



Water Use on Australian Farms 2003-04



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2003–04

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ABBREVIATIONS

'000	thousand
ACT	Australian Capital Territory
Aust.	Australia
EVAO	Estimated Value of Agricultural Operations
ha	hectare
mm	millimetre
ML	megalitre
ML/ha	megalitres per hectare
no.	number
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

INTRODUCTION

BACKGROUND

The agriculture industry is the major water consumer in the Australian economy. The *Water Account Australia 2000-01* (cat. no. 4610.0) showed the agriculture industry accounted for 67% of water consumption in 2000-01.

This publication presents estimates of agricultural water use, sources of irrigation water, irrigation methods, and water traded in Australia in 2003-04. The estimates were compiled from data collected as part of the annual Agricultural Survey for the year ended 30 June 2004.

Comparisons with 2002-03 estimates of agricultural water use, sources of irrigation water, irrigation methods, and water traded in Australia are included in this publication. Due to differences in collection methodology, care should be taken when comparing the results.

Climatic conditions can affect the availability of water for irrigation and the need to irrigate in order to supplement rainfall. During 2003-04, there were areas of Australia which benefited from average to above average rainfall, easing the affects of the widespread drought. The all-Australian mean rainfall for 2003-04 was 541mm, 15% above the 1961-1990 long-term average. There were areas of eastern Australia, however, which continued to receive below average rainfall, intensifying the deficiencies of the drought from previous years. During 2003-04, areas of Australia were also affected by other climatic extremes such as heatwaves and floods. Information from the Bureau of Meteorology on climatic conditions for 2003-04 is included as an appendix.

The ABS welcomes feedback on the content of this publication in terms of the relevance, usefulness, quality and range of the data presented. Please send any comments to the Director, Environment and Energy Business Statistics Centre, GPO Box 66, Hobart, TAS 7001, or phone (03) 6222 5804.

OVERVIEW

During 2003-04, 40,400 Australian agricultural establishments reported they had undertaken irrigation activity on their holding, a decrease from 2002-03 (43,774 establishments). This represented 31.0% of Australian agricultural establishments in 2003-04 compared to 32.9% in 2002-03. The number of Australian agricultural establishments also fell to 130,526 in 2003-04, from 132,983 in 2002-03.

Despite the decrease in the number of agricultural establishments irrigating, the total area irrigated increased by 1.0% to 2,402,000 hectares, and the total volume of water applied increased slightly to 10,442 gigalitres. During this same period, the total area of agricultural land in Australia increased by 579,000 hectares.

1.1 IRRIGATION ACTIVITY, By State—2002–03 and 2003–04

	Agricultural establishments no.	Agricultural establishments irrigating no.	Area of agricultural land '000 ha	Area irrigated '000 ha	Volume applied ML	Application rate ML/ha(a)
2002–03						
NSW(b)	41 184	11 230	65 175	939	4 272 705	4.6
Vic.	33 212	12 005	13 413	593	2 464 357	4.2
Qld	27 688	10 278	139 042	525	2 229 009	4.3
SA	14 262	5 471	54 139	183	899 530	4.9
WA	12 270	2 731	102 728	48	313 248	6.5
Tas.	3 969	1 923	1 771	87	208 956	2.4
NT	397	136	63 263	3	15 953	4.7
Aust.	132 983	43 774	439 531	2 378	10 403 759	4.4
2003–04						
NSW(b)	40 915	9 998	63 631	892	3 953 125	4.4
Vic.	32 463	10 844	13 619	619	2 559 385	4.1
Qld	26 785	9 520	144 288	561	2 420 048	4.3
SA	14 238	5 494	52 520	185	957 163	5.2
WA	11 876	2 459	101 184	54	308 254	5.7
Tas.	3 866	1 939	1 745	87	229 355	2.6
NT	382	145	63 124	4	14 186	3.8
Aust.	130 526	40 400	440 110	2 402	10 441 515	4.3

(a) Averaged across all irrigated pastures and crops.

(b) Includes ACT.

Note: Number of agricultural establishments and area of agricultural land sourced from *Agricultural Commodities* (cat. no. 7121.0).

While at the national level, the number of irrigating agricultural establishments fell by 7.7% between 2002-03 and 2003-04, South Australia, Tasmania and the Northern Territory reported slight increases. Of the states/territories, Tasmania continued to have the highest percentage of agricultural establishments irrigating (50.2%), as well as the

OVERVIEW *continued*

highest proportion of agricultural land irrigated (5.0%). Western Australia again reported the lowest percentage of agricultural establishments irrigating, down from 22.3% in 2002-03 to 20.7% in 2003-04.

The three eastern mainland states all reported a drop in the percentage of agricultural establishments irrigating, with the largest fall occurring in New South Wales (from 27.3% to 24.4%). While New South Wales reported a fall in both area irrigated and volume applied during 2003-04, both Victoria and Queensland reported increases.

Despite the reported decrease in both area irrigated and volume of water applied in New South Wales in 2003-04, it remained the largest irrigating state or territory, applying 3,953 gigalitres, or 37.9% of the Australian total volume applied, on 892,000 hectares, or 37.2% of the Australian total area irrigated.

Across most states and territories, average application rates remained relatively stable across the two years. The exceptions were Western Australia and Northern Territory, where irrigating agricultural establishments reported a substantial decrease in application rates. The average application rate in Western Australia decreased from 6.5 megalitres per hectare in 2002-03 to 5.7 megalitres per hectare in 2003-04, which remains the highest application rate for all states and territories. The average application rate decreased from 4.7 to 3.8 megalitres per hectare in the Northern Territory.

IRRIGATION WATER
USAGE

In 2003-04, the most extensive use of irrigation water by Australian agricultural establishments continued to be pasture for grazing. Almost one-third of irrigating establishments (32.1%), irrigated pasture for grazing, in line with the proportion of agricultural establishments irrigating pasture for grazing in 2002-03 (32.9%). While the percentage of agricultural establishments irrigating pasture for grazing remained stable, the area of pasture for grazing increased by 26,298,000 hectares (7.7%), the area irrigated increased by 74,000 hectares (10.4%) and the volume of irrigation water applied increased by 258 gigalitres (9.1%). The average application rate on pasture for grazing remained relatively static (down 0.1 megalitres per hectare). Nationally, irrigation of pasture for grazing accounted for 32.6% of the total area of irrigated crops and 29.5% of the total volume of irrigation water applied. This was slightly up on the figures reported in 2002-03.

