not exceptionally so.

Rainfall for the year averaged over Australia was 521 mm, 11% above the average for the 1961-90 reference period. This ranked as the 21st highest value out of 109 years. Queensland (25% above average, 14th highest), the Northern Territory (15% above average) and Western Australia (13% above average) all had wet years. In contrast, Victoria (25% below average) had its tenth-driest year on record, the third successive year which has ranked in the bottom ten. Tasmania (10% below), South Australia (8% below average) and New South Wales (3% below average) were all slightly drier than normal, as were the Murray-Darling Basin (8% below average) and south-western Western Australia (3% below average).

Above normal rainfall dominated northern Australia (A1.2). Most of Queensland was wetter than average, except for the far south-west, parts of Cape York Peninsula, and scattered patches in the south-eastern quarter. It was also wet in the Northern Territory north of Tennant Creek, except for a small area on the central north coast. Western Australia was also predominantly wet, except for western areas within 300 kilometres of the coast from Onslow southwards. Outside the tropics, areas which were wetter than normal included the far west coast and north-west of South Australia, northern New South Wales, and a few parts of southern Tasmania.

The largest positive rainfall anomalies occurred in much of northern Queensland outside Cape York Peninsula. Most of this region was in the wettest 10% of all years (decile 10) with records set around Townsville and Mount Isa, while a large area in the inland northwest of Queensland had more than double its annual average. The bulk of this rain fell in January and early February 2009, resulting in widespread and severe flooding. Rainfall figures in the wettest 10% of years also occurred over much of a band extending from north-western Queensland across the north-central Northern Territory into the Kimberley region of Western Australia. Decile 10 falls also occurred on the north coast of New South Wales north of Taree, and a small area around Esperance in Western Australia.

The most significant dryness was in the south-east of Australia. While no significant records were set, a number of regions still had a year sufficiently dry to rank in the driest 10% on record. The most significant of these was an area of central Victoria centred on Melbourne, and extending from Ararat to Sale. Other similarly dry areas included the far south coast of New South Wales (where totals were 40-50% below average), far western Victoria and adjoining South Australia, and some small areas in the vicinity of Bunbury, Perth and Shark Bay in Western Australia.

