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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.

BACKGROUND

The agriculture industry is a major consumer of water in the Australian economy. The most recently published data on water use across the economy, *Water Account, Australia 2004–05 (cat. no. 4610.0)* showed agriculture to account for 65% of all water consumed in 2004–05.

This publication presents estimates of agricultural water use, pastures and crops irrigated, sources of water for agricultural use, irrigation water management and financial data relating to irrigation. Estimates are presented for Australia, state/territories and regions, as well as for the Murray-Darling Basin. The estimates are compiled from data collected as part of the Agricultural survey for the year ended 30 June 2007. Estimates for 2002–03 to 2005–06 are also included in this publication, and changes between 2005–06 and 2006–07 are described.

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 2006 to June 2007 are presented as an appendix to assist in interpreting this data.

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Australian Statistician

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ABBREVIATIONS

'000	thousand
ACT	Australian Capital Territory
Aust.	Australia
EVAO	Estimated Value of Agricultural Operations
ha	hectare
mm	millimetre
MDB	Murray-Darling Basin
ML	megalitre
ML/ha	megalitres per hectare
no.	number
NRM	natural resource management
NSW	New South Wales
NT	Northern Territory
Qld	Queensland
RSE	relative standard error
SA	South Australia
SE	standard error
Tas.	Tasmania
Vic.	Victoria
WA	Western Australia
°C	degrees Celsius

CHAPTER 1

SUMMARY OF AGRICULTURAL WATER USE

AGRICULTURAL WATER USE

Australia

Agricultural water use decreased by 27.1% from the 11,689 gigalitres used in 2005–06 to 8,521 gigalitres in 2006–07. This was driven by a decrease in the use of water for irrigation of crops and pastures, primarily rice and cotton.

Of this 8,521 gigalitres, 89.6% was used for irrigation of pastures and crops, and 10.4% for other agricultural purposes such as stock watering and the cleaning of dairies and piggeries. Volumes of irrigation water for crops and pastures declined by 28.9% from 2005–06, and volumes of water for other purposes declined by 7.0%.

1.1 AGRICULTURAL WATER USE, by State—2006–07

	WATER USE			
	<i>Agricultural businesses no.</i>	<i>Irrigation ML</i>	<i>Other agricultural uses ML</i>	<i>Total water use ML</i>
NSW(a)	47 869	2 605 019	240 062	2 845 082
Vic.	37 429	1 648 914	174 371	1 823 285
Qld	30 650	1 840 252	243 980	2 084 231
SA	15 835	966 057	68 723	1 034 780
WA	13 608	293 186	118 806	411 992
Tas.	4 783	263 029	24 816	287 845
NT	643	19 737	14 477	34 215
Aust.	150 817	7 636 194	885 234	8 521 428

(a) Includes ACT.

State/territory

Total water use by agricultural businesses declined in all states/territories except for Tasmania and South Australia, where increases of 25.3% and 6.1% respectively were reported.

The largest decrease was reported in the New South Wales/Australian Capital Territory region, where total water use by agricultural businesses declined by 40.7% from 4,796 gigalitres in 2005–06 to 2,845 gigalitres in 2006–07. This was followed by Victoria with a decline of 31.0% and Queensland with a decline of 19.2% from the previous year.

Irrigation was the major use of water for agricultural businesses in all states/territories, accounting for 93.4% of all agricultural uses in South Australia, 91.6% in New South Wales, and 91.4% in Tasmania.

Water used for other agricultural purposes accounted for 42.3% of agricultural water use in the Northern Territory and 28.8% in Western Australia.

IRRIGATION WATER USE

Australia

Nationally, 27.7% of agricultural businesses reported using water for irrigation in 2006–07, a decline from the 29.0% reporting the use of water for irrigation in 2005–06. These businesses used 7,636 gigalitres of water for irrigation of crops and pastures, a decline of 28.9% from the 10,737 gigalitres reported in 2005–06.

Nationally, a total of 1,923,000 hectares of agricultural land was irrigated in 2006–07, a decline of 24.5% from that irrigated in 2005–06. The average application rate reduced slightly to 4.0 ML/ha.

1.2 IRRIGATION ACTIVITY, by State—2002–03 to 2006–07

	<i>Agricultural businesses no.</i>	<i>Agricultural businesses irrigating no.</i>	<i>Area of agricultural holding '000 ha</i>	<i>Area irrigated '000 ha</i>	<i>Volume applied ML</i>	<i>Application rate ML/ha</i>
AUSTRALIA						
Old basis(a)						
2002–03	132 983	43 774	439 531	2 378	10 403 759	4.4
2003–04	130 526	40 400	440 110	2 402	10 441 515	4.3
2004–05	129 934	35 244	445 149	2 405	10 084 596	4.2
New basis(b)						
2005–06	154 681	44 826	434 925	2 546	10 737 364	4.2
2006–07	150 817	41 787	425 449	1 923	7 636 194	4.0
2006–07						
New basis(b)						
NSW(c)	47 869	10 689	58 661	680	2 605 019	3.8
Vic.	37 429	10 557	13 250	438	1 648 914	3.8
Qld	30 650	8 757	143 871	458	1 840 252	4.0
SA	15 835	6 447	50 065	201	966 057	4.8
WA	13 608	2 935	96 742	53	293 186	5.5
Tas.	4 783	2 060	1 659	87	263 029	3.0
NT	643	342	61 202	6	19 737	3.2

(a) Derived using ABS-maintained frame. See Explanatory Notes paragraphs 2-6 for detail.

(b) Derived using ABR-based register. See Explanatory Notes paragraphs 2-6 for detail.

(c) Includes ACT.

State/territory

The state with the largest number of agricultural businesses irrigating was New South Wales (25.6% of the national total), followed by Victoria (25.3%) and Queensland (21.0%).

New South Wales, Victoria and Queensland continue to be the major users of irrigation water, together accounting for 6,094 gigalitres or 79.8% of the national volume of water used for irrigation. Water used for irrigation across these three states declined by 34.5% from the 9,307 gigalitres used in 2005–06.

Western Australia continued to have the highest application rate of irrigation water (5.5 ML/ha, up from 5.1 ML/ha in the previous year), followed by South Australia (4.8 ML/ha, up from 4.1 ML/ha). Tasmania continued to have the lowest application rate for irrigation water (3.0 ML/ha, up from 2.5 ML/ha in the previous year).

The area of agricultural land irrigated decreased in all states/territories except Tasmania where it increased by 7.4% to 87,000 hectares in 2006–07. Businesses in New South Wales reported the largest decline in area of land irrigated, down 31.6% to 680,000 hectares from 994,000 hectares in 2005–06. New South Wales reported the greatest proportion of the national irrigated land, with 680,000 hectares, accounting for 35.4% of

State/territory continued

the national total, followed by Queensland and Victoria accounting for 23.8% and 22.8% respectively.

Murray-Darling Basin

Nationally, 39.7% of agricultural businesses and 40.8% of irrigating agricultural businesses were in the Murray-Darling Basin. Irrigated agriculture in the Murray-Darling Basin used 4,458 gigalitres of water, or 58.4% of water used for irrigation nationally. This is a decline of 39.5% in the volume of irrigation water applied from the previous year.

The area of agricultural land irrigated in the Murray-Darling Basin was 1,101,000 hectares, down 33.4% from the 1,654,000 hectares irrigated in 2005–06.

1.3 IRRIGATION ACTIVITY, Murray-Darling Basin(a)—2006–07

	<i>Agricultural businesses no.</i>	<i>Agricultural businesses irrigating no.</i>	<i>Area of agricultural holding '000 ha</i>	<i>Area irrigated '000 ha</i>	<i>Volume applied ML</i>	<i>Application rate ML/ha</i>
MDB in NSW(b)	28 967	5 941	53 469	598	2 384 595	4.0
MDB in Vic	18 934	7 281	8 812	346	1 381 116	4.0
MDB in Qld	7 535	1 384	29 947	85	301 937	3.6
MDB in SA	4 429	2 456	4 932	73	390 631	5.4
MDB	59 865	17 062	97 160	1 101	4 458 279	4.1

(a) Refer to Explanatory Notes paragraph 12.

(b) Includes ACT.

CHAPTER 2

IRRIGATION WATER USE

PASTURES AND CROPS IRRIGATED

Australia

Nationally, the volume of irrigation water applied in 2006–07 decreased by 3,101 gigalitres from that applied in 2005–06. The reduction in irrigation volume for pasture for grazing, rice and cotton accounted for 89.0%. Rice was the crop showing the largest change in volume of irrigation water, down 80.9% to 239 gigalitres. Similarly, the area of rice grown also decreased by 80.4%, to approximately 20,000 hectares, leaving the application rate relatively constant at 12.2 ML/ha. The crop showing the next largest decrease in water applied was pasture for grazing, down by 880 gigalitres or 30.5%, followed by cotton, down 50.0% to 868 gigalitres. The area of cotton irrigated declined by 50.4% over this period.

Pasture for grazing continued to account for the highest volume of irrigation water applied in 2006–07, using 2,008 gigalitres, or 26.3% of national irrigation volume, at an application rate of 3.5 ML/ha. Of this 2,008 gigalitres, 1,163 gigalitres (58.0%) was applied to irrigate pasture for grazing dairy cattle, 513 gigalitres (25.5%) to irrigate pasture for grazing meat cattle, and the remaining 331 gigalitres (16.5%) to irrigate pasture for grazing other livestock. The irrigation of pasture for grazing dairy cattle accounted for 15.2% of total volume of water applied to pastures and crops.

After pasture for grazing, the second largest application of irrigation water was for sugar cane (978 gigalitres at an application rate of 4.9 ML/ha) followed by cotton (868 gigalitres, 6.5 ML/ha). These two crops accounted for 12.8% and 11.4% respectively, of all irrigation water applied.

State/territory

Cotton growers continued to be one of the major users of irrigation water in New South Wales, using 674 gigalitres or 25.9% of irrigation water in the state in 2006–07. The next major use of irrigation water in New South Wales was for cereal crops harvested for grain or seed (18.4% of the total state volume), followed by pasture for grazing (15.9%) and rice (9.1%). The volume of water applied to irrigate rice in New South Wales decreased by 80.9% from the previous year.

Pasture for grazing decreased by 42.9% from 2005–06, but remained the major user of irrigation water in Victoria, using a total of 902 gigalitres, or 54.7% of water used for irrigation in this state. Irrigation of grapevines was the second largest application of irrigation water in Victoria, using 215 gigalitres or 13% of the states irrigation water.

In Queensland, the total decrease in irrigation water from the previous year was 20.8%, mainly due to a significant drop in cotton irrigation. Sugar cane remained the largest user of irrigation water, using 931 gigalitres to irrigate 196,000 hectares at an application rate of 4.7 ML/ha. This represents a decrease of 5.8% from the total volume of water applied to sugar cane in 2005–06.

Pasture for grazing remained the largest use of irrigation water in South Australia during 2006–07, using 309 gigalitres, or 32.0% of the irrigation water applied in South Australia.

State/territory continued

Pasture for grazing dairy cattle was the major pasture irrigated and used 140 gigalitres. The irrigation of grapevines was the next major use of irrigation water in South Australia, using 225 gigalitres or 23.2% of irrigation water in South Australia.

Irrigation of pasture for grazing was also the major use of irrigation water in both Western Australia and Tasmania. In Western Australia, 78 gigalitres or 26.7% of water was applied to pasture for grazing. In Tasmania, 162 gigalitres of water was applied to pasture for grazing and made up 61.6% of irrigation water in that state.

In the Northern Territory, irrigation of fruit and nut trees, plantation or berry fruit used approximately 13 gigalitres, a decline of 17.2% from 2005–06. This volume accounted for 64% of the total volume of irrigation water applied in the Northern Territory.

Murray-Darling Basin

The total water for irrigation in the Murray-Darling Basin in 2006–07 decreased by 39.5% from 7,370 gigalitres in 2005–06 to 4,458 gigalitres in 2006–07.

As for 2005–06, the major uses of irrigation water in the Murray-Darling Basin during 2006–07 were the irrigation of pasture for grazing and the irrigation of cotton. The irrigation of pasture for grazing used 1,093 gigalitres (24.5% of total irrigation water for the region) and cotton used 819 gigalitres (18.4% of total irrigation water for the region). Of water used to irrigate pasture for grazing, 685 gigalitres, or 62.7%, was used to irrigate pasture for grazing dairy cattle.