As was the case in 2002-03, rice growers reported the highest average application rate nationally in 2003-04, although the rate decreased from 14.1 to 12.4 megalitres per irrigated hectare. The next highest average application rate nationally was cotton, at 6.7 megalitres per irrigated hectare. While the average application rate for cotton was slightly higher than the previous year, the total volume applied decreased from 1,526 gigalitres in 2002-03 to 1,249 gigalitres in 2003-04.

In 2003-04, the percentage of Australian agricultural establishments irrigating decreased across most pastures and crops grown, compared to 2002-03. The two exceptions were vegetables for seed (up from 53.0% to 74.6% of agricultural establishments growing vegetables for seed) and pasture for seed production (up from 37.6% to 37.8% of agricultural establishments growing pasture for seed production). The percentage of area irrigated also decreased for most pastures and crops grown in 2003-04.

IRRIGATION WATER
USAGE *continued*

At the state level, pasture for grazing remained the predominant use of water in Victoria and Tasmania. In line with 2002-03 estimates, the volume applied to pasture for grazing in Victoria was nearly two-thirds of the water applied in that state for 2003-04 (66.1%), while in Tasmania the volume applied to pasture for grazing was almost half of the total water applied to crops and pastures (49.0%). The 1,692 gigalitres applied to pasture for grazing in Victoria accounted for 54.9% of the volume applied to pasture for grazing nationally. In 2003-04, sugar cane continued to be the predominant crop irrigated in Queensland (1,141 gigalitres), accounting for 47.2% of the total irrigation water applied in that state, a decrease from 54.4% in 2002-03. The major crops and pastures irrigated in Western Australia in 2003-04 included sugar cane (22.4% of the total volume applied) and vegetables for human consumption (19.9% of the total volume applied). In New South Wales in 2003-04, the major crops and pastures irrigated were cotton, pasture for grazing, and cereal crops for grain or seed. Grapevines and pasture for grazing continued to be the predominant crop and pasture irrigated in South Australia, while fruit continued to be the main crop irrigated in the Northern Territory.

IRRIGATION WATER
AVAILABILITY

Water for irrigation purposes is mainly sourced through surface water, ground water, reticulated mains supply and recycled or re-used water from off farm sources.

In 2003-04, the most common source of irrigation water in Australia continued to be surface water, with 28,890 establishments (71.5% of irrigating establishments) reporting it as one of their sources. Nationally, groundwater remained the second most favoured source with 13,442 agricultural establishments reporting it as one of their sources. The number of irrigating establishments using recycled or re-used water from off farm sources increased 49% from 1,053 in 2002-03 to 1,569 in 2003-04.

At the state level, irrigating establishments in South Australia and Northern Territory reported groundwater as their most common source of irrigation water in 2003-04 (45.8% and 92.4% respectively). Western Australia was the only state to report an increase in the percentage of irrigating establishments using town or country reticulated mains supply (up 1.6%), while Victoria reported the largest increase in the percentage of irrigating establishments using recycled or re-used water from off farm sources (up from 3.6% to 6.4%).

Nationally, 6,200 or 4.8% of agricultural establishments reported purchasing extra water, while 4,388 or 3.4% of agricultural establishments reported selling water. Victoria reported the largest percentage of agricultural establishments trading water, with 8.5% purchasing extra water and 5.8% selling water. Water trading in Victoria accounted for 44.7% of the total number of agricultural establishments purchasing extra water in Australia, and 43.0% of the total number of agricultural establishments selling water in Australia. New South Wales had the second largest percentage of agricultural establishments trading water, with 4.4% purchasing extra water and 4.0% selling water.

IRRIGATION WATER
MANAGEMENT

Irrigators use a variety of methods to irrigate their crops and pastures, including surface (such as flood, furrow, basin, or border check), drip or trickle, and sprinkler (microspray, portable irrigators, hose irrigators, large mobile machines and solid set).

IRRIGATION WATER
MANAGEMENT *continued*

In 2003-04, the most common irrigation method reported by irrigators continued to be surface irrigation, with 12,119 irrigating agricultural establishments reporting this method (30.0% of irrigating establishments). Nationally, surface irrigation accounted for 58.0% of the total area irrigated, a slight increase compared to 2002-03, when surface irrigation accounted for 56.5% of the total area irrigated.

Amongst the states and territories, Victoria continued to have the highest percentage of establishments reporting surface irrigation. In both 2002-03 and 2003-04, 50.0% of Victorian irrigating establishments reported surface irrigation as one of their methods. Despite New South Wales reporting a slight increase in the percentage of establishments using surface irrigation in 2003-04, the area over which it was used decreased marginally to just under three-quarters of the area irrigated by all methods, and to just under half the area surface irrigated nationally. The most common irrigation method in Western Australia remained above ground drip or trickle irrigation, while Queensland, South Australia, Tasmania and Northern Territory continued to favour sprinklers.