AUSTRALIAN CLIMATE  
CONDITIONS - 2008-09  
*continued*

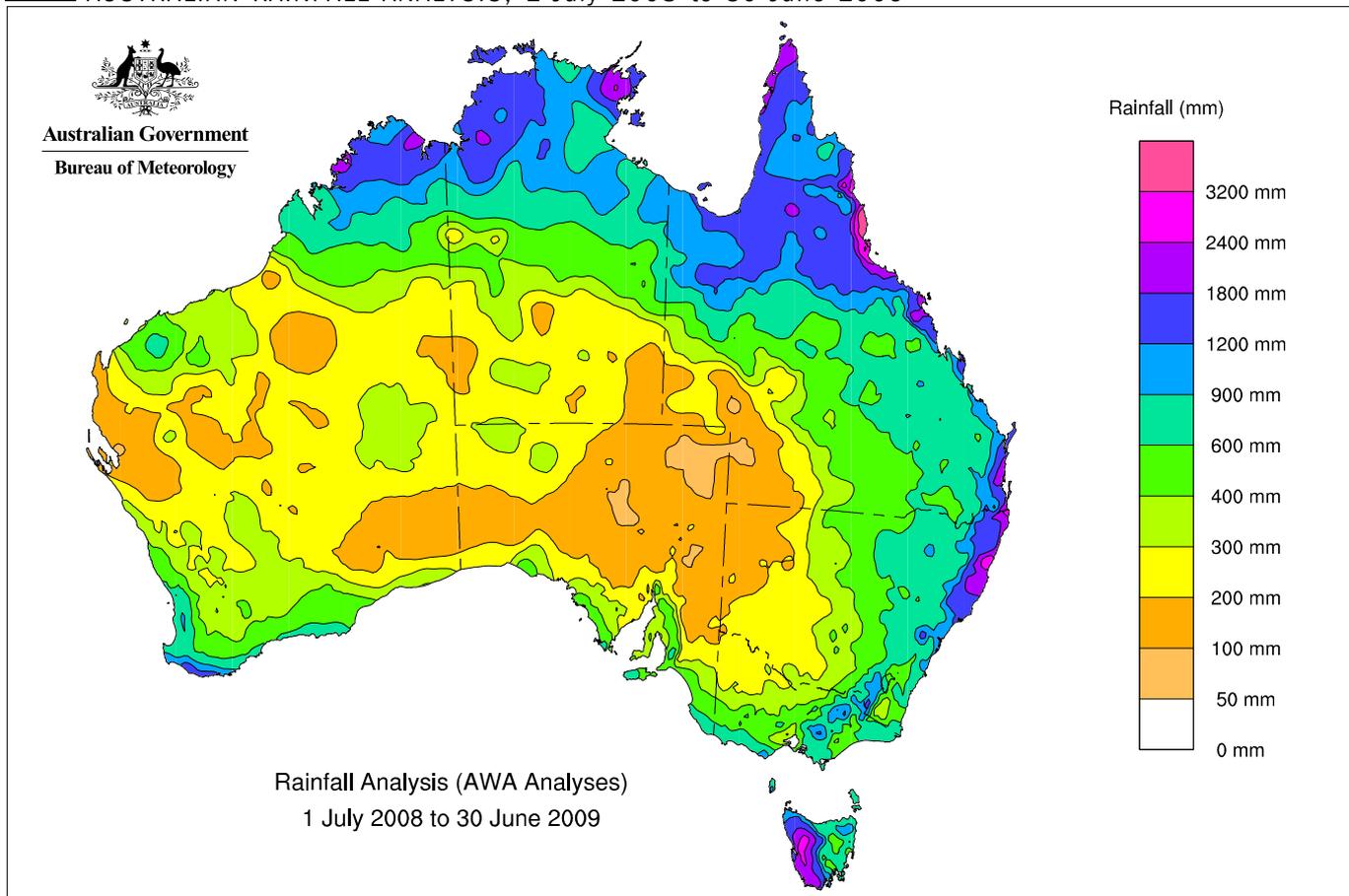
Both daytime maximum (A1.3) and overnight minimum (A1.4) temperatures were above normal over most of Australia, but not by exceptional margins compared with recent years. Both maximum (0.40°C above the 1961-90 average) and minimum (0.32°C above) temperatures ranked as 15th highest on record. The largest temperature anomalies for the year were around +1°C. For maximum temperatures, they occurred around Shark Bay and Broome in Western Australia, as well as east of Darwin in the Northern Territory, where local records were set. Similar anomalies also occurred in south-western Queensland and the eastern Riverina (NSW). For minimum temperatures, the most abnormally warm areas were in the far south of the Northern Territory, and in parts of southern inland New South Wales.

Conversely, maximum temperatures for the year were below normal in areas including northern interior Queensland and adjacent parts of the Northern Territory (largely as a result of the very active wet season), and the south coast of Western Australia. Below normal minimum temperatures occurred over most of Victoria and agricultural areas of South Australia, as well as much of the western half of Western Australia, and scattered patches through the tropics.