Irrigation of rice represented 17.0% of the total volume of agricultural water used in the Murray-Darling Basin in 2005–06 and in 2006–07 had declined to only 5.4% of the total volume. The total volume of water applied to rice in the Murray-Darling Basin in 2005–06 was 1,252 gigalitres, while in 2006–07 the volume applied was 239 gigalitres. This represents a decrease 80.9%.

The volume of water applied to other broadacre crops in the Murray-Darling Basin declined by almost 50% from 118 gigalitres in 2005–06 to 61 gigalitres in 2006–07.

The volume of water used to irrigate grapevines in the Murray-Darling Basin increased by 3.7% from 515 gigalitres in 2005–06 to 534 gigalitres in 2006–07.

NRM Regions

The NRM regions with the largest area of irrigated land were the Murrumbidgee (includes ACT) and Murray in NSW, and Goulburn Broken and North Central in Victoria. These regions also had the largest volumes of irrigation water applied. Burdekin (Qld) and SA Murray Darling Basin and South East (SA) also had large volumes of irrigation water applied.

2.1 PASTURES AND CROPS IRRIGATED, Australia—2002–03 to 2006–07

	<i>Agricultural businesses no.</i>	<i>Agricultural businesses irrigating no.</i>	<i>Area under pasture or crop '000 ha</i>	<i>Area irrigated '000 ha</i>	<i>Volume applied ML</i>	<i>Application rate ML/ha</i>
TOTAL						
Old basis(a)						
2002–03	132 983	43 774	439 531	2 378	10 403 759	4.4
2003–04	130 526	40 400	440 110	2 402	10 441 515	4.3
2004–05	129 934	35 244	445 149	2 405	10 084 596	4.2
New basis(b)						
2005–06	154 681	44 826	434 925	2 546	10 737 364	4.2
2006–07(c)	(d) 150 817	(d) 41 787	(e) 425 449	1 923	7 636 194	4.0
2006–07						
New basis(b)						
Pasture for grazing	na	12 818	na	567	2 007 554	3.5
- Pasture for grazing dairy cattle	na	4 454	na	262	1 163 495	4.4
- Pasture for grazing meat cattle	na	6 208	na	188	512 874	2.7
- Pasture for grazing other livestock	na	2 789	na	116	331 185	2.9
Pasture harvested for hay (including lucerne), silage or seed	na	5 791	na	200	794 622	4.0
Cereal crops harvested for grain or seed(f)	36 129	2 265	18 248	262	674 470	2.6
Cereal crops cut for hay or for grazing or fed off	na	1 622	na	49	^ 150 984	3.1
Rice	^ 311	^ 311	^ 20	^ 20	^ 239 432	12.2
Sugar cane	4 499	1 991	497	202	977 611	4.9
Cotton	608	555	163	134	867 662	6.5
Other broadacre crops(g)	15 803	588	3 071	37	108 939	2.9
Fruit trees, nut trees, plantation or berry fruits(h)	11 697	8 080	189	141	648 443	4.6
Vegetables for human consumption or seed	na	6 355	na	105	413 889	4.0
Nurseries, cutflowers or cultivated turf	3 620	3 198	19	15	72 099	5.0
Grapevines	8 837	7 736	197	178	638 590	3.6

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

na not available

(a) Derived using ABS-maintained frame. See Explanatory Notes paragraphs 2-6 for detail.

(b) Derived using ABR-based register. See Explanatory Notes paragraphs 2-6 for detail.

(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 all 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.

(f) Excludes rice.

(g) Excludes sugar cane and cotton.

(h) Excludes grapevines.

2.2 PASTURES AND CROPS IRRIGATED, New South Wales(a)—2002–03 to 2006–07

	Agricultural businesses no.	Agricultural businesses irrigating no.	Area under pasture or crop '000 ha	Area irrigated '000 ha	Volume applied ML	Application rate ML/ha
TOTAL						
Old basis(b)						
2002–03	41 184	11 230	65 175	939	4 272 705	4.5
2003–04	40 915	9 998	63 631	892	3 953 125	4.4
2004–05	40 163	8 606	64 404	910	3 716 557	4.1
New basis(c)						
2005–06	48 838	11 587	62 119	994	4 533 325	4.6
2006–07(d)	(e)47 869	(e)10 689	(f)58 661	680	2 605 019	3.8
2006–07						
New basis(c)						
Pasture for grazing	na	2 903	na	161	413 887	2.6
- Pasture for grazing dairy cattle	na	624	na	46	157 143	3.4
- Pasture for grazing meat cattle	na	1 553	na	^ 64	^ 131 405	2.1
- Pasture for grazing other livestock	na	^ 893	na	^ 51	^ 125 339	2.5
Pasture harvested for hay (including lucerne), silage or seed	na	1 817	na	^ 70	^ 257 834	3.7
Cereal crops harvested for grain or seed(g)	12 345	1 222	5 282	189	480 326	2.5
Cereal crops cut for hay or for grazing or fed off	na	^ 615	na	^ 25	^ 91 706	^ 3.7
Rice	^ 304	^ 304	^ 20	^ 20	^ 237 214	12.2
Sugar cane	540	np	38	np	np	np
Cotton	363	339	120	99	673 905	6.8
Other broadacre crops(h)	4 009	^ 226	655	^ 20	^ 53 879	2.7
Fruit trees, nut trees, plantation or berry fruits(i)	3 861	1 880	55	34	134 564	4.0
Vegetables for human consumption or seed	na	1 467	na	15	62 195	4.1
Nurseries, cutflowers or cultivated turf	1 246	1 131	5	^ 5	^ 26 362	5.5
Grapevines	1 849	1 625	45	41	^ 171 025	4.2

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

na not available

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

(a) Includes ACT.

(b) Derived using ABS-maintained frame. See Explanatory Notes paragraphs 2-6 for detail.

(c) Derived using ABR-based register. See Explanatory Notes paragraphs 2-6 for detail.

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

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

(f) Total includes area of all 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.

(g) Excludes rice.

(h) Excludes sugar cane and cotton.

(i) Excludes grapevines.

2.3 PASTURES AND CROPS IRRIGATED, Victoria—2002–03 to 2006–07

	Agricultural businesses no.	Agricultural businesses irrigating no.	Area under pasture or crop '000 ha	Area irrigated '000 ha	Volume applied ML	Application rate ML/ha
TOTAL						
Old basis(a)						
2002–03	33 212	12 005	13 413	593	2 464 357	4.2
2003–04	32 463	10 844	13 619	619	2 559 385	4.1
2004–05	32 357	9 829	13 920	636	2 363 764	3.7
New basis(b)						
2005–06	37 146	11 621	12 314	648	2 448 485	3.8
2006–07(c)	(d)37 429	(d)10 557	(e)13 250	438	1 648 914	3.8
2006–07						
New basis(b)						
Pasture for grazing	na	5 267	na	242	901 966	3.7
- Pasture for grazing dairy cattle	na	2 662	na	154	656 377	4.3
- Pasture for grazing meat cattle	na	2 019	na	^ 55	^ 169 761	3.1
- Pasture for grazing other livestock	na	^ 851	na	^ 34	^ 75 828	2.3
Pasture harvested for hay (including lucerne), silage or seed	na	1 747	na	^ 63	^ 193 849	3.1
Cereal crops harvested for grain or seed(f)	7 976	^ 361	2 563	^ 14	^ 31 512	2.2
Cereal crops cut for hay or for grazing or fed off	na	^ 368	na	^ 10	*24 455	2.3
Rice	**7	**7	**—	**—	**2 219	**12.0
Other broadacre crops(g)	3 773	*46	633	*2	*3 268	1.6
Fruit trees, nut trees, plantation or berry fruits(h)	1 746	1 454	42	35	190 622	5.5
Vegetables for human consumption or seed	na	1 063	na	22	73 213	3.3
Nurseries, cutflowers or cultivated turf	838	695	5	3	11 529	3.8
Grapevines	2 308	1 929	^ 48	^ 44	^ 214 835	4.9

- ^ 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)
- na not available
- (a) Derived using ABS-maintained frame. See Explanatory Notes paragraphs 2-6 for detail.
- (b) Derived using ABR-based register. See Explanatory Notes paragraphs 2-6 for detail.
- (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 all 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.
- (f) Excludes rice.
- (g) Excludes sugar cane and cotton.
- (h) Excludes grapevines.

2.4 PASTURES AND CROPS IRRIGATED, Queensland—2002–03 to 2006–07

	Agricultural businesses no.	Agricultural businesses irrigating no.	Area under pasture or crop '000 ha	Area irrigated '000 ha	Volume applied ML	Application rate ML/ha
TOTAL						
Old basis(a)						
2002–03	27 688	10 278	139 042	525	2 229 009	4.2
2003–04	26 785	9 520	144 288	561	2 420 048	4.3
2004–05	27 132	8 258	143 797	542	2 613 404	4.8
New basis(b)						
2005–06	32 212	9 861	145 519	539	2 325 003	4.3
2006–07(c)	(d)30 650	(d)8 757	(e)143 871	458	1 840 252	4.0
2006–07						
New basis(b)						
Pasture for grazing	na	1 772	na	^ 52	^ 142 586	^ 2.8
- Pasture for grazing dairy cattle	na	422	na	^ 15	^ 64 328	4.4
- Pasture for grazing meat cattle	na	^ 1 267	na	^ 36	^ 76 094	^ 2.1
- Pasture for grazing other livestock	na	^ 104	na	^ 1	*2 164	^ 1.6
Pasture harvested for hay (including lucerne), silage or seed	na	1 154	na	^ 31	131 873	4.2
Cereal crops harvested for grain or seed(f)	3 332	459	1 240	49	^ 142 857	2.9
Cereal crops cut for hay or for grazing or fed off	na	^ 434	na	^ 9	^ 20 585	2.4
Sugar cane	3 947	1 949	455	196	931 468	4.7
Cotton	245	215	44	35	193 757	5.5
Other broadacre crops(g)	1 092	^ 142	113	^ 9	^ 23 826	^ 2.5
Fruit trees, nut trees, plantation or berry fruits(h)	2 946	1 975	52	37	133 057	3.6
Vegetables for human consumption or seed	na	1 660	na	31	86 940	2.8
Nurseries, cutflowers or cultivated turf	719	675	4	4	14 501	4.0
Grapevines	^ 159	^ 114	^ 1	^ 1	^ 5 644	^ 4.7

^ 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

na not available

(a) Derived using ABS-maintained frame. See Explanatory Notes paragraphs 2-6 for detail.

(b) Derived using ABR-based register. See Explanatory Notes paragraphs 2-6 for detail.

(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 all 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.

(f) Excludes rice.

(g) Excludes sugar cane and cotton.

(h) Excludes grapevines.

2.5 PASTURES AND CROPS IRRIGATED, South Australia—2002–03 to 2006–07

	<i>Agricultural businesses no.</i>	<i>Agricultural businesses irrigating no.</i>	<i>Area under pasture or crop '000 ha</i>	<i>Area irrigated '000 ha</i>	<i>Volume applied ML</i>	<i>Application rate ML/ha</i>
TOTAL						
Old basis(a)						
2002–03	14 262	5 471	54 139	183	899 530	4.9
2003–04	14 238	5 494	52 520	185	957 163	5.2
2004–05	14 111	4 739	54 107	184	877 818	4.8
New basis(b)						
2005–06	16 455	6 298	55 408	217	897 197	4.1
2006–07(c)	(d) 15 835	(d) 6 447	(e) 50 065	201	966 057	4.8
2006–07						
New basis(b)						
Pasture for grazing	na	1 355	na	51	308 558	6.1
- Pasture for grazing dairy cattle	na	311	na	^ 22	^ 139 946	6.5
- Pasture for grazing meat cattle	na	^ 615	na	^ 13	^ 75 179	^ 5.6
- Pasture for grazing other livestock	na	^ 519	na	^ 16	^ 93 434	5.9
Pasture harvested for hay (including lucerne), silage or seed	na	^ 725	na	^ 28	^ 185 553	6.6
Cereal crops harvested for grain or seed(f)	6 314	* 73	3 609	* 3	* 5 899	* 1.7
Cereal crops cut for hay or for grazing or fed off	na	^ 121	na	* 3	* 9 108	* 3.0
Other broadacre crops(g)	3 644	* 52	627	* 2	^ 3 202	* 1.6
Fruit trees, nut trees, plantation or berry fruits(h)	1 385	1 253	21	19	130 052	6.9
Vegetables for human consumption or seed	na	757	na	14	85 945	6.1
Nurseries, cutflowers or cultivated turf	^ 273	^ 237	1	1	^ 3 534	4.3
Grapevines	3 266	3 086	85	78	224 606	2.9

^ 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

na not available

(a) Derived using ABS-maintained frame. See Explanatory Notes paragraphs 2-6 for detail.