2.1 PASTURES AND CROPS IRRIGATED, Australia—2002–03 and 2003–04

	Agricultural establishments no.	Agricultural establishments irrigating no.	Area under pasture or crop '000 ha	Area irrigated '000 ha	Volume applied ML	Application rate ML/ha(a)
2002–03						
Pasture for grazing	102 419	14 419	341 336	710	2 826 854	4.0
Pasture for seed production	1 520	^ 572	91	^ 32	^ 138 752	4.4
Pasture for hay and silage	23 783	6 206	740	162	682 737	4.2
Cereal crops cut for hay	10 758	2 215	505	^ 66	^ 245 599	3.7
Cereal crops for grain or seed(b)	37 504	3 569	17 351	365	1 001 579	2.8
Cereal crops not for grain or seed	10 360	^ 1 764	841	42	^ 127 110	3.0
Rice	647	631	46	44	615 375	14.1
Sugar cane	5 146	2 710	568	238	^ 1 293 099	5.4
Cotton	659	647	245	234	^ 1 525 502	6.5
Other broadacre crops(c)	21 688	1 879	3 540	68	172 184	2.5
Fruit trees, nut trees, plantation or berry fruits(d)	11 373	8 604	187	138	659 893	4.8
Vegetables for human consumption	5 484	5 225	121	112	439 229	3.9
Vegetables for seed	644	341	6	4	8 455	2.3
Nurseries, cutflowers or cultivated turf	2 992	2 956	16	13	77 920	5.8
Grapevines	8 219	8 114	157	150	588 794	3.9
Total(e)	(f) 132 983	(f) 43 774	(g) 439 531	2 378	10 403 759	4.4
2003–04						
Pasture for grazing	100 714	12 981	367 634	784	3 084 393	3.9
Pasture for seed production	2 585	976	^ 144	^ 32	^ 138 627	4.4
Pasture for hay and silage	31 172	6 392	1 048	198	785 122	4.0
Cereal crops cut for hay	15 099	1 290	603	^ 43	^ 128 187	3.0
Cereal crops for grain or seed(b)	39 709	2 855	20 148	326	865 566	2.7
Cereal crops not for grain or seed	9 901	^ 1 440	757	^ 28	^ 68 834	2.4
Rice	1 028	973	66	65	813 812	12.4
Sugar cane	4 822	2 359	559	241	1 210 243	5.0
Cotton	838	623	227	185	1 248 924	6.7
Other broadacre crops(c)	26 000	1 834	3 198	89	^ 268 343	3.0
Fruit trees, nut trees, plantation or berry fruits(d)	10 815	7 493	172	120	625 812	5.2
Vegetables for human consumption	5 084	4 541	126	116	477 136	4.1
Vegetables for seed	556	415	5	^ 5	11 858	2.6
Nurseries, cutflowers or cultivated turf	2 999	2 811	16	^ 16	^ 95 384	6.1
Grapevines	8 568	7 154	164	149	607 083	4.1
Total(e)	(f) 130 526	(f) 40 400	(g) 440 110	2 402	10 441 515	4.3

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

(a) Averaged across all irrigated pastures or crops.

(b) Excludes rice.

(c) Excludes sugar cane and cotton.

(d) Excludes grapevines.

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

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

(g) Total area of agricultural land does not equal the sum of area under pasture or crop as not all agricultural land is under pasture or crop.

Note: Number of agricultural establishments and area under pasture or crop sourced from *Agricultural Commodities* (cat. no. 7121.0).

2.2 PASTURES AND CROPS IRRIGATED, New South Wales(a)—2002–03 and 2003–04

	Agricultural establishments no.	Agricultural establishments irrigating no.	Area under pasture or crop '000 ha	Area irrigated '000 ha	Volume applied ML	Application rate ML/ha(b)
2002–03						
Pasture for grazing	33 468	3 813	49 423	208	677 639	3.3
Pasture for seed production	*137	np	*4	np	np	np
Pasture for hay and silage	3 838	1 977	101	^ 59	^ 251 518	4.2
Cereal crops cut for hay	2 728	^ 908	165	^ 37	^ 164 420	4.5
Cereal crops for grain or seed(c)	12 022	1 953	4 391	282	805 558	2.9
Cereal crops not for grain or seed	4 526	^ 729	327	^ 23	^ 80 035	3.5
Rice	637	np	45	np	np	np
Sugar cane	553	—	39	—	—	—
Cotton	367	^ (d) 386	^ 177	^ 173	^ 1 211 732	7.0
Other broadacre crops(e)	5 964	^ 344	788	^ 29	^ 71 683	2.5
Fruit trees, nut trees, plantation or berry fruits(f)	3 651	2 279	49	30	151 943	5.1
Vegetables for human consumption	913	807	17	15	67 960	4.7
Vegetables for seed	^ 69	*37	^ —	^ —	^ 1 000	3.0
Nurseries, cutflowers or cultivated turf	1 053	(d) 1 084	4	4	31 404	7.0
Grapevines	1 576	(d) 1 614	37	34	140 690	4.2
Total(g)	(h) 41 184	(h) 11 230	(i) 65 175	939	4 272 705	4.6
2003–04						
Pasture for grazing	33 590	3 560	48 388	255	767 471	3.0
Pasture for seed production	^ 438	*np	*19	*np	*np	np
Pasture for hay and silage	6 732	1 863	208	62	259 646	4.2
Cereal crops cut for hay	4 189	^ 391	143	^ 15	^ 34 754	2.4
Cereal crops for grain or seed(c)	14 109	1 604	5 798	241	643 922	2.7
Cereal crops not for grain or seed	3 939	^ 389	290	^ 11	^ 33 465	3.1
Rice	1 021	np	66	np	np	np
Sugar cane	^ 529	**10	*56	**—	**27	0.2
Cotton	360	^ 294	^ 126	^ 112	^ 792 122	7.1
Other broadacre crops(e)	5 991	^ 413	663	^ 43	^ 154 582	3.6
Fruit trees, nut trees, plantation or berry fruits(f)	3 421	1 955	45	25	135 723	5.5
Vegetables for human consumption	824	744	^ 19	^ (d) 21	^ 102 386	4.8
Vegetables for seed	^ 66	*43	^ 1	^ 1	^ 2 142	3.9
Nurseries, cutflowers or cultivated turf	1 083	973	5	^ 5	^ 38 594	7.3
Grapevines	1 644	1 460	39	34	168 133	4.9
Total(g)	(h) 40 915	(h) 9 998	(i) 63 631	892	3 953 125	4.4

^ 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

— 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.

(b) Averaged across all irrigated pastures or crops.

(c) Excludes rice.

(d) See Explanatory Notes, paragraph 8.

(e) Excludes sugar cane and cotton.

(f) Excludes grapevines.

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

(h) Total agricultural establishments does not equal the sum of agricultural establishments as many establishments grow or irrigate more than pasture or crop.

(i) Total area of agricultural land does not equal the sum of area under pasture or crop as not all agricultural land is under pasture or crop.

Note: Number of agricultural establishments and area under pasture or crop sourced from *Agricultural Commodities* (cat. no. 7121.0).