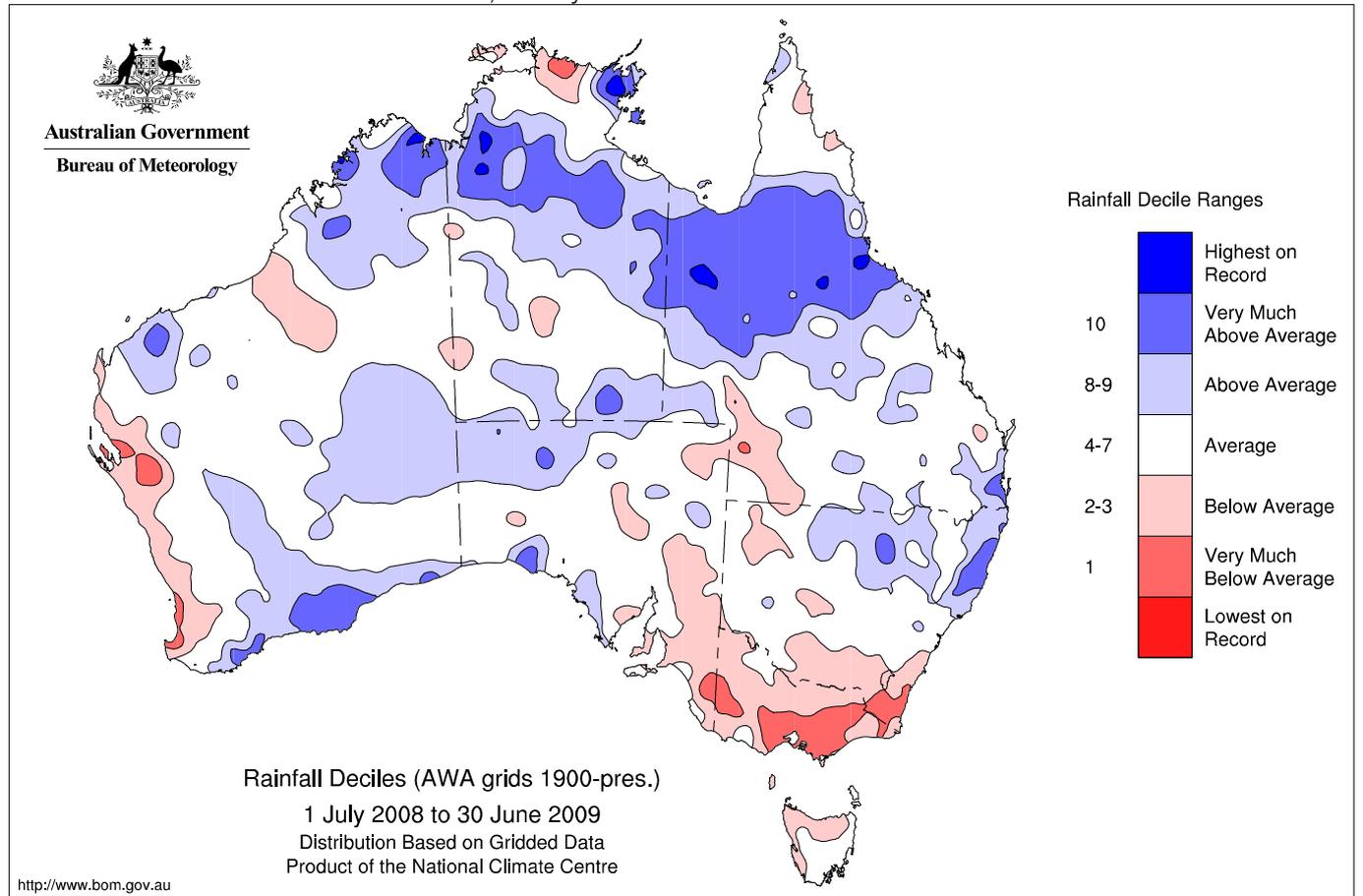
At a monthly level, August 2008 was very dry over most of Australia, especially in the southwest where many records were set. It was also a rather cold month and featured a new state record low temperature for Western Australia (-7.2°C), at Eyre on the Nullarbor coast. For the third year in succession the September-October period was extremely dry and warm in the southeast, especially in Victoria and southern South Australia, but was quite wet in Western Australia (which had its ninth wettest spring on record). November and December saw rain return to much of the inland after a very dry ten months; South Australia had its wettest November-December 2008 on record after its second driest January-October 2008.