(b) Derived using ABR-based register. See Explanatory Notes paragraphs 2-6 for detail.

(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 all 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.

(f) Excludes rice.

(g) Excludes sugar cane and cotton.

(h) Excludes grapevines.

2.6 PASTURES AND CROPS IRRIGATED, Western Australia—2002–03 to 2006–07

	Agricultural businesses no.	Agricultural businesses irrigating no.	Area under pasture or crop '000 ha	Area irrigated '000 ha	Volume applied ML	Volume applied ML/ha
TOTAL						
Old basis(a)						
2002–03	12 270	2 731	102 728	48	313 248	6.5
2003–04	11 877	2 459	101 184	54	308 254	5.7
2004–05	11 915	2 049	104 646	45	267 098	6.0
New basis(b)						
2005–06	14 526	3 173	98 653	60	306 284	5.1
2006–07(c)	(d) 13 608	(d) 2 935	(e) 96 742	53	293 186	5.5
2006–07						
New basis(b)						
Pasture for grazing	na	^ 553	na	^ 13	^ 78 280	6.1
- Pasture for grazing dairy cattle	na	np	na	np	np	np
- Pasture for grazing meat cattle	na	^ 320	na	np	np	np
- Pasture for grazing other livestock	na	np	na	np	np	np
Pasture harvested for hay (including lucerne), silage or seed	na	np	na	np	np	np
Cereal crops harvested for grain or seed(f)	5 668	np	5 527	np	np	np
Cereal crops cut for hay or for grazing or fed off	na	**15	na	—	3 389	9.9
Sugar cane	^ 12	^ 12	4	4	45 708	13.1
Other broadacre crops(g)	2 997	np	1 030	1	16 748	14.0
Fruit trees, nut trees, plantation or berry fruits(h)	1 194	1 024	11	9	40 838	4.7
Vegetables for human consumption or seed	na	661	na	8	57 686	7.1
Nurseries, cutflowers or cultivated turf	376	306	2	2	14 135	7.9
Grapevines	1 034	810	15	^ 13	^ 17 892	^ 1.4

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

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

— nil or rounded to zero (including null cells)

na not available

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

(a) Derived using ABS-maintained frame. See Explanatory Notes paragraphs 2-6 for detail.

(b) Derived using ABR-based register. See Explanatory Notes paragraphs 2-6 for detail.

(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 all 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.

(f) Excludes rice.

(g) Excludes sugar cane and cotton.

(h) Excludes grapevines.

2.7 PASTURES AND CROPS IRRIGATED, Tasmania—2002–03 to 2006–07

	Agricultural businesses no.	Agricultural businesses irrigating no.	Area under pasture or crop '000 ha	Area irrigated '000 ha	Volume applied ML	Application rate ML/ha
TOTAL						
Old basis(a)						
2002–03	3 969	1 923	1 771	87	208 956	2.4
2003–04	3 866	1 939	1 745	87	229 355	2.6
2004–05	3 877	1 654	1 803	86	231 758	2.7
New basis(b)						
2005–06	4 745	1 919	1 739	81	203 931	2.5
2006–07(c)	(d) 4 783	(d) 2 060	(e) 1 659	87	263 029	3.0
2006–07						
New basis(b)						
Pasture for grazing	na	960	na	48	161 939	3.4
- Pasture for grazing dairy cattle	na	336	na	20	^ 98 825	4.8
- Pasture for grazing meat cattle	na	^ 428	na	^ 15	^ 30 863	^ 2.1
- Pasture for grazing other livestock	na	^ 268	na	13	^ 32 250	2.5
Pasture harvested for hay (including lucerne), silage or seed	na	^ 264	na	^ 5	^ 11 460	2.2
Cereal crops harvested for grain or seed(f)	485	^ 135	20	5	8 232	1.7
Cereal crops cut for hay or for grazing or fed off	na	^ 68	na	^ 1	* 1 741	^ 1.9
Other broadacre crops(g)	258	^ 91	^ 8	^ 3	^ 7 942	^ 2.7
Fruit trees, nut trees, plantation or berry fruits(h)	299	^ 257	3	3	6 670	2.4
Vegetables for human consumption or seed	na	674	na	14	45 420	3.4
Nurseries, cutflowers or cultivated turf	^ 131	^ 120	—	—	1 455	4.2
Grapevines	^ 213	^ 164	^ 1	^ 1	^ 2 492	^ 2.1

^ 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

— nil or rounded to zero (including null cells)

na not available

(a) Derived using ABS-maintained frame. See Explanatory Notes paragraphs 2-6 for detail.

(b) Derived using ABR-based register. See Explanatory Notes paragraphs 2-6 for detail.

(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 all 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.

(f) Excludes rice.

(g) Excludes sugar cane and cotton.

(h) Excludes grapevines.

2.8 PASTURES AND CROPS IRRIGATED, Northern Territory—2002–03 to 2006–07

	Agricultural businesses no.	Agricultural businesses irrigating no.	Area under pasture or crop '000 ha	Area irrigated '000 ha	Volume applied ML	Application rate ML/ha
TOTAL						
Old basis(a)						
2002–03	397	136	63 263	3	15 953	4.7
2003–04	382	145	63 124	4	14 186	3.7
2004–05	380	110	62 473	4	14 198	4.0
New basis(b)						
2005–06	659	351	59 127	7	22 356	3.1
2006–07(c)	(d) 643	(d) 342	(e) 61 202	6	19 737	3.2
2006–07						
New basis(b)						
Pasture for grazing	na	^ 8	na	*—	*338	*1.1
- Pasture for grazing dairy cattle	na	np	na	np	np	np
- Pasture for grazing meat cattle	na	^ 5	na	np	np	np
- Pasture for grazing other livestock	na	np	na	np	np	np
Pasture harvested for hay (including lucerne), silage or seed	na	np	na	np	np	np
Cereal crops harvested for grain or seed(f)	*8	np	**7	np	np	np
Cereal crops cut for hay or for grazing or fed off	na	—	na	—	—	—
Other broadacre crops(g)	**29	np	**6	np	np	np
Fruit trees, nut trees, plantation or berry fruits(h)	265	237	5	5	12 639	2.8
Vegetables for human consumption or seed	na	74	na	1	2 490	3.6
Nurseries, cutflowers or cultivated turf	37	36	^—	—	583	6.5
Grapevines	7	7	—	—	2 097	8.2

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* 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)

na not available

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

(a) Derived using ABS-maintained frame. See Explanatory Notes paragraphs 2-6 for detail.

(b) Derived using ABR-based register. See Explanatory Notes paragraphs 2-6 for detail.

(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 all 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.

(f) Excludes rice.

(g) Excludes sugar cane and cotton.

(h) Excludes grapevines.

NRM Regions continued

2.9 PASTURES AND CROPS IRRIGATED, Murray-Darling Basin(a)—2006–07

	Agricultural businesses no.	Agricultural businesses irrigating no.	Area under pasture or crop '000 ha	Area irrigated '000 ha	Volume applied ML	Application rate ML/ha
Total(b)	(c) 59 865	(c) 17 062	(d) 97 160	1 101	4 458 279	4.1
Pasture for grazing	na	6 209	na	315	1 092 784	3.5
- Pasture for grazing dairy cattle	na	2 400	na	154	685 284	4.5
- Pasture for grazing meat cattle	na	2 642	na	^ 90	^ 234 533	2.6
- Pasture for grazing other livestock	na	1 515	na	^ 71	^ 172 967	2.4
Pasture harvested for hay (including lucerne), silage or seed	na	3 286	na	131	465 824	3.6
Cereal crops harvested for grain or seed(e)	21 357	1 808	9 176	229	571 756	2.5
Cereal crops cut for hay or for grazing or fed off	na	^ 972	na	^ 37	^ 117 833	3.2
Rice	^ 311	^ 311	^ 20	^ 20	^ 239 432	12.2
Cotton	571	518	155	126	818 780	6.5
Other broadacre crops(f)	7 099	^ 281	1 288	^ 24	^ 61 044	2.5
Fruit trees, nut trees, plantation or berry fruits(g)	3 890	3 167	89	78	417 066	5.3
Vegetables for human consumption or seed	na	979	na	26	124 863	4.8
Nurseries, cutflowers or cultivated turf	^ 466	343	^ 4	^ 2	^ 12 680	5.8
Grapevines	4 726	4 299	123	112	533 933	4.8

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

na not available

(a) Refer to Explanatory Notes paragraph 12.

(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 all 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.

(e) Excludes rice.

(f) Excludes sugar cane and cotton.

(g) Excludes grapevines.

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*	estimate has a relative standard error of 25% to 50% and should be used with caution	(a)	Includes ACT.
—	nil or rounded to zero (including null cells)	(b)	Includes Cape York-Northern Gulf.
		(c)	Includes Alinytjara Wilurara.

2.10 IRRIGATION ACTIVITY, by NRM region—2006–07 *continued*

	Agricultural businesses no.	Agricultural businesses irrigating no.	Area of agricultural holding '000 ha	Area irrigated '000 ha	Volume applied ML	Application rate ML/ha
Western Australia						
Avon	2 878	76	8 270	**3	**3 832	**1.5
Northern Agricultural Region	1 361	58	5 186	*1	*6 218	6.1
Rangelands (WA)	672	279	76 208	10	92 342	9.1
South Coast Region	2 246	151	3 417	^3	*4 574	*1.4
South West Region	4 781	1 445	3 129	27	^123 152	4.6
Swan	1 670	926	532	10	^63 068	6.6
Total	13 608	2 935	96 742	53	293 186	5.5
Tasmania						
North (TAS)	1 752	723	751	41	132 789	3.3
North West (TAS)	1 705	759	270	29	82 872	2.8
South (TAS)	1 327	579	638	17	47 368	2.7
Total	4 783	2 060	1 659	87	263 029	3.0
Northern Territory						
Total	643	342	61 202	6	19 737	3.2
Australia	150 817	41 787	425 449	1 923	7 636 194	4.0