2.3**PASTURES AND CROPS IRRIGATED, Victoria—2002–03 and 2003–04**

	<i>Agricultural establishments no.</i>	<i>Agricultural establishments 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 (a)</i>
2002–03						
Pasture for grazing	26 531	6 558	7 541	368	1 611 486	4.4
Pasture for seed production	^ 262	np	^ 19	np	np	np
Pasture for hay and silage	10 558	^ 1 709	362	^ 57	^ 204 806	3.6
Cereal crops cut for hay	1 860	^ 515	55	*13	*39 115	2.9
Cereal crops for grain or seed(b)	8 081	^ 536	2 367	^ 27	^ 51 312	1.9
Cereal crops not for grain or seed	^ 1 544	*415	^ 67	*5	*16 995	3.3
Rice	**10	np	**1	np	np	np
Sugar cane	(c)—	—	(c)—	—	—	—
Cotton	(c)—	—	(c)—	—	—	—
Other broadacre crops(d)	4 667	^ 323	686	^ 8	^ 17 495	2.2
Fruit trees, nut trees, plantation or berry fruits(e)	1 686	1 305	^ 45	^ 39	172 755	4.5
Vegetables for human consumption	1 048	928	27	25	78 956	3.2
Vegetables for seed	166	83	^ 2	^ 1	^ 2 972	2.2
Nurseries, cutflowers or cultivated turf	520	491	4	3	10 680	4.2
Grapevines	2 559	2 491	38	35	205 451	5.8
Total(f)	(g)33 212	(g)12 005	(h)13 413	593	2 464 357	4.2

2003–04						
Pasture for grazing	25 638	5 405	7 548	389	1 691 938	4.4
Pasture for seed production	^ 376	^ np	^ 23	*np	*np	np
Pasture for hay and silage	14 019	1 994	495	74	^ 262 617	3.6
Cereal crops cut for hay	3 243	^ 287	107	*14	^ 32 233	2.3
Cereal crops for grain or seed(b)	8 001	^ 386	2 644	^ 29	^ 59 274	2.1
Cereal crops not for grain or seed	^ 1 422	^ 307	^ 50	*6	*12 991	2.2
Rice	**7	np	**1	np	np	np
Sugar cane(c)	—	—	—	—	—	—
Cotton(c)	—	—	—	—	—	—
Other broadacre crops(d)	4 753	^ 270	572	^ 7	^ 14 916	2.3
Fruit trees, nut trees, plantation or berry fruits(e)	1 747	1 302	39	29	173 567	5.9
Vegetables for human consumption	971	736	28	21	79 453	3.8
Vegetables for seed	161	124	2	2	3 324	2.1
Nurseries, cutflowers or cultivated turf	558	520	4	3	9 992	3.3
Grapevines	2 562	2 121	39	33	179 359	5.5
Total(f)	(g)32 463	(g)10 844	(h)13 619	619	2 559 385	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)

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

(a) Averaged across all irrigated pastures or crops.

(b) Excludes rice.

(c) Data not collected.

(d) Excludes sugar cane and cotton.

(e) Excludes grapevines.

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

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

(h) Total area of agricultural land does not equal the sum of area under pasture or crop as not all agricultural land is under pasture or crop.

Note: Number of agricultural establishments and area under pasture or crop sourced from *Agricultural Commodities* (cat. no. 7121.0).

2.4 PASTURES AND CROPS IRRIGATED, Queensland—2002–03 and 2003–04

	Agricultural establishments no.	Agricultural establishments irrigating no.	Area under pasture or crop '000 ha	Area irrigated '000 ha	Volume applied ML	Application rate ML/ha(a)
2002–03						
Pasture for grazing	19 329	^ 1 761	117 205	^ 44	^ 129 953	3.0
Pasture for seed production	^ 315	*83	^ 19	*2	*5 484	2.6
Pasture for hay and silage	2 510	^ 1 719	51	^ 25	^ 96 582	3.9
Cereal crops cut for hay	1 554	^ 664	55	*13	^ 30 287	2.3
Cereal crops for grain or seed(b)	3 980	^ 758	1 115	^ 48	^ 128 393	2.7
Cereal crops not for grain or seed	2 327	^ 473	251	^ 11	^ 19 764	1.8
Rice	(c)—	—	(c)—	—	—	—
Sugar cane	4 580	2 696	524	235	^ 1 212 802	5.2
Cotton	292	^ 261	68	61	^ 313 770	5.1
Other broadacre crops(d)	2 122	^ 404	164	^ 11	^ 32 542	2.9
Fruit trees, nut trees, plantation or berry fruits(e)	2 897	2 278	50	35	125 713	3.6
Vegetables for human consumption	1 784	1 670	35	34	110 618	3.3
Vegetables for seed	*80	*16	*—	**—	**286	3.7
Nurseries, cutflowers or cultivated turf	700	(f) 761	3	3	14 052	4.1
Grapevines	230	^ (f) 317	2	^ (f) 3	^ 8 291	3.1
Total(g)	(h) 27 688	(h) 10 278	(i) 139 042	525	2 229 009	4.3

2003–04						
Pasture for grazing	18 709	1 660	131 523	^ 46	^ 147 397	3.2
Pasture for seed production	^ 551	*82	^ 32	*2	*6 536	3.4
Pasture for hay and silage	2 686	1 669	^ 62	*36	^ 131 817	3.7
Cereal crops cut for hay	1 481	^ 405	^ 48	*11	**49 231	4.5
Cereal crops for grain or seed(b)	4 287	^ 624	1 561	^ 50	^ 150 673	3.0
Cereal crops not for grain or seed	2 184	^ 407	^ 256	^ 9	^ 16 634	1.9
Rice(c)	—	—	—	—	—	—
Sugar cane	4 279	2 335	498	237	1 141 173	4.8
Cotton	476	329	101	73	^ 456 802	6.3
Other broadacre crops(d)	6 898	^ 480	192	^ 24	^ 62 444	2.6
Fruit trees, nut trees, plantation or berry fruits(e)	2 724	1 836	48	33	128 163	3.9
Vegetables for human consumption	1 586	1 446	37	34	96 662	2.9
Vegetables for seed	*69	*20	*—	**1	**902	1.7
Nurseries, cutflowers or cultivated turf	720	708	3	3	15 030	4.6
Grapevines	237	^ (f) 276	3	*3	^ 9 599	2.9
Total(g)	(h) 26 785	(h) 9 520	(i) 144 288	561	2 420 048	4.3

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- nil or rounded to zero (including null cells)
- (a) Averaged across all irrigated pastures or crops.
- (b) Excludes rice.
- (c) Data not collected.
- (d) Excludes sugar cane and cotton.
- (e) Excludes grapevines.
- (f) See Explanatory Notes, paragraph 8.
- (g) Totals include other pastures or crops not elsewhere classified.
- (h) Total agricultural establishments does not equal the sum of agricultural establishments as many establishments grow or irrigate more than one pasture or crop.
- (i) Total area of agricultural land does not equal the sum of area under pasture or crop as not all agricultural land is under pasture or crop.
- Note: Number of agricultural establishments and area under pasture or crop sourced from *Agricultural Commodities* (cat. no. 7121.0).