January and February 2009 were, as noted above, very wet in northern Australia, but very dry in much of the south. Temperatures followed the rainfall pattern, being well below normal in the north, and well above normal in the south, thanks mainly to an exceptional heatwave in late January and early February which set state record high temperatures for Victoria (48.8°C at Hopetoun) and Tasmania (42.2°C at Scamander), and culminated in the "Black Saturday" bushfires of 7 February. Autumn 2009 was rather dry in many areas - with the major exception of coastal northern New South Wales and southern Queensland. A late "autumn break" in May was received in many cropping areas in both the south-east and south-west of Australia. Kalbarri (WA) did not receive its first measurable rain for 2009 until 20 May. However, useful rains in both regions in late May and June enabled most winter crops to be planted.

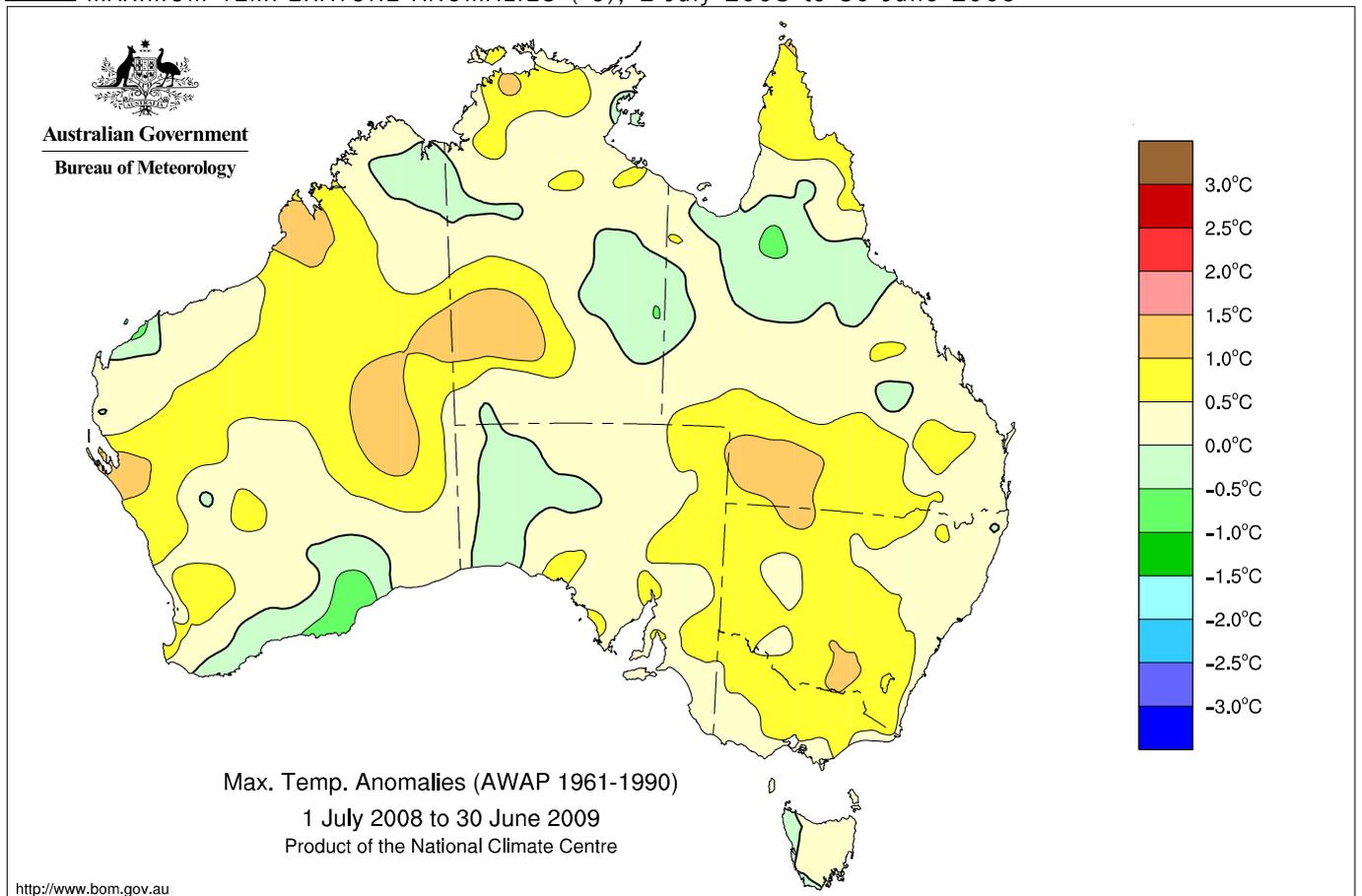
**A1.1** AUSTRALIAN RAINFALL ANALYSIS, 1 July 2008 to 30 June 2009