^ 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

2.11 IRRIGATION ACTIVITY, by Statistical Division—2006–07

	<i>Agricultural businesses no.</i>	<i>Agricultural businesses irrigating no.</i>	<i>Area of agricultural holding '000 ha</i>	<i>Area irrigated '000 ha</i>	<i>Volume applied ML</i>	<i>Application rate ML/ha</i>
New South Wales(a)						
Sydney	2 548	1 597	94	11	^ 41 850	3.9
Hunter	3 629	1 179	1 389	^ 37	^ 90 171	2.5
Illawarra	1 285	^ 256	^ 119	^ 4	^ 7 264	^ 1.9
Richmond-Tweed	3 887	^ 715	437	^ 10	^ 18 616	^ 2.0
Mid-North Coast	3 925	^ 681	^ 932	*12	^ 31 581	^ 2.7
Northern	7 649	889	7 409	124	583 120	4.7
North Western	4 328	^ 604	14 117	^ 47	^ 256 467	5.5
Central West	6 407	^ 755	5 614	^ 45	^ 153 626	^ 3.4
South Eastern	5 115	^ 587	2 575	^ 13	^ 38 079	3.0
Murrumbidgee(a)	4 806	1 543	5 268	187	819 308	4.4
Murray	3 990	1 869	8 296	190	555 333	2.9
Far West	^ 299	^ 15	^ 12 411	^ 2	^ 9 605	5.3
<i>Total(a)</i>	<i>47 869</i>	<i>10 689</i>	<i>58 661</i>	<i>680</i>	<i>2 605 019</i>	<i>3.8</i>
Victoria						
Melbourne	3 626	1 322	281	19	47 462	2.6
Barwon	2 221	^ 299	467	^ 3	^ 8 722	^ 2.5
Western District	4 706	^ 480	1 712	^ 17	^ 64 616	^ 3.8
Central Highlands	2 137	^ 403	802	^ 12	^ 39 043	^ 3.4
Wimmera	2 950	^ 113	2 954	^ 7	^ 16 817	2.4
Mallee	3 645	2 179	2 530	^ 115	537 142	4.7
Loddon	2 383	^ 494	877	^ 24	^ 53 928	^ 2.3
Goulburn	6 777	3 657	1 662	176	700 960	4.0
Ovens-Murray	2 811	^ 622	671	^ 17	^ 44 230	^ 2.6
East Gippsland	2 462	^ 739	^ 874	^ 42	^ 123 807	2.9
Gippsland	3 711	^ 250	420	*6	*12 188	^ 2.1
<i>Total</i>	<i>37 429</i>	<i>10 557</i>	<i>13 250</i>	<i>438</i>	<i>1 648 914</i>	<i>3.8</i>
Queensland						
Brisbane	1 526	^ 774	^ 193	^ 7	^ 20 547	^ 2.9
Gold Coast	^ 502	*181	*70	**2	**8 016	^ 3.5
Sunshine Coast	^ 1 212	514	^ 111	^ 5	*22 225	*4.8
West Moreton	2 135	^ 781	^ 776	^ 26	^ 81 682	3.2
Wide Bay-Burnett	5 332	1 659	3 688	78	224 497	2.9
Darling Downs	6 487	1 301	8 750	75	253 289	3.4
South West	1 917	^ 98	30 206	^ 10	^ 47 593	^ 5.0
Fitzroy	3 112	^ 489	^ 13 528	47	169 746	3.6
Central West	656	*13	31 581	*—	^ 2 822	^ 6.6
Mackay	2 425	1 030	^ 7 088	88	146 000	1.7
Northern	1 937	810	^ 7 881	84	697 801	8.3
Far North	2 893	1 088	13 991	34	155 967	4.7
North West	516	^ 16	26 007	1	^ 10 066	10.3
<i>Total</i>	<i>30 650</i>	<i>8 757</i>	<i>143 871</i>	<i>458</i>	<i>1 840 252</i>	<i>4.0</i>
South Australia						
Adelaide	1 344	1 162	^ 35	^ 10	^ 22 962	^ 2.3
Outer Adelaide	3 323	1 671	648	38	^ 90 738	2.4
Yorke and Lower North	2 234	^ 255	2 068	^ 6	^ 6 790	^ 1.1
Murray Lands	3 681	2 107	3 272	66	414 257	6.2
South East	2 562	1 163	1 895	79	428 846	5.5
Eyre	1 480	*21	4 180	*—	*127	*1.5
Northern	1 212	^ 68	37 966	*1	*2 337	^ 2.5
<i>Total</i>	<i>15 835</i>	<i>6 447</i>	<i>50 065</i>	<i>201</i>	<i>966 057</i>	<i>4.8</i>

^ 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.

2.11 IRRIGATION ACTIVITY, by Statistical Division—2006–07 *continued*

	<i>Agricultural businesses no.</i>	<i>Agricultural businesses irrigating no.</i>	<i>Area of agricultural holding '000 ha</i>	<i>Area irrigated '000 ha</i>	<i>Volume applied ML</i>	<i>Application rate ML/ha</i>
Western Australia						
Perth	1 173	748	^ 65	5	29 666	6.0
South West	3 370	1 348	878	26	^ 119 454	4.6
Lower Great Southern	2 183	^ 153	2 792	^ 3	*4 669	*1.4
Upper Great Southern	1 655	*29	3 512	*—	*435	^ 2.8
Midlands	3 123	^ 345	7 603	^ 9	^ 45 056	^ 5.3
South Eastern	635	—	^ 19 696	—	—	—
Central	1 226	^ 185	^ 33 191	^ 1	^ 9 484	7.3
Pilbara	*44	—	*11 733	—	—	—
Kimberley	^ 201	^ 128	^ 17 272	9	84 421	9.4
<i>Total</i>	13 608	2 935	96 742	53	293 186	5.5
Tasmania						
Greater Hobart	309	^ 174	^ 39	^ 2	^ 5 997	2.5
Southern	1 008	404	585	^ 15	41 371	2.7
Northern	1 762	723	766	41	132 789	3.3
Mersey-Lyell	1 705	759	270	29	82 872	2.8
<i>Total</i>	4 783	2 060	1 659	87	263 029	3.0
Northern Territory						
Darwin	267	215	^ 360	3	6 924	2.2
Northern Territory - Bal	375	^ 127	60 843	3	12 813	4.3
<i>Total</i>	643	342	61 202	6	19 737	3.2
Australia	150 817	41 787	425 449	1 923	7 636 194	4.0

^ 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)

CHAPTER 3

WATER SOURCES

SOURCES OF AGRICULTURAL WATER

Australia

Nationally, more water for agriculture was sourced from Government or private irrigation schemes than from any other source. A total of 3,276 gigalitres, or 38.4% of the volume of water used for all agricultural purposes in 2006–07, was supplied by Government or private irrigation schemes.

Groundwater accounted for 32.2% of the total volume of water from all sources in 2006–07. This is an increase of 14.6% from the previous year. Surface water accounted for 26.5% of water sourced for agriculture.

State/territory

Water supplied by Government or private irrigation schemes was the major source of water by volume for agricultural purposes in New South Wales, Victoria and Queensland, being 37.7%, 57.7% and 36.3% respectively. Groundwater was the major source used in South Australia (57.3%) and the Northern Territory (64.1%), while surface water (excluding that supplied by Government or private irrigation schemes) was the primary source used in Western Australia (33.7%) and Tasmania (78.3%).

Murray-Darling Basin

In 2006–07, water supplied by Government or private irrigation schemes was the major source of agricultural water use in the Murray-Darling Basin, accounting for 48.8% of agricultural water sourced in the region. Groundwater supplied 28.0% of the total volume and surface water (excluding that supplied by Government or private irrigation schemes) 20.8%.

Murray-Darling Basin
continued

3.1 SOURCES OF AGRICULTURAL WATER, by State and Murray-Darling Basin(a)—2006–07

	Surface water	Water supplied by Government or private irrigation schemes	Groundwater	Town or country reticulated mains supply	Recycled or re-used water from off-farm sources	Other	Total all sources
	ML	ML	ML	ML	ML	ML	ML
NSW(b)	677 388	1 073 085	1 027 323	^ 10 897	^ 13 255	^ 43 134	2 845 082
Vic.	338 530	1 051 603	^ 337 065	^ 9 821	^ 58 068	^ 28 198	1 823 285
Qld	682 232	757 416	607 595	^ 2 418	^ 21 098	^ 13 473	2 084 231
SA	183 805	221 849	592 652	*18 789	^ 9 487	*8 198	1 034 780
WA	138 754	133 459	130 969	^ 2 916	*1 003	4 891	411 992
Tas.	225 393	np	^ 22 452	np	*1 424	185	287 845
NT	10 825	np	21 954	np	—	—	34 215
Aust.	2 256 927	3 275 943	2 740 011	^ 46 133	^ 104 335	98 078	8 521 428
MDB(a)	994 042	2 329 474	1 337 539	^ 9 498	^ 41 349	^ 60 308	4 772 209
non MDB	1 262 886	946 469	1 402 472	^ 36 635	62 986	^ 37 771	3 749 219

^ 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)

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

(a) Refer to Explanatory Notes paragraph 12.

(b) Includes ACT.

PURCHASE AND SALES OF
AGRICULTURAL WATER
Australia

In 2006–07, 3,998 agricultural businesses (2.7% of all Australian agricultural businesses) reported purchasing extra irrigation water on a temporary basis. The volume of extra water purchased on a temporary basis was 655 gigalitres at a cost of \$122 million. An additional 74 gigalitres of irrigation water was purchased by 636 agricultural businesses on a permanent basis, at a cost of \$93 million.

The number of agricultural businesses that reported selling water on a temporary basis was 2,734 (approximately 1.8% of all agricultural businesses). The volume of water sold on a temporary basis was 363 gigalitres for \$65 million. A small number of agricultural businesses (277) reported selling water on a permanent basis, with 78 gigalitres sold for \$100 million.

State/territory

The purchase and sales of water on a temporary and permanent basis was most common in New South Wales and Victoria.

3.2 PURCHASE AND SALES OF IRRIGATION WATER, by State—2006–07

	NSW(a)	Vic.	Qld	SA	WA	Tas.	NT	Aust.
NUMBER								
Purchase of extra water on a temporary basis	1 114	1 610	^ 461	^ 612	np	^ 124	np	3 998
Purchase of extra water on a permanent basis	^ 128	^ 240	np	*87	np	np	—	^ 636
Sales of water on a temporary basis	1 050	^ 1 264	^ 119	*186	*97	^ 16	—	2 734
Sales of water on a permanent basis	*81	*141	**36	**11	np	np	—	*277
VOLUME (ML)								
Purchase of extra water on a temporary basis	315 495	^ 158 014	^ 97 793	^ 50 631	^ 21 052	np	np	654 872
Purchase of extra water on a permanent basis	^ 21 141	25 997	np	*10 770	np	np	—	^ 74 036
Sales of water on a temporary basis	^ 205 910	^ 98 993	^ 25 374	*18 733	*12 009	^ 1 605	—	362 625
Sales of water on a permanent basis	^ 35 158	*29 205	*6 190	**6 985	np	np	—	^ 78 046
\$ '000								
Purchase of extra water on a temporary basis	45 411	^ 51 689	*8 476	^ 14 869	np	^ 804	np	121 707
Purchase of extra water on a permanent basis	^ 20 340	40 675	np	*20 748	np	np	—	^ 92 655
Sales of water on a temporary basis	^ 29 725	^ 31 101	^ 1 183	*2 989	*360	^ 87	—	65 444
Sales of water on a permanent basis	^ 28 705	*49 933	*6 478	**14 539	np	np	—	^ 100 236
^ 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) Includes ACT.								

CHAPTER 4

IRRIGATION WATER MANAGEMENT

IRRIGATION METHODS

Australia

Above ground drip or trickle irrigation was used by the greatest number of agricultural businesses (24.9% of all irrigating agricultural businesses), followed by surface irrigation (22.5% of all irrigating agricultural businesses).

Nationally, in 2006–07, the method covering the largest area of land was surface irrigation, irrigating 915,000 hectares. Large mobile machines were used to irrigate 229,000 hectares and above ground drip or trickle irrigation was used to irrigate 214,000 hectares.

State/territory

In New South Wales and Victoria the most common method of irrigation was surface irrigation (2,739 and 4,282 agricultural businesses respectively), followed by above ground drip or trickle irrigation (2,226 and 2,008 agricultural businesses respectively). In Queensland, hose irrigation was the most common irrigation method (2,316 agricultural businesses) followed by surface irrigation (1,581 agricultural businesses). For both South Australia and Western Australia above ground drip or trickle irrigation was the most frequently used irrigation method (2,956 and 1,419 agricultural businesses respectively). The most frequently used irrigation method in Tasmania was hose irrigation (935), whilst in the Northern Territory irrigating agricultural businesses most commonly used microspray.

Of all the irrigation methods used, surface irrigation covered the largest areas of irrigated land in New South Wales (421,000 hectares), Victoria (250,000 hectares) and Queensland (193,000 hectares), while above ground drip or trickle irrigation covered the largest area in South Australia. In Western Australia, the majority of the area irrigated was covered by surface irrigation (17,000 hectares) or above ground drip or trickle irrigation (18,000 hectares). In Tasmania, the largest area irrigated was covered by hose irrigators (30,000 hectares).

CHANGES MADE TO IRRIGATION PRACTICES

Just over 20,000 agricultural businesses reported making one or more changes to their irrigation practices in 2006–07. Adoption of more efficient irrigation techniques was the most common change (7,834 agricultural businesses), marginally more than reducing the area under irrigation (7,645) followed by adoption of more efficient irrigation scheduling. One of these three changes was the most common change reported in each state/territory, with the exception of Tasmania, where increased area under irrigation was the most commonly reported change. In the Murray-Darling Basin, reduction in the area under irrigation was the most common change, while outside the Murray-Darling Basin, it was adoption of more efficient irrigation techniques.

**CHANGES INTENDED TO
BE MADE TO IRRIGATION
PRACTICES**

Nationally, the most common change to irrigation practices intended to be made after 30 June 2007 was the adoption of more efficient irrigation techniques. This pattern was the same both inside and outside the Murray-Darling Basin. The only states/territories different to this were Western Australia, where increased on-farm water storage was the most common intended change reported and Tasmania where increasing the area under irrigation was the most common intended change reported.