2.5**PASTURES AND CROPS IRRIGATED, South Australia—2002–03 and 2003–04**

	<i>Agricultural establishments no.</i>	<i>Agricultural establishments 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(a)</i>
2002–03						
Pasture for grazing	9 764	1 114	43 065	^ 42	^ 226 199	5.4
Pasture for seed production	^ 325	^ 204	^ 22	^ 14	^ 75 231	5.5
Pasture for hay and silage	2 667	^ 591	89	^ 16	^ 117 116	7.1
Cereal crops cut for hay	1 921	^ 86	87	*2	*10 218	4.7
Cereal crops for grain or seed(b)	6 471	*172	3 417	^ 4	^ 7 928	2.3
Cereal crops not for grain or seed	968	*50	^ 94	*2	**7 910	4.5
Rice	(c)—	—	(c)—	—	—	—
Sugar cane	(c)—	—	(c)—	—	—	—
Cotton	(c)—	—	(c)—	—	—	—
Other broadacre crops(d)	4 014	*93	632	*3	*8 648	2.5
Fruit trees, nut trees, plantation or berry fruits(e)	1 557	1 349	22	18	145 665	8.1
Vegetables for human consumption	500	(f)501	14	13	74 536	5.6
Vegetables for seed	^ 111	^ 51	*2	*1	^ 1 720	1.8
Nurseries, cutflowers or cultivated turf	^ 292	213	^ 1	^ 1	*6 835	6.5
Grapevines	2 893	2 773	67	66	217 496	3.3
Total(g)	(h)14 262	(h)5 471	(i)54 139	183	899 530	4.9

2003–04						
Pasture for grazing	9 671	1 158	45 354	^ 49	^ 283 999	5.9
Pasture for seed production	516	^ 468	*41	^ 15	^ 87 113	5.8
Pasture for hay and silage	3 390	^ 559	129	^ 17	^ 103 524	6.0
Cereal crops cut for hay	2 811	^ 114	129	*2	*9 266	6.0
Cereal crops for grain or seed(b)	6 490	^ 71	3 450	^ 3	^ 5 039	1.9
Cereal crops not for grain or seed	1 067	^ 214	81	**1	*1 359	2.6
Rice(c)	—	—	—	—	—	—
Sugar cane(c)	—	—	—	—	—	—
Cotton(c)	—	—	—	—	—	—
Other broadacre crops(d)	3 898	*117	637	^ 2	*5 575	2.5
Fruit trees, nut trees, plantation or berry fruits(e)	1 415	1 245	19	17	123 033	7.1
Vegetables for human consumption	494	448	14	13	86 478	6.5
Vegetables for seed	^ 60	^ 43	^ 1	^ 1	^ 2 996	3.8
Nurseries, cutflowers or cultivated turf	238	^ 200	^ 1	** (f)2	**20 413	9.4
Grapevines	3 027	2 586	70	64	^ 228 156	3.6
Total(g)	(h)14 238	(h)5 494	(i)52 520	185	957 163	5.2

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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)

(a) Averaged across all irrigated pastures or crops.

(b) Excludes rice.

(c) Data not collected.

(d) Excludes sugar cane and cotton.

(e) Excludes grapevines.

(f) See Explanatory Notes, paragraph 8.

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

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

(i) Total area of agricultural land does not equal the sum of area under pasture or crop as not all agricultural land is under pasture or crop.

Note: Number of agricultural establishments and area under pasture or crop sourced from *Agricultural Commodities* (cat. no. 7121.0).

2.6 PASTURES AND CROPS IRRIGATED, Western Australia—2002–03 and 2003–04 ..

	Agricultural establishments no.	Agricultural establishments irrigating no.	Area under pasture or crop '000 ha	Area irrigated '000 ha	Volume applied ML	Application rate ML/ha (a)
2002–03						
Pasture for grazing	9 797	np	82 254	np	np	np
Pasture for seed production	^ 368	np	^ 23	np	np	np
Pasture for hay and silage	2 142	**19	89	^ —	2 352	5.8
Cereal crops cut for hay	2 568	np	^ 141	np	np	np
Cereal crops for grain or seed(b)	6 308	np	6 037	np	np	np
Cereal crops not for grain or seed	829	np	^ 98	np	np	np
Rice	—	—	—	—	—	—
Sugar cane	^ 13	^ (c)14	4	4	80 298	20.3
Cotton	—	—	—	—	—	—
Other broadacre crops(d)	3 921	np	1 244	np	np	np
Fruit trees, nut trees, plantation or berry fruits(e)	1 171	1 031	^ 12	^ 10	^ 46 154	4.9
Vegetables for human consumption	544	(c)600	10	9	63 864	7.1
Vegetables for seed	*49	^ 21	^ —	—	505	3.7
Nurseries, cutflowers or cultivated turf	315	^ 301	^ 2	2	13 491	8.3
Grapevines	783	^ 777	12	^ 10	^ 12 215	1.2
Total(f)	(g)12 270	(g)2 731	(h)102 728	48	313 248	6.5

2003–04						
Pasture for grazing	9 570	^ np	83 633	^ np	^ np	np
Pasture for seed production	^ 583	**np	^ 25	**np	**np	np
Pasture for hay and silage	2 286	*33	106	*2	*14 203	5.9
Cereal crops cut for hay	3 225	*24	173	^ —	161	3.0
Cereal crops for grain or seed(b)	6 207	**14	6 671	**1	**3 227	2.5
Cereal crops not for grain or seed	1 050	*16	75	—	924	2.7
Rice	—	—	—	—	—	—
Sugar cane	^ 15	^ 15	^ 5	4	69 043	16.0
Cotton	**2	—	**—	—	—	—
Other broadacre crops(d)	3 661	*np	1 114	^ np	np	np
Fruit trees, nut trees, plantation or berry fruits(e)	1 121	821	^ 14	^ 9	^ 47 720	5.2
Vegetables for human consumption	533	(c)535	10	9	61 307	7.0
Vegetables for seed	^ 37	*37	^ 1	^ —	^ 356	1.6
Nurseries, cutflowers or cultivated turf	290	^ (c)299	^ 2	^ 2	10 320	6.4
Grapevines	862	^ 608	12	*(c)14	*17 284	1.3
Total(f)	(g)11 876	(g)2 459	(h)101 184	54	308 254	5.7

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— nil or rounded to zero (including null cells)

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(a) Averaged across all irrigated pastures or crops.