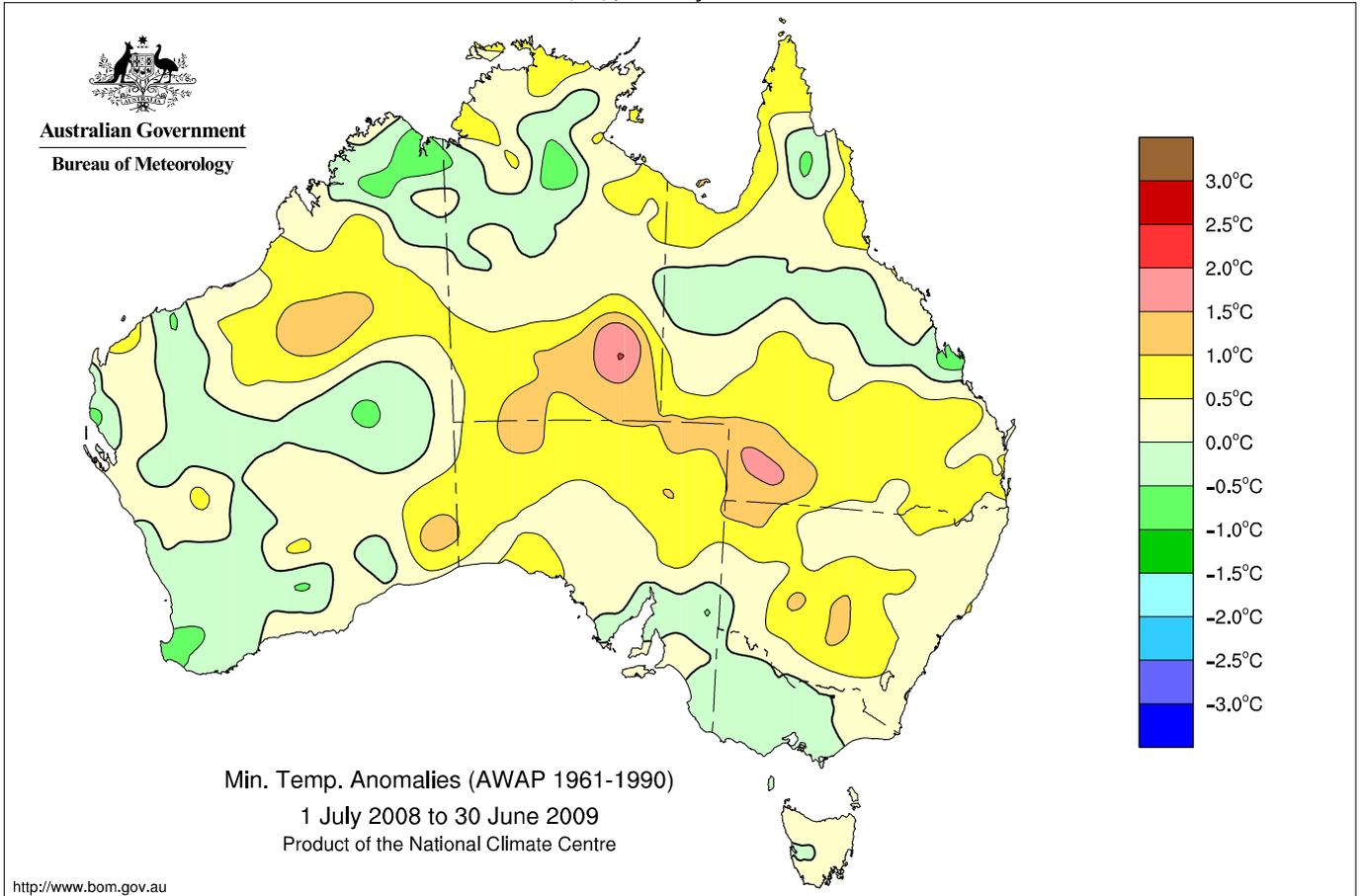
**A1.2** AUSTRALIAN RAINFALL DECILES, 1 July 2008 to 30 June 2009