**BARRIERS TO CHANGING
IRRIGATION PRACTICES**

Nationally, 31,893 businesses reported barriers to changing irrigation practices. The most common barrier reported was lack of financial resources, reported by 56.1% of all agricultural businesses in Australia reporting barriers to change. In most states/territories, a lack of financial resources was also reported as the most common barrier, except for Victoria and South Australia, where uncertainty of water allocation was the most common barrier reported.

The pattern within the Murray-Darling Basin was quite different to the national one. While a similar proportion of agricultural businesses reporting barriers in this region reported a lack of financial resources (55.6%) as a barrier, a higher proportion reported uncertainty of water allocation as a barrier (68.3%), compared to 26.1% outside the Murray-Darling Basin.

4.1**IRRIGATION METHODS, by State—Number of agricultural businesses—2006–07 .**

	<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>
	no.	no.	no.	no.	no.	no.	no.	no.
Surface	2 739	4 282	1 581	^ 456	^ 309	np	np	9 422
Drip or trickle								
Above ground	2 226	2 008	1 339	2 956	1 419	381	82	10 411
Subsurface	^ 289	*183	375	*103	^ 114	*17	^ 17	1 099
Sprinkler								
Microspray	1 640	1 195	1 539	1 345	696	^ 157	185	6 757
Portable irrigators	1 301	^ 617	^ 1 213	^ 362	np	^ 326	np	3 957
Hose irrigators	1 217	^ 1 001	2 316	^ 339	*44	935	^ 9	5 860
Large mobile machines	^ 582	^ 420	539	786	^ 69	305	**20	2 720
Solid set	740	^ 1 101	763	^ 729	^ 454	^ 154	17	3 959
Other	^ 218	np	*183	*77	np	*57	np	^ 737

^ 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) Includes ACT.

4.2 IRRIGATION METHODS, by State—Area irrigated—2006–07

	NSW(a)	Vic.	Qld	SA	WA	Tas.	NT	Aust.
	'000 ha	'000 ha	'000 ha	'000 ha	'000 ha	'000 ha	'000 ha	'000 ha
Surface	421	250	193	^ 28	^ 17	np	np	915
Drip or trickle								
Above ground	42	^ 50	25	75	18	^ 4	1	214
Subsurface	^ 8	* 7	^ 10	^ 2	1	*—	^ 1	29
Sprinkler								
Microspray	^ 13	^ 20	24	15	4	^ 1	3	81
Portable irrigators	25	^ 14	^ 19	^ 2	np	^ 13	np	74
Hose irrigators	34	22	110	^ 5	**1	30	^—	202
Large mobile machines	^ 68	^ 28	^ 43	57	^ 4	28	*—	229
Solid set	^ 8	^ 21	^ 12	^ 13	4	1	^—	59
Other	*1	np	**2	**—	np	*—	np	*4

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* 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)

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(a) Includes ACT.

4.3**CHANGES TO IRRIGATION PRACTICES, by State—2006–07**

	NSW(a)	Vic.	Qld	SA	WA	Tas.	NT	Aust.
	no.	no.	no.	no.	no.	no.	no.	no.
Made no change	5 505	4 631	4 714	3 553	1 920	1 172	241	21 736
Made one or more change	5 183	5 927	4 043	2 894	1 015	888	101	20 051
Type of change								
Reduced the area under irrigation	1 950	3 202	1 381	^ 600	^ 304	^ 184	24	7 645
Increased the area under irrigation	^ 381	^ 468	^ 484	^ 323	^ 190	^ 347	^ 25	2 218
Adopted more efficient irrigation techniques	2 113	2 164	1 764	1 049	^ 396	^ 311	38	7 834
Adopted more efficient irrigation scheduling	1 934	1 491	1 489	1 327	^ 394	^ 209	44	6 887
Purchased extra water	870	1 504	^ 470	^ 607	*128	np	np	3 707
Sold water	^ 748	^ 970	*100	^ 55	*103	np	np	1 990
Installed piping and/or covered open channels to reduce water loss	^ 422	^ 545	^ 530	^ 152	*114	^ 112	^ 8	1 883
Laser levelled areas to improve water management	950	^ 925	825	^ 101	*18	np	np	2 825
Introduced reused or recycled water	796	^ 740	^ 333	*133	*41	*33	^ 3	2 080
Increased on-farm water storage capacity	1 282	^ 1 209	^ 857	^ 316	^ 289	^ 228	18	4 198
Installed soil moisture sensors	^ 605	^ 379	469	^ 505	^ 160	^ 178	13	2 308
Other	^ 261	^ 509	^ 169	^ 175	*108	**33	^ 6	^ 1 261

^ 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) Includes ACT.

4.4 CHANGES TO IRRIGATION PRACTICES, Murray-Darling Basin—2006–07

	<i>MDB(a)</i>	<i>non MDB</i>	<i>Aust.</i>
	no.	no.	no.
Made no change	7 006	14 730	21 736
Made one or more change	10 056	9 995	20 051
Type of change			
Reduced the area under irrigation	4 810	2 835	7 645
Increased the area under irrigation	^ 628	1 590	2 218
Adopted more efficient irrigation techniques	3 910	3 924	7 834
Adopted more efficient irrigation scheduling	3 182	3 705	6 887
Purchased extra water	2 460	1 247	3 707
Sold water	1 689	^ 301	1 990
Installed piping and/or covered open channels to reduce water loss	^ 837	1 045	1 883
Laser levelled areas to improve water management	1 942	884	2 825
Introduced reused or recycled water	^ 1 142	938	2 080
Increased on-farm water storage capacity	1 774	2 424	4 198
Installed soil moisture sensors	939	1 370	2 308
Other	^ 496	^ 765	^ 1 261

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

(a) Refer to Explanatory Notes paragraph 12.

4.5**INTENDED CHANGES TO IRRIGATION PRACTICES, by State—2006–07**

	NSW(a)	Vic.	Qld	SA	WA	Tas.	NT	Aust.
	no.	no.	no.	no.	no.	no.	no.	no.
Intended change(b)								
Reduce the area under irrigation	1 004	^ 1 400	^ 551	^ 484	^ 167	^ 96	^ 9	3 710
Increase the area under irrigation	803	^ 935	^ 852	^ 348	^ 303	435	34	3 710
Adopt more efficient irrigation techniques	1 874	1 650	1 431	^ 982	^ 240	^ 297	*36	6 509
Adopt more efficient irrigation scheduling	1 281	^ 1 065	1 090	^ 952	^ 276	^ 164	20	4 846
Purchase extra water	^ 541	^ 760	^ 256	^ 552	np	^ 121	np	2 283
Sell water	^ 209	^ 656	**58	*25	*65	*11	—	^ 1 025
Install piping and/or covered open channels to reduce water loss	^ 446	^ 511	^ 393	*111	*63	^ 109	^ 9	1 641
Laser level areas to improve water management	901	^ 759	634	^ 91	**40	np	np	2 429
Introduce reused or recycled water	^ 629	^ 506	^ 275	*131	*43	np	np	1 612
Increase on-farm water storage capacity	1 209	^ 930	^ 1 032	^ 287	^ 339	^ 241	^ 12	4 050
Install soil moisture sensors	607	^ 469	421	^ 318	^ 201	^ 138	**27	2 181
Other intended changes	*205	*211	*114	^ 88	*28	*23	^ 6	^ 675

- ^ 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)
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- (a) Includes ACT.
- (b) Changes intended to be made after 30 June 2007.

4.6**INTENDED CHANGES TO IRRIGATION PRACTICES, Murray-Darling Basin(a)—2006–07**

	<i>MDB</i>	<i>non MDB</i>	<i>Aust.</i>
	no.	no.	no.
Intended change(b)			
Reduce the area under irrigation	2 461	1 249	3 710
Increase the area under irrigation	^ 1 258	2 452	3 710
Adopt more efficient irrigation techniques	3 449	3 060	6 509
Adopt more efficient irrigation scheduling	2 292	2 555	4 846
Purchase extra water	1 577	^ 706	2 283
Sell water	^ 901	^ 123	^ 1 025
Install piping and/or covered open channels to reduce water loss	^ 738	903	1 641
Laser level areas to improve water management	1 688	742	2 429
Introduce reused or recycled water	^ 880	732	1 612
Increase on-farm water storage capacity	1 491	2 559	4 050
Install soil moisture sensors	^ 960	1 220	2 181
Other intended changes	^ 297	^ 378	^ 675

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

(a) Refer to Explanatory notes paragraph 12.

(b) Changes intended to be made after 30 June 2007.

4.7 BARRIERS TO CHANGING IRRIGATION PRACTICES, by State—2006–07

	NSW(a)	Vic.	Qld	SA	WA	Tas.	NT	Aust.
	no.	no.	no.	no.	no.	no.	no.	no.
No barriers to change	3 606	3 083	2 927	2 390	1 581	794	217	14 599
Barriers to change	8 526	8 759	6 801	4 479	1 778	1 416	^ 135	31 893
Type of barrier								
Inadequate water quality	^ 753	^ 901	1 000	^ 680	^ 318	^ 107	13	3 772
Uncertainty of water allocation	4 099	5 305	2 208	2 443	^ 288	^ 219	*38	14 600
Lack of financial resources	4 932	4 960	3 795	2 274	1 008	867	72	17 907
Lack of time	1 343	^ 1 048	1 413	^ 565	^ 393	^ 288	35	5 085
Insufficient or inadequate information	^ 554	^ 716	^ 312	^ 303	*128	^ 62	16	2 092
Doubts about likely success	^ 923	^ 1 191	^ 797	^ 384	^ 309	^ 172	30	3 806
Age or poor health	^ 847	^ 1 216	^ 853	^ 376	^ 164	^ 201	14	3 671
Inadequate water availability	3 810	4 007	3 255	1 423	^ 485	578	17	13 574
Other	^ 482	^ 537	^ 449	^ 346	^ 157	^ 79	^ 8	2 059

^ 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.

4.8 BARRIERS TO CHANGING IRRIGATION PRACTICES, Murray-Darling Basin—2006–07

	MDB(a)	non MDB	Australia
	no.	no.	no.
No barriers	3 990	10 608	14 599
Barriers to change	14 891	17 003	31 893
Type of barrier			
Inadequate water quality	1 362	2 410	3 772
Uncertainty of water allocation	10 166	4 435	14 600
Lack of financial resources	8 272	9 636	17 907
Lack of time	1 677	3 407	5 085
Insufficient or inadequate information	^ 1 046	1 046	2 092
Doubts about likely success	1 806	2 001	3 806
Age or poor health	^ 1 652	2 020	3 671
Inadequate water availability	7 243	6 331	13 574
Other	^ 863	1 195	2 059

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

(a) Refer to Explanatory notes paragraph 12.

EXPENDITURE

Nationally, agricultural establishments spent \$1.4 billion on irrigation related expenditure. The largest expenditure reported was irrigation operating expenses other than the costs associated with the purchase of water (\$477 million or 34.2%). Such expenses include pump running expenses, fuel, electricity, repairs and maintenance and other similar expenses. The purchase of irrigation equipment was the next largest irrigation expenditure (\$286 million or 20.5%), followed by water licence and annual irrigation volumetric/usage charges (\$226 million or 16.2%).

In all states except New South Wales and Victoria, irrigation operating expenses and purchases of irrigation equipment were the largest items of expenditure. In New South Wales and Victoria, water licence and annual irrigation volumetric/usage charges were also large expenses. Only New South Wales spent more on capital construction of earthworks and structures for irrigation than the purchase of irrigation equipment (\$78 million).

5.1 IRRIGATION EXPENDITURE, by State—2006–07

	NSW(a)	Vic.	Qld	SA	WA	Tas.	NT	Aust.
	\$ '000	\$ '000	\$ '000	\$ '000	\$ '000	\$ '000	\$ '000	\$ '000
Water license and annual irrigation volumetric/usage charges	74 919	79 895	36 129	25 446	^ 6 886	2 108	^ 551	225 933
Purchase of extra water on a temporary basis	45 411	^ 51 689	*8 476	^ 14 869	np	^ 804	np	121 707
Purchase of extra water on a permanent basis	^ 20 340	40 675	np	*20 748	np	np	—	^ 92 655
Other irrigation operating expenses	165 027	78 637	103 552	80 539	26 017	21 117	2 815	477 704
Purchase of irrigation equipment	^ 70 993	^ 56 002	59 937	^ 50 646	*26 520	19 508	*2 797	286 403
Capital construction of earthworks and structures for irrigation purposes	*78 187	^ 27 947	^ 50 455	^ 6 614	^ 8 124	^ 10 839	^ 464	^ 182 631
Total irrigation expenditure(b)	457 836	335 213	265 013	201 414	^ 68 740	60 421	^ 6 628	1 395 265

- ^ estimate has a relative standard error of 10% to less than 25% 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 of 25% to 50% and should be used with caution (a) Includes ACT.
- nil or rounded to zero (including null cells) (b) Includes unspecified expenditure.