(b) Excludes rice.

(c) See Explanatory Notes, paragraph 8.

(d) Excludes sugar cane and cotton.

(e) Excludes grapevines.

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

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

(h) Total area of agricultural land does not equal the sum of area under pasture or crop as not all agricultural land is under pasture or crop.

Note: Number of agricultural establishments and area under pasture or crop sourced from *Agricultural Commodities* (cat. no. 7121.0).

2.7 PASTURES AND CROPS IRRIGATED, Tasmania—2002–03 and 2003–04

	Agricultural establishments no.	Agricultural establishments irrigating no.	Area under pasture or crop '000 ha	Area irrigated '000 ha	Volume applied ML	Application rate ML/ha (a)
2002–03						
Pasture for grazing	3 370	729	1 199	36	99 329	2.8
Pasture for seed production	109	^ 83	^ 4	^ 2	^ 3 348	1.4
Pasture for hay and silage	2 029	^ 186	39	^ 4	^ 8 564	2.0
Cereal crops cut for hay	^ 119	*31	^ 1	^ —	^ 247	1.0
Cereal crops for grain or seed(b)	641	131	23	^ 4	^ 4 661	1.3
Cereal crops not for grain or seed	^ 165	^ 94	^ 3	^ 2	^ 2 126	1.4
Rice	(c)—	—	(c)—	—	—	—
Sugar cane	(c)—	—	(c)—	—	—	—
Cotton	(c)—	—	(c)—	—	—	—
Other broadacre crops(d)	966	705	22	16	33 745	2.1
Fruit trees, nut trees, plantation or berry fruits(e)	290	257	5	^ 4	^ 9 542	2.4
Vegetables for human consumption	683	(f) 712	17	17	42 543	2.6
Vegetables for seed	^ 169	^ 133	^ 1	^ 1	^ 1 973	2.6
Nurseries, cutflowers or cultivated turf	83	(f) 84	—	—	^ 1 161	3.6
Grapevines	172	^ 137	1	^ 1	^ 1 702	2.0
Total(g)	(h) 3 969	(h) 1 923	(i) 1 771	87	208 956	2.4

2003–04						
Pasture for grazing	3 351	786	1 241	35	112 403	3.2
Pasture for seed production	111	^ 71	^ 3	^ 2	^ 3 094	1.7
Pasture for hay and silage	2 017	^ 269	44	^ 6	13 007	2.1
Cereal crops cut for hay	^ 146	*69	^ 2	^ 1	2 542	2.2
Cereal crops for grain or seed(b)	611	152	23	3	3 344	1.0
Cereal crops not for grain or seed	^ 238	^ 107	^ 5	^ 2	^ 3 461	1.5
Rice(c)	—	—	—	—	—	—
Sugar cane(c)	—	—	—	—	—	—
Cotton(c)	—	—	—	—	—	—
Other broadacre crops(d)	767	507	17	^ 12	28 678	2.4
Fruit trees, nut trees, plantation or berry fruits(e)	268	227	^ 4	^ 4	^ 8 273	2.1
Vegetables for human consumption	659	616	18	18	49 733	2.8
Vegetables for seed	163	^ 149	1	^ 1	^ 2 139	2.6
Nurseries, cutflowers or cultivated turf	84	^ (f) 93	—	—	775	2.5
Grapevines	228	^ 97	1	*1	*1 575	1.6
Total(g)	(h) 3 866	(h) 1 939	(i) 1 745	87	229 355	2.6

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(a) Averaged across all irrigated pastures or crops.

(b) Excludes rice.

(c) Data not collected.

(d) Excludes sugar cane and cotton.

(e) Excludes grapevines.

(f) See Explanatory Notes, paragraph 8.

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

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

(i) Total area of agricultural land does not equal the sum of area under pasture or crop as not all agricultural land is under pasture or crop.

Note: Number of agricultural establishments and area under pasture or crop sourced from *Agricultural Commodities* (cat. no. 7121.0).

2.8 PASTURES AND CROPS IRRIGATED, Northern Territory—2002–03 and 2003–04

	Agricultural establishments no.	Agricultural establishments irrigating no.	Area under pasture or crop '000 ha	Area irrigated '000 ha	Volume applied ML	Application rate ML/ha(a)
2002–03						
Pasture for grazing	160	np	40 649	np	np	np
Pasture for seed production	4	—	—	—	—	—
Pasture for hay and silage	40	5	8	—	1 797	6.9
Cereal crops cut for hay	7	np	—	np	np	np
Cereal crops for grain or seed(b)	3	np	—	np	np	np
Cereal crops not for grain or seed	2	np	—	np	np	np
Rice	—	—	—	—	—	—
Sugar cane	(c)—	—	(c)—	—	—	—
Cotton	(c)—	—	(c)—	—	—	—
Other broadacre crops(d)	34	np	3	np	np	np
Fruit trees, nut trees, plantation or berry fruits(e)	122	105	2	2	8 121	3.5
Vegetables for human consumption	13	7	—	—	752	3.3
Vegetables for seed	—	—	—	—	—	—
Nurseries, cutflowers or cultivated turf	29	21	—	—	298	6.5
Grapevines	6	5	—	—	2 950	9.3
Total(f)	(g) 397	(g) 136	(h) 63 263	3	15 953	4.7
2003–04						
Pasture for grazing	185	np	49 947	np	np	np
Pasture for seed production	10	—	—	—	—	—
Pasture for hay and silage	42	6	5	—	309	2.7
Cereal crops cut for hay	4	—	—	—	—	—
Cereal crops for grain or seed(b)	3	(i)4	—	—	88	2.0
Cereal crops not for grain or seed	1	—	—	—	—	—
Rice	—	—	—	—	—	—
Sugar cane(c)	—	—	—	—	—	—
Cotton(c)	—	—	—	—	—	—
Other broadacre crops(d)	32	np	3	np	np	np
Fruit trees, nut trees, plantation or berry fruits(e)	118	106	2	(i)3	9 333	3.5
Vegetables for human consumption	17	16	—	—	1 117	2.6
Vegetables for seed	—	—	—	—	—	—
Nurseries, cutflowers or cultivated turf	27	19	—	—	259	4.1
Grapevines	8	6	—	—	2 977	7.9
Total(f)	(g) 382	(g) 145	(h) 63 124	4	14 186	3.8

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(b) Excludes rice.