**A1.3** MAXIMUM TEMPERATURE ANOMALIES (°C), 1 July 2008 to 30 June 2009

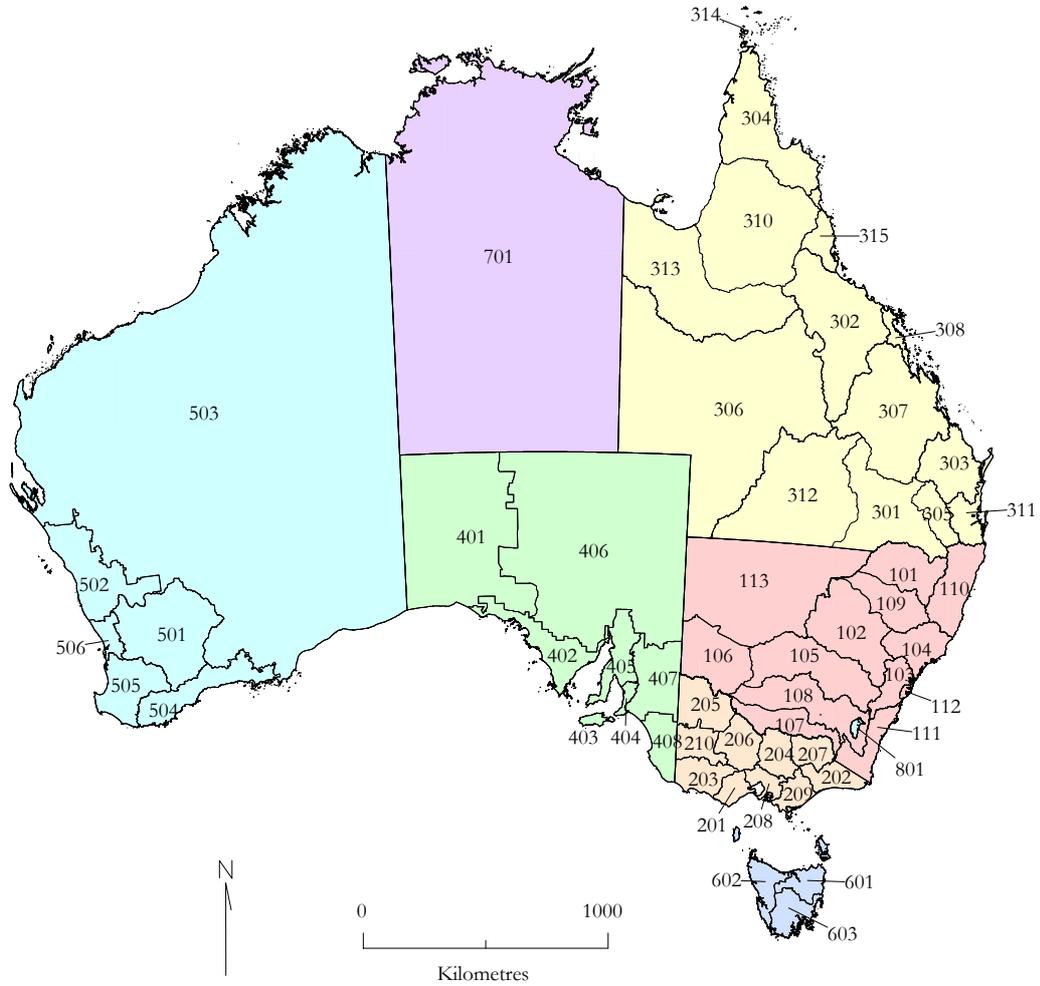


**A1.4** MINIMUM TEMPERATURE ANOMALIES (°C), 1 July 2008 to 30 June 2009



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Issued: 25/01/2010



NRM Region \*

- |  |  |  |
|--|--|--|
| <ul style="list-style-type: none"> <li>101: Border Rivers-Gwydir</li> <li>102: Central West</li> <li>103: Hawkesbury-Nepean</li> <li>104: Hunter-Central Rivers</li> <li>105: Lachlan</li> <li>106: Lower Murray-Darling</li> <li>107: Murray</li> <li>108: Murrumbidgee</li> <li>109: Namoi</li> <li>110: Northern Rivers</li> <li>111: Southern Rivers</li> <li>112: Sydney Metro</li> <li>113: Western</li> </ul> | <ul style="list-style-type: none"> <li>208: Port Phillip and Westernport</li> <li>209: West Gippsland</li> <li>210: Wimmera</li> </ul>   | <ul style="list-style-type: none"> <li>404: Adelaide and Mount Lofty Ranges</li> <li>405: Northern and Yorke</li> <li>406: SA Arid Lands</li> <li>407: SA Murray Darling Basin</li> <li>408: South East (SA)</li> </ul>  |
| <ul style="list-style-type: none"> <li>201: Mallee</li> <li>202: East Gippsland</li> <li>203: Glenelg Hopkins</li> <li>204: Goulburn Broken</li> <li>205: North Central</li> <li>206: North East (VIC)</li> </ul>  | <ul style="list-style-type: none"> <li>301: Border Rivers Maranoa-Balonne</li> <li>302: Burdekin</li> <li>303: Burnett Mary</li> <li>304: Cape York</li> <li>305: Condamine</li> <li>306: Desert Channels</li> <li>307: Fitzroy</li> <li>308: Mackay Whitsunday</li> <li>310: Northern Gulf</li> <li>311: South East (QLD)</li> <li>312: South West (QLD)</li> <li>313: Southern Gulf</li> <li>314: Torres Strait</li> <li>315: Wet Tropics</li> </ul> | <ul style="list-style-type: none"> <li>501: Avon</li> <li>502: Northern Agricultural Region</li> <li>503: Rangelands (WA)</li> <li>504: South Coast Region</li> <li>505: South West Region</li> <li>506: Swan</li> </ul> |