ASSETS

The value of irrigation equipment and infrastructure on agricultural establishments in 2006–07 was \$9.3 billion. This was highest in New South Wales (\$3.4 billion), which also had the highest expenditure on capital construction of earthworks and structures for irrigation purposes.

5.2 VALUE OF IRRIGATION EQUIPMENT AND INFRASTRUCTURE, by State—2006–07

	<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	3 415 089	1 493 792	2 389 191	1 223 656	458 982	307 682	54 932	9 343 324

(a) Includes ACT.

EXPLANATORY NOTES

INTRODUCTION

1 This publication presents estimates from the 2006–07 Agricultural survey. It contains detailed statistics at the national and state/territory levels, as well as for the Murray-Darling Basin, on agricultural water use, pastures and crops irrigated, sources of water, irrigation water management and irrigation finances. Summary data on irrigation water use is also presented by Natural Resource Management regions.

NEW FRAME

2 Prior to running the 2005–06 Agricultural Census, the ABS had maintained its own register of agricultural establishments. However, it was increasingly difficult to maintain this list, and users were questioning the accuracy of some data.

3 The ABS investigated a number of alternatives for maintaining an agricultural business register and discussed these with key users of agriculture statistics. As a result of this, it was agreed that the ABS should move to a new frame sourced from the Australian Taxation Office's Australian Business Register (ABR) from the 2005–06 Agricultural Census onwards.

4 The ABR-based register consists of all businesses on the ABR classified to an 'agricultural' industry, as well as businesses which have indicated they undertake agricultural activities. All businesses with a turnover of \$50,000 or more are required to register on the ABR. Many agricultural businesses with a turnover of less than \$50,000 have also chosen to register on the ABR.

5 Moving to the ABR-based register required changes to many of the methodologies used for compiling agriculture commodity and water statistics. These included changes to the methods used for determining whether agricultural businesses were 'in-scope' of the collection, and also to ways the data were compiled. These changes include improved estimation and imputation techniques. Implications of these changes were discussed in detail in a Technical Note in *Water Use on Australian Farms 2005–06 (cat. no. 4618.0)*.

IMPLICATIONS FOR USERS

6 The key implication of the move to the new register is that the data from 2006–07 and the 2005–06 Agricultural Census are not directly comparable with the historical time series of agricultural water data presented for 2002–2005, and therefore care should be taken in comparing 'Old-basis' and 'New-basis' estimates.

SCOPE AND COVERAGE

7 The scope of the 2006–07 Agricultural Survey was businesses undertaking agricultural activity with an estimated value of agricultural operations (EVAO) of \$5,000 or more, or a Standardised BAS Total Sales (SBTS) of \$5,000 plus. While the new ABR-based register used for the Agricultural Census does not contain all agricultural businesses in Australia, it provides better coverage than the old ABS-maintained Agricultural Survey frame since 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 used for the Agricultural Census 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.

8 The 2006–07 Agricultural Survey included a total in-scope population of approximately 151,000 agricultural businesses compared to approximately 130,000 establishments on the old ABS-maintained frame.

OTHER WATER USE	9 Due to a low response to the question on water use for agricultural purposes other than irrigation, a high level of imputation was required to produce estimates for this item. Industry information and feedback from respondents on stock drinking rates was used, where possible, to impute. Estimates of water used for agricultural purposes other than irrigation should be used with caution.
APPLICATION RATE	10 The Australian and state/territory totals for application rate of water applied for irrigation are calculated by dividing total area irrigated by total volume applied across all pastures and crops.
COMPARABILITY WITH AGRICULTURAL COMMODITIES AUSTRALIA	11 The estimates of agricultural businesses and area under pasture or crop for 2002–03 and 2003–04 in this publication have been drawn from <i>Agricultural Commodities, Australia (cat. no. 7121.0)</i> . These estimates were compiled from the annual Agricultural Survey and Supplementary Collections (i.e. Apples and Pears Collection and Vineyards Collection). The estimates of agricultural establishments and area under pasture or crop for 2006–07 in this publication differ from <i>Agriculture Commodities, Australia 2006–07</i> , in that the estimates for grapevines in this publication are derived from the Agricultural Census/Survey rather than the Vineyards Collection.
MURRAY-DARLING BASIN GEOGRAPHY	12 The data for the Murray-Darling Basin (MDB) used in this publication were derived from a concordance of NRM regions falling mostly within the MDB. The MDB data used in the <i>Water Use on Australian Farms 2005–06</i> publication was derived from geocoded data. Therefore, there will be small differences between the two publications.
RESPONSE RATE	13 The response rate for the Agricultural Survey 2006–07 was 88.1%.
RELIABILITY OF DATA	14 The estimates in this publication are subject to sampling and non-sampling errors.
SAMPLING ERRORS	<p>15 The estimates in this publication are based on information obtained from respondents to the Agricultural Survey for the year ended 30 June 2007 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.</p> <p>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 estimates to which it refers.</p> <p>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.</p>

SAMPLING ERRORS *continued*

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—2006–07

	Aust.	NSW(a)	Vic.	Qld	SA	WA	Tas.	NT
	%	%	%	%	%	%	%	%
Total area irrigated (ha)	1.8	3.5	4.4	2.9	4.1	5.6	4.2	3.6
Total volume applied (ML)	1.9	3.3	4.8	4.0	5.3	5.5	5.7	2.9
Pasture for grazing - area irrigated (ha)	4.0	8.7	6.5	14.0	8.2	15.2	6.2	30.0
Pasture for grazing - volume applied (ML)	4.0	8.1	6.9	10.4	9.7	17.0	8.8	26.7
Rice - area irrigated (ha)	10.5	10.6	93.0	—	—	—	—	—
Rice - volume applied (ML)	10.6	10.6	93.0	—	—	—	—	—
Sugar cane - area irrigated (ha)	4.2	82.9	—	4.3	—	3.3	—	—
Sugar cane - volume applied (ML)	6.8	72.9	—	7.1	—	0.6	—	—
Cotton - area irrigated (ha)	4.7	5.9	—	6.8	—	—	—	—
Cotton - volume applied (ML)	4.5	5.5	—	6.3	—	—	—	—
Sources of agricultural water - government or private irrigation schemes (ML)	2.9	4.3	6.2	6.0	9.4	8.4	11.4	23.7
Sources of agricultural water - surface water (ML)	2.3	4.0	7.0	4.2	8.1	5.9	6.6	7.3
Sources of agricultural water - groundwater (ML)	3.8	6.6	11.5	7.9	7.8	7.5	16.7	2.3

— 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 error, 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.

RELATED PUBLICATIONS

21 A range of environmental and agricultural publications is produced by the ABS, including:

- *Agricultural Commodities, Australia (cat. no. 7121.0)*
- *Agricultural Commodities: Small Area Data, Australia (cat. no. 7125.0)*
- *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)*

22 Current publications and other products released by the ABS are listed in the *Catalogue of Publications and Products (cat. no. 1101.0)*. The Catalogue is available from any ABS office or the ABS web site <<http://www.abs.gov.au>>. The ABS also issues a daily Release Advice on the web site which details products to be released in the week ahead. All ABS publications are available free of charge from the ABS website.

ACKNOWLEDGMENT

23 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.

AUSTRALIAN CLIMATE IN
2006-07

Rainfall over Australia in 2006-07 was near normal, with the all-Australian average for the 12-month period finishing 4% below the long-term average. It was very dry over much of southern and eastern Australia during the second half of 2006, but the first half of 2007 was closer to normal in those areas, whilst wet-season rainfall was above normal over many tropical areas. These conditions were associated with an El Niño event which became established in the second half of 2006 before breaking down in early 2007.

In south-eastern Australia, the second half of 2006 was exceptionally dry. Parts of Victoria (especially in the north-eastern ranges and around Melbourne), north-eastern Tasmania and southern coastal South Australia had their driest six months on record, and most of the region had rainfall 40-60% below normal. It was also rather dry over this period further north in eastern Australia, and much of the inland was seasonally dry. Rainfall returned to near-normal levels over most of the region in the first half of 2007, with good rains in many areas in April and May after initial falls from a system of tropical origin in late January. Coastal New South Wales, which had not been as dry as inland areas, and eastern Victoria received very heavy rains in June, with widespread flooding, which lifted 12-month totals in some areas into the above-normal range. There were some residual dry areas, especially around Melbourne and in northern Tasmania, with parts of both areas having their driest year on record. Tasmania (22% below normal) had its 8th driest year on record, whilst Victoria (27% below) ranked 9th.

After a dry start, many tropical and subtropical areas had an active wet season. January saw widespread heavy rains through central Australia associated with a tropical low, with Bedourie (Queensland) receiving 169 mm on one day, more than three times its total for all of 2006. There were further heavy rains in the Top End of the Northern Territory in late February and early March, with four-day falls exceeding 800 mm in places. Whilst it was a very quiet cyclone season, with only five cyclones in the Australian region (equalling the lowest number since at least 1944), the cyclones which did occur brought rainfalls well above normal to parts of Western Australia's northern interior. Many parts of the tropics received further unseasonal rains in June, especially in the northern half of the NT and northern inland Queensland. An area around Kakadu had its wettest 12 months on record, and parts of interior WA were more than 50% above normal. However, one subtropical area which missed out was southeastern Queensland, where continued dry conditions contributed to major water shortages. Most of the southeast was in the driest 10% of all years for the 12-month period.

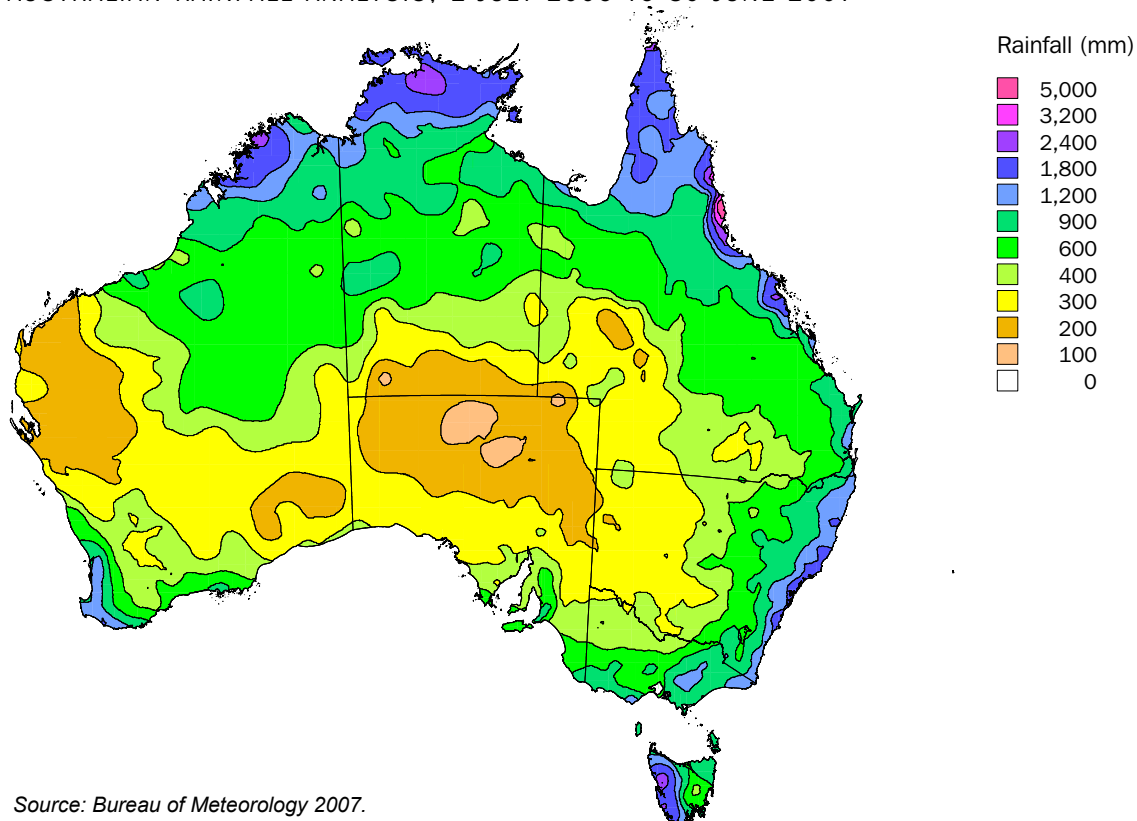
The south-west of Western Australia received near-normal rainfall in August and September after an extremely dry first half of the winter rainfall season. However, early-season rains were again lacking in the first half of 2007, although not to quite such an extreme extent as in 2006. This resulted in below-normal rainfall through most of the region, with many parts of the west coast south of the tropics in the lowest decile, and some records set around Geraldton.