(c) Data not collected.

(d) Excludes sugar cane and cotton.

(e) Excludes grapevines.

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

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

(h) Total area of agricultural land does not equal the sum of area under pasture or crop as not all agricultural land is under pasture or crop.

(i) See Explanatory Notes, paragraph 8.

Note: Number of agricultural establishments and area under pasture or crop sourced from *Agricultural Commodities* (cat. no. 7121.0).

3.1

SOURCES OF IRRIGATION WATER, Number of Establishments(a)—By State—2002–03 and 2003–04

	Surface water no.	Groundwater no.	Town or country reticulated mains supply no.	Recycled or re-used water from off farm sources no.	Other no.
.....					
2002–03					
NSW(b)	9 301	2 426	^ 605	^ 231	*70
Vic.	10 237	2 297	^ 625	^ 437	**43
Qld	6 520	4 812	^ 271	^ 243	*49
SA	2 444	2 662	^ 1 073	^ 114	**22
WA	1 477	1 340	^ 132	np	np
Tas.	1 707	^ 271	^ 144	*25	—
NT	5	127	6	np	np
Aust.	31 691	13 935	2 855	^ 1 053	^ 195
.....					
2003–04					
NSW(b)	7 957	2 400	^ 539	^ 310	^ 415
Vic.	9 136	2 364	^ 590	^ 689	^ 448
Qld	6 389	4 457	^ 209	^ 390	^ 206
SA	2 296	2 514	^ 747	^ 157	^ 367
WA	1 395	1 193	^ 158	*4	*26
Tas.	1 706	^ 380	^ 121	^ 18	*39
NT	11	134	4	—	1
Aust.	28 890	13 442	2 368	1 569	1 502

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- (a) Establishments reporting more than one source are shown against each source reported.
- (b) Includes ACT.

3.2 WATER TRADED, By State—2003–04

	<i>Agricultural establishments</i>	<i>Agricultural establishments purchasing extra water</i>	<i>Agricultural establishments selling water</i>
.....			
NUMBER OF ESTABLISHMENTS			
NSW(a)	40 915	1 815	1 632
Vic.	32 463	2 773	1 886
Qld	26 785	^ 728	^ 406
SA	14 238	^ 484	^ 357
WA	11 876	^ 246	*50
Tas.	3 866	^ 151	^ 53
NT	382	3	5
Aust.	130 526	6 200	4 388

.....

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(a) Includes ACT.

4.1

IRRIGATION METHODS, Number of Establishments(a)—By State—2002–03 and 2003–04

	NSW no.(b)	Vic. no.	Qld no.	SA no.	WA no.	Tas. no.	NT no.	Aust. no.
2002–03								
Surface	3 949	5 986	1 956	^ 699	^ 324	^ 57	—	12 970
Drip or trickle								
Above ground	1 962	1 873	1 753	2 235	1 418	365	26	9 632
Subsurface	*199	^ 136	^ 600	*27	^ 183	*8	5	1 156
Sprinkler								
Microspray	1 503	1 028	1 808	1 278	661	^ 104	88	6 469
Portable irrigators	^ 2 034	^ 1 373	1 974	^ 510	^ 85	^ 252	5	6 231
Hose irrigators	1 825	^ 1 329	3 315	^ 355	*np	1 229	np	8 122
Large mobile machines	^ 739	^ 498	^ 674	589	^ 30	^ 192	7	2 730
Solid set	1 053	1 424	1 359	1 046	426	164	14	5 487
Other	*158	*187	^ 288	*96	^ np	*35	np	^ 848
2003–04								
Surface	3 681	5 421	1 895	^ 754	^ 288	^ np	np	12 119
Drip or trickle								
Above ground	1 874	2 037	1 569	2 010	1 110	313	27	8 939
Subsurface	^ 138	^ 157	^ 585	*70	^ 123	*6	11	1 090
Sprinkler								
Microspray	1 423	^ 1 160	1 522	1 347	548	^ 113	91	6 204
Portable irrigators	^ 1 485	^ 898	1 880	^ 378	^ np	388	np	5 115
Hose irrigators	1 533	^ 1 010	2 992	^ 306	^ np	1 132	np	7 025
Large mobile machines	^ 633	^ 610	^ 650	635	^ 52	235	9	2 823
Solid set	885	1 198	1 072	851	377	^ 168	13	4 563
Other	^ 255	^ 345	*252	^ 120	^ 98	^ np	np	^ 1 116

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(a) Establishments reporting irrigating by more than one method are shown against each method reported.

(b) Includes ACT.

4.2 IRRIGATION METHODS, Area Irrigated(a)—By State—2002–03 and 2003–04

	NSW '000 <i>ha</i> (b)	Vic. '000 <i>ha</i>	Qld '000 <i>ha</i>	SA '000 <i>ha</i>	WA '000 <i>ha</i>	Tas. '000 <i>ha</i>	NT '000 <i>ha</i>	Aust. '000 <i>ha</i>
2002–03								
Surface	691	386	208	^ 35	^ 17	^ 6	—	1 344
Drip or trickle								
Above ground	31	^ 42	^ 29	55	^ 17	^ 5	1	180
Subsurface	^ 5	^ 3	^ 13	*—	^ 1	*—	—	23
Sprinkler								
Microspray	^ 15	18	24	17	^ 5	^ 1	2	80
Portable irrigators	^ 45	^ 28	^ 35	^ 4	^ 1	^ 10	—	123
Hose irrigators	^ 54	^ 32	154	^ 5	^ np	44	np	289
Large mobile machines	^ 55	^ 40	^ 50	44	1	19	1	209
Solid set	^ 15	^ 32	^ 18	^ 20	4	^ 2	—	91
Other	*2	*5	*5	^ 1	^ np	*1	np	^ 14
2003–04								
Surface	659	433	245	^ 34	16	^ np	np	1 393
Drip or trickle								
Above ground	^ 48	32	28	56	^ 20	^ 4	1	189
Subsurface	^ 5	^ 7	^ 16	*1	^ 1	^ —	1	31
Sprinkler								
Microspray	^ 13	18	24	17	4	^ 1	2	80
Portable irrigators	^ 31	^ 21	^ 39	^ 3	^ np	13	np	109
Hose irrigators	^ 51	26	158	^ 4	*np	41	np	281
Large mobile machines	^ 58	^ 41	^ 51	50	^ 4	24	—	229
Solid set	^ 10	^ 24	13	15	5	^ 2	—	68
Other	^ 1	*2	*2	*1	*—	^ np	np	^ 7

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— nil or rounded to zero (including null cells)

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(a) Areas reported as being irrigated by more than one method are shown against each method reported.