| <ul style="list-style-type: none"> <li>601: North (TAS)</li> <li>602: North West (TAS)</li> <li>603: South (TAS)</li> </ul>  | <ul style="list-style-type: none"> <li>701: Northern Territory</li> </ul>  | <ul style="list-style-type: none"> <li>801: ACT</li> </ul>   |

\*Numbers used are NRM codes.

Source: Department of the Environment and Heritage - 2008.

## GLOSSARY .....

<b>Agricultural business</b>	A business which is engaged in agricultural activities above a minimum size (\$5,000, based on EVAO or a derived value based on Business Activity Statement (BAS) Turnover).
<b>Application rate</b>	The rate at which water is applied to an area or crop. Measured in megalitres per hectare, application rate is calculated by dividing the total area of interest by the total volume applied to the area.
<b>Area of agricultural holding</b>	Includes all occupied and maintained land owned, leased or rented, land worked by sharefarmers and all road permits by a particular agricultural establishment. Excludes land leased or rented to others.
<b>Area of agricultural land</b>	Refers to the area of agricultural holding of in-scope agricultural businesses. This is not equal to the area under pasture or crop as not all land on agricultural holdings is under pasture or crop.
<b>Estimated value of agricultural operations (EVAO)</b>	An estimation of the value of agricultural activity undertaken by an agricultural business. Three-year average weighted prices are applied to livestock turnoff and livestock numbers on the farm, and to area and production data for crops. The resultant aggregation of these commodity values is EVAO. It is not an indicator of the value of receipts of individual farms, but rather, an indicator of the extent of agricultural activity.
<b>Gigalitre</b>	One thousand million litres.
<b>Megalitre</b>	One million litres.







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