It was a very warm year through most of the continent, with only a very cool June (especially in the tropics) preventing Australia from having its warmest July-June period on record. Mean temperatures for the period were 0.71°C above the 1961-90 average, ranking third, with daytime maxima (+0.88°C) ranking third and overnight minima (+0.54°C) sixth.

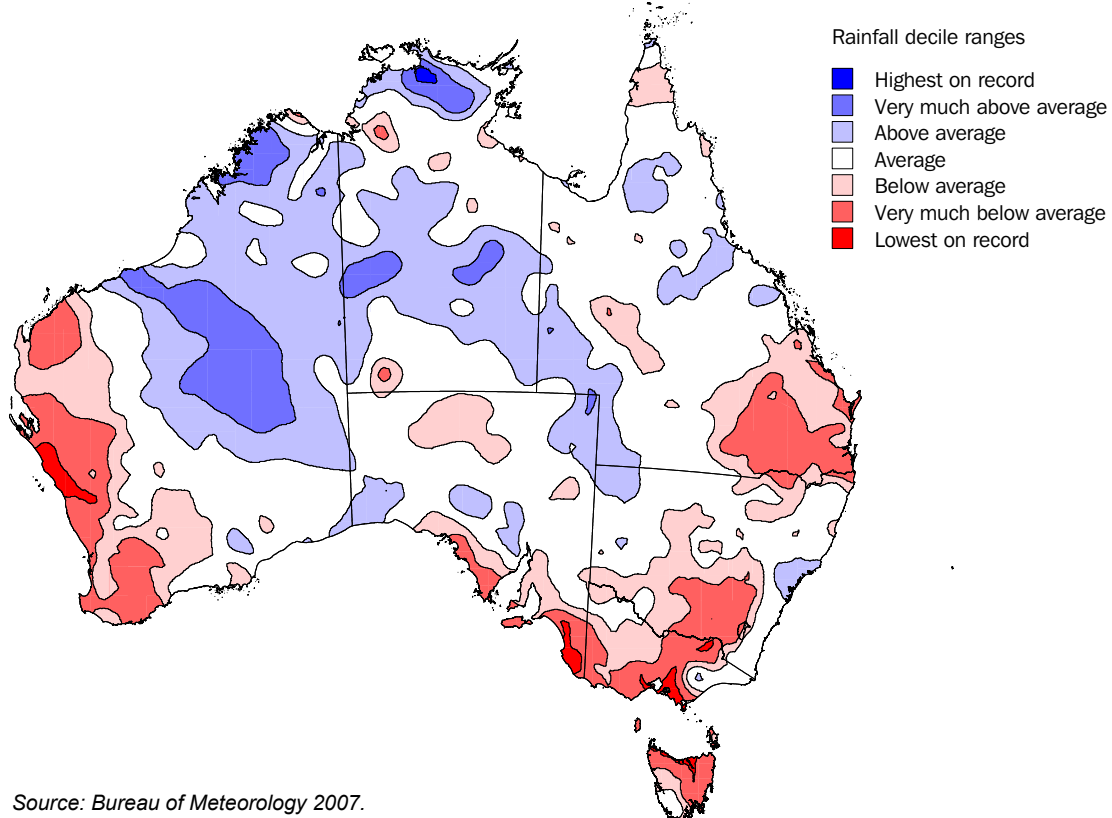
AUSTRALIAN CLIMATE IN
2006-07 *continued*

Whilst temperatures in the northern tropics were generally close to normal, it was a very warm year in the southern two-thirds of the continent, with many areas having their warmest 12 months on record, especially for daytime maxima. South Australia, Victoria and New South Wales all had their warmest July-June periods on record. Maximum temperatures were more than 1°C over most areas outside the tropics, except for Tasmania and the eastern coastal fringe, and were 1.5-2.5°C above normal over most of northern Victoria and southern inland NSW. Minima were less extreme but were still 1-2°C above normal over a broad belt in central Australia extending from the southern Northern Territory into southern inland Queensland. Spring and autumn were especially warm with records set in many areas, although there were also some damaging late-season frosts in September and October in parts of the southeast. Summer was also widely warmer than normal, although less so than autumn and spring. An exceptional cold spell in mid-June, associated with unseasonal rain, brought record low daytime temperatures to many parts of the tropics, with maximum temperatures below 10°C extending as far north as Tennant Creek and Mount Isa.

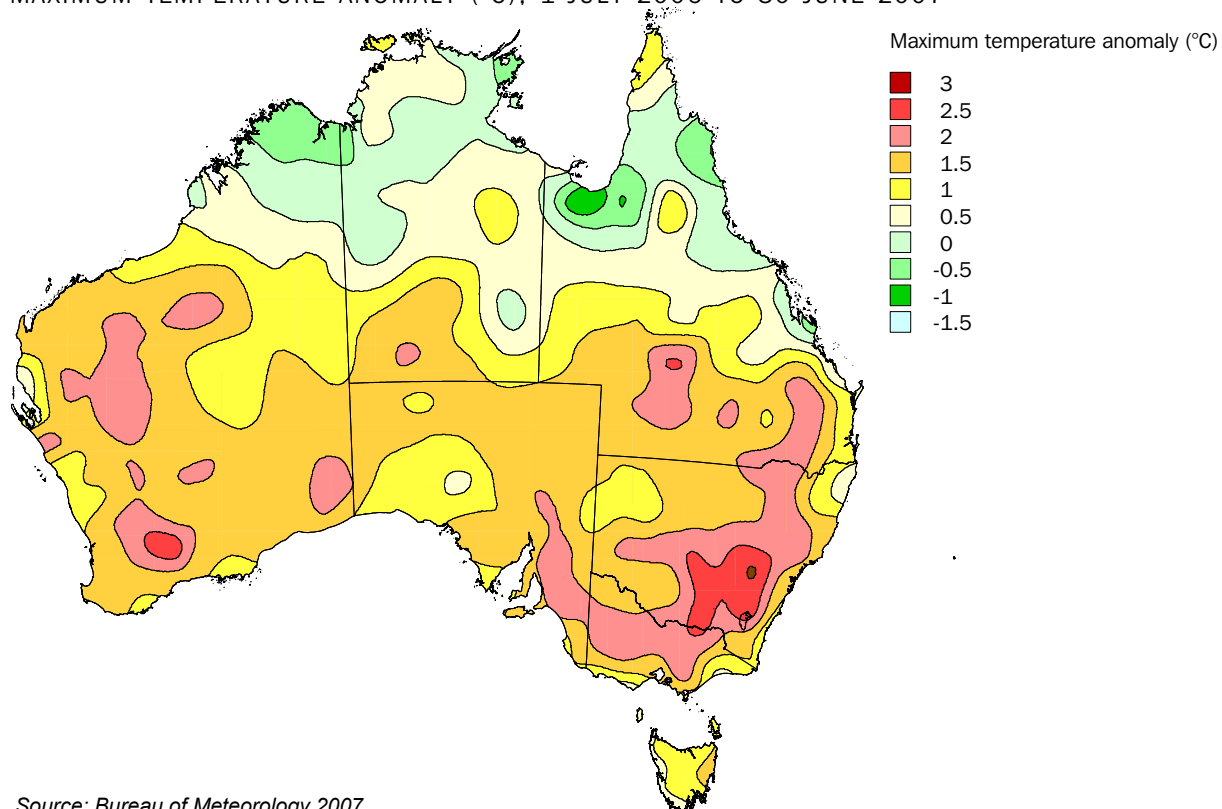
AUSTRALIAN RAINFALL ANALYSIS, 1 JULY 2006 TO 30 JUNE 2007



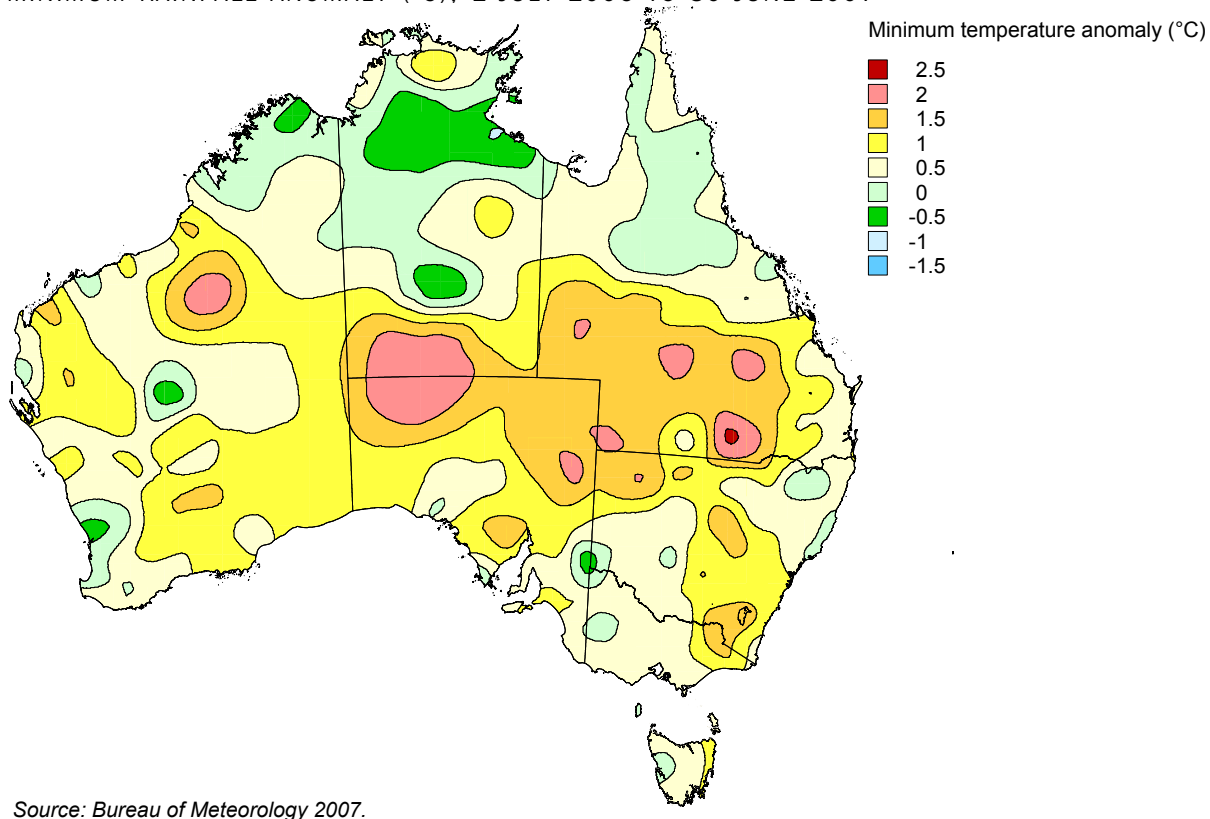
AUSTRALIAN RAINFALL DECILES, 1 JULY 2006 TO 30 JUNE 2007