(b) Includes ACT.

EXPLANATORY NOTES

- INTRODUCTION**
- 1** This publication presents estimates of water use and management from the 2003-04 Agricultural Survey and Vineyards Survey. It contains detailed statistics on crops and pasture irrigated, irrigation methods and sources of water.
- 2** This publication also includes estimates for 2002-03 derived from the Water Survey - Agriculture 2002-03. Due to the differences in collection methodologies, care should be taken in comparing the results between 2002-03 and 2003-04.
- SCOPE AND COVERAGE**
- 3** The scope of the 2003-04 Agricultural Survey is establishments undertaking agricultural activity with an estimated value of agricultural operations (EVAO) of \$5,000 or more.
- 4** The sample for the 2003-04 Agricultural Survey included the same 28,000 units selected for the 2002-03 Agricultural Survey.
- 5** A further 3,000 units were selected to cover sample loss due to units in the original selections having ceased farming, and to improve relative standard errors where commodities were approaching or exceeding design parameters in the 2002-03 Agricultural Survey. A proportion of the 3,000 units was also used to sample units that commenced farming since 2001-02. This strategy was used to help ensure good estimates of movements as parts of Australia move out of the drought.
- AGRICULTURAL ESTABLISHMENTS**
- 6** An agricultural establishment is the smallest accounting unit within a state or territory controlling its productive activities and maintaining a specified range of detailed data enabling value-added to be calculated. In general, an establishment covers all operations at a physical location, but may consist of a group of locations provided they are within the same Statistical Local Area (SLA) or contiguous SLAs. The majority of agricultural establishments operate at one location only.
- COMPARABILITY WITH WATER ACCOUNT AUSTRALIA**
- 7** Estimates of water usage presented in this publication differ from those presented in *Water Account, Australia* (cat.no. 4610.0). The water use estimates represent water used specifically for the irrigation of pastures and crops during the reference periods, as reported by agricultural establishments. Estimates of water usage presented in the Water Accounts represent water used for all agricultural purposes including for pastures and crops. Water use in the Water Accounts was determined by applying regional water application rates, obtained from water supplier surveys and state and territory or industry contacts, to the area of irrigated crops and livestock numbers.
- COMPARABILITY WITH AGRICULTURAL COMMODITIES AUSTRALIA**
- 8** The estimates of agricultural establishments and area under pasture or crop in this publication have been drawn from *Agricultural Commodities, Australia* (cat. no. 7121.0). Due to differences in editing of survey data, some estimates of irrigating agricultural establishments and area of crop irrigated presented in this publication are higher than the estimates of agricultural establishments and area under that crop. Measures will be implemented to eliminate these discrepancies in future issues of this publication. For further information please contact the Director, Environment and Energy Business Statistics Centre, on Hobart 03 6222 5804.
- RELIABILITY OF DATA**
- 9** The estimates in this publication are subject to sampling and non-sampling errors.

SAMPLING ERRORS

10 The estimates in this publication are based on information obtained from a sample drawn from the total farm population in scope of the collection, and are subject to sampling variability; that is, they may differ from figures that would have been produced if all farms 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 have varied by chance because only a sample of units was included. 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 a census had been conducted, and approximately nineteen chances in twenty that the difference will be less than two SEs.

11 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.

12 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.

13 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—2003–04

	NSW(a)	Vic.	Qld	SA	WA	Tas.	NT	Aust.
	%	%	%	%	%	%	%	%
Total area irrigated (ha)	3.5	3.8	4.1	4.6	8.7	3.2	—	1.9
Total volume applied (ML)	3.6	3.7	5.7	7.2	5.0	4.0	—	2.2
Cereal crops for grain or seed - area irrigated (ha)	5.2	18.4	11.0	21.9	65.3	8.2	—	4.5
Cereal crops for grain or seed - volume applied (ML)	5.2	22.9	15.8	15.9	62.2	9.2	—	5.0
Vegetables for human consumption - area irrigated (ha)	15.3	2.6	4.0	6.9	4.3	3.1	—	3.2
Vegetables for human consumption - volume applied (ML)	12.5	3.4	4.2	7.5	4.7	4.0	—	3.3
Nurseries cutflowers or cultivated turf - area irrigated (ha)	18.1	9.5	6.9	57.0	12.5	8.4	—	10.2
Nurseries cutflowers or cultivated turf - volume applied (ML)	20.8	7.4	6.6	72.1	4.3	9.8	—	17.6
Irrigation methods - sprinkler - microspray - area irrigated (ha)	11.2	7.7	4.7	7.0	9.7	16.3	—	3.3

— nil or rounded to zero (including null cells)

(a) Includes ACT.

NON-SAMPLING ERRORS

14 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

15 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 either the National Information and Referral Service on 1300 135 070 or Ron Just on (03) 6222 5842.

RELATED PUBLICATIONS

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

- *Water Account, Australia* (cat. no. 4610.0)
- *Agricultural Commodities, Australia* (cat. no. 7121.0)

RELATED PUBLICATIONS

continued

■ *Environment Expenditure Local Government* (cat. no. 4611.0)

17 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.

ACKNOWLEDGMENT

18 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. Information received by the ABS is treated in strict confidence, as required by the *Census and Statistics Act 1905*.

CLIMATE CONDITIONS IN
2003-04

After the widespread drought of 2002-03, 2003-04 saw a return to normal to above-normal rainfall for large parts of Australia, though areas of eastern Australia, despite recording more rainfall than in 2002-03, continued to receive below average totals.

Rainfall was well above normal in much of the Northern Territory and the north and east of Western Australia. It was particularly wet in the Top End of the Northern Territory, with the 12-month period being the wettest on record in an area centred on Katherine. 2003-04 was the latest in a sequence of abnormally wet 'wet seasons' in northwestern Australia – six of the ten wettest October-April periods on record in Western Australia have occurred in the 10 years from 1994-95 to 2003-04. The November-February period was especially wet through much of the north, whilst May and early June brought heavy rains to large areas of central Australia.

In the eastern states and South Australia, rainfall in 2003-04 was broadly near normal, although there were local deviations from this, the most significant being