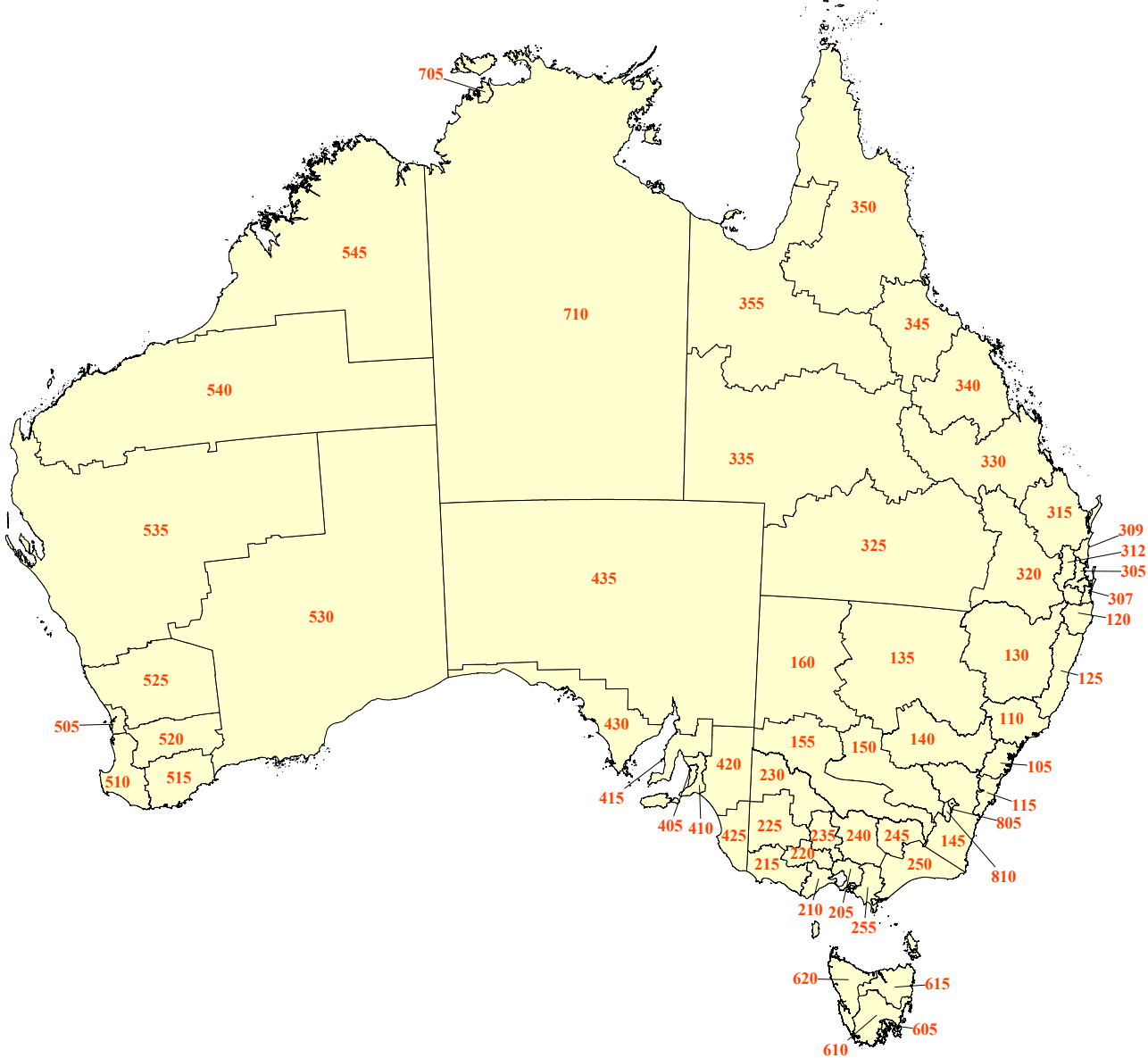
MAXIMUM TEMPERATURE ANOMALY (°C), 1 JULY 2006 TO 30 JUNE 2007



MINIMUM RAINFALL ANOMALY (°C), 1 JULY 2006 TO 30 JUNE 2007



STATISTICAL DIVISIONS, Australia—2006–07



A2.1 STATISTICAL DIVISIONS, Australia—2006–07**New South Wales**

105 Sydney
 110 Hunter
 115 Illawarra
 120 Richmond-Tweed
 125 Mid-North Coast
 130 Northern
 135 North Western
 140 Central West
 145 South Eastern
 150 Murrumbidgee
 155 Murray
 160 Far West

Victoria

205 Melbourne
 210 Barwon
 215 Western District
 220 Central Highlands
 225 Wimmera
 230 Mallee
 235 Loddon
 240 Goulburn
 245 Ovens-Murray
 250 East Gippsland
 255 Gippsland

Queensland

305 Brisbane
 307 Gold Coast
 309 Sunshine Coast
 312 West Moreton
 315 Wide Bay-Burnett
 320 Darling Downs
 325 South West
 330 Fitzroy
 335 Central West
 340 Mackay
 345 Northern
 350 Far North

Queensland *cont.*

355 North West

South Australia

405 Adelaide
 410 Outer Adelaide
 415 Yorke and Lower
 North
 420 Murray Lands
 425 South East
 430 Eyre
 435 Northern

Western Australia

505 Perth
 510 South West
 515 Lower Great
 Southern
 520 Upper Great
 Southern
 525 Midlands
 530 South Eastern
 535 Central
 540 Pilbara
 545 Kimberley

Tasmania

605 Greater Hobart
 610 Southern
 615 Northern
 620 Mersey-Lyell

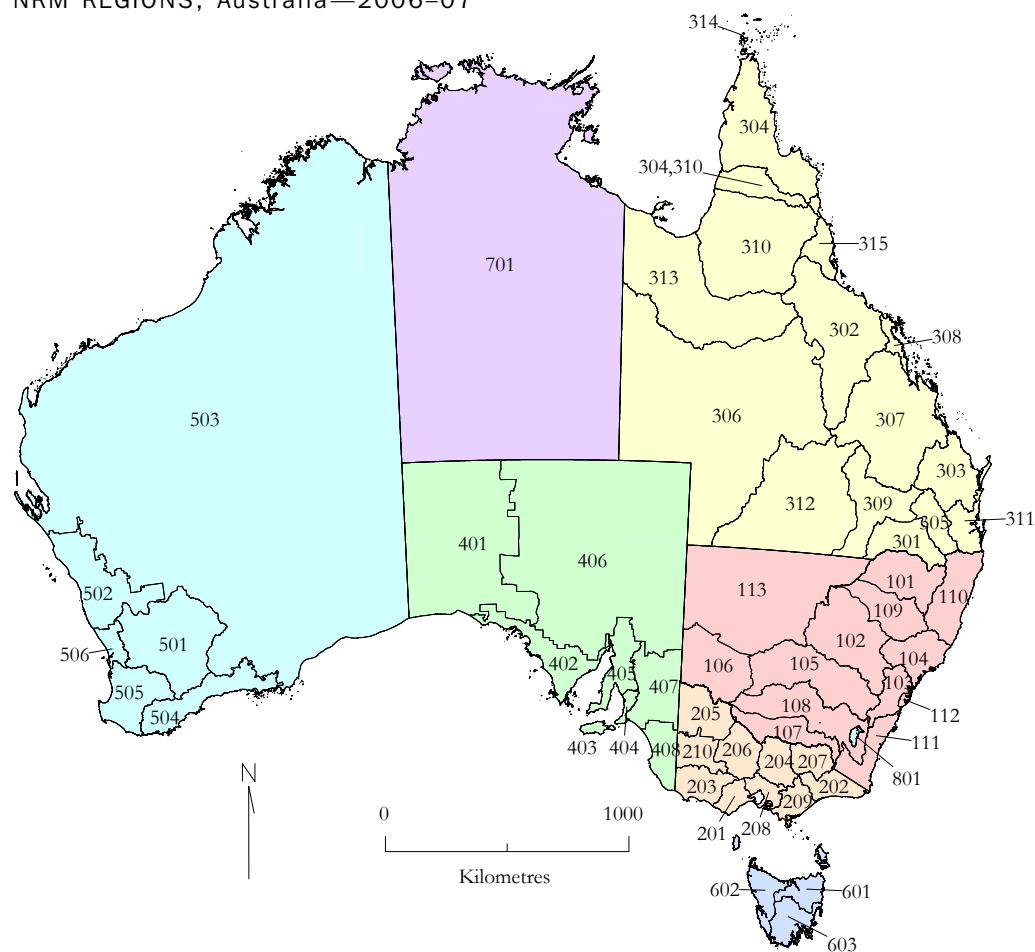
Northern Territory

705 Darwin
 710 Northern Territory -
 Bal

Australian Capital Territory

805 Canberra
 810 Australian Capital
 Territory - Bal

NRM REGIONS, Australia—2006–07



NRM Region *

- | | | |
|--|--|---|
| <p>NSW</p> <p>101: Border Rivers-Gwydir</p> <p>102: Central West</p> <p>103: Hawkesbury-Nepean</p> <p>104: Hunter-Central Rivers</p> <p>105: Lachlan</p> <p>106: Lower Murray-Darling</p> <p>107: Murray</p> <p>108: Murrumbidgee</p> <p>109: Namoi</p> <p>110: Northern Rivers</p> <p>111: Southern Rivers</p> <p>112: Sydney Metro</p> <p>113: Western</p> <p>VIC</p> <p>201: Corangamite</p> <p>202: East Gippsland</p> <p>203: Glenelg Hopkins</p> <p>204: Goulburn Broken</p> <p>205: Mallee</p> <p>206: North Central</p> <p>207: North East (VIC)</p> | <p>QLD</p> <p>301: Border Rivers</p> <p>302: Burdekin</p> <p>303: Burnett Mary</p> <p>304: Cape York</p> <p>304,310: Cape York-Northern Gulf</p> <p>305: Condamine</p> <p>306: Desert Channels</p> <p>307: Fitzroy</p> <p>308: Mackay Whitsunday</p> <p>309: Maranoa Balonne</p> <p>310: Northern Gulf</p> <p>311: South East (QLD)</p> <p>312: South West (QLD)</p> <p>313: Southern Gulf</p> <p>314: Torres Strait</p> <p>315: Wet Tropics</p> <p>SA</p> <p>401: Alinytjara Wilurara</p> | <p>402: Eyre Peninsula</p> <p>403: Kangaroo Island</p> <p>404: Adelaide and Mount Lofty Ranges</p> <p>405: Northern and Yorke</p> <p>406: SA Arid Lands</p> <p>407: SA Murray Darling Basin</p> <p>408: South East (SA)</p> <p>WA</p> <p>501: Avon</p> <p>502: Northern Agricultural Region</p> <p>503: Rangelands (WA)</p> <p>504: South Coast Region</p> <p>505: South West Region</p> <p>506: Swan</p> <p>TAS</p> <p>601: North (TAS)</p> <p>602: North West (TAS)</p> <p>603: South (TAS)</p> <p>NT</p> <p>701: Northern Territory</p> <p>ACT</p> <p>801: ACT</p> |
|--|--|---|

*Numbers used are NRM codes.

Source: Department of the Environment and Heritage - 2006.

GLOSSARY

Agricultural business	A business which is engaged mainly in agricultural activities.
Annual irrigation volumetric/usage charges	Charges associated with accessing controlled water from an irrigation scheme or from regulated surface water or groundwater system.
Application rate	Rate at which water is applied to an area or crop, measured in megalitres per hectare.
Area of holding	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.
Drip or trickle irrigation methods (above ground or subsurface)	Localised irrigation system allowing water to drip or trickle slowly to the roots of plants, either onto the soil surface or directly onto the root zone through a network of valves, pipes, tubing and emitters.
Estimated value of agricultural operations (EVAO)	An estimation of the value of agricultural activity undertaken by an agricultural establishment. 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 the EVAO. It is not an indicator of the value of receipts of individual farms but rather an indicator of the extent of agricultural activity.
Gigalitre	One thousand million litres.
Groundwater	Water occurring below the ground's surface.
Hose irrigator (sprinkler)	Includes travelling gun, rotating boom and travelling boom sprinklers.
Irrigation schemes	A water source (dam, river, etc) controlled by either Government or private operators, specifically for the purposes of supplying irrigation water to registered users.
Large mobile machine sprinkler	Includes centre pivot, linear or lateral move sprinklers.
Megalitre	One million litres.
Microspray sprinkler	Localised irrigation is a system where water is distributed under low pressure through a piped network, in a predetermined pattern, and applied as a small discharge to each plant or adjacent to it.
Portable irrigator (sprinkler)	Includes handshifts, end-tow lateral and side roll sprinklers.
Recycled or re-used water (off-farm)	Waste water, that may have been treated to some extent, that is used again without first being discharged to the environment e.g. sewage water brought onto a property for the purpose of irrigation.
Solid set sprinkler	A system utilising sprinklers, sprays, or guns mounted overhead on permanently installed risers.
Surface water	Water flowing or held in streams, rivers and other wetlands in the landscape.
Town or country reticulated mains supply	Water supplied, often through a non-natural network, where an economic transaction has occurred for the exchange of this water.
Water license	An authority to allow the holder permission to obtain water from an irrigation scheme or from regulated surface water or groundwater systems.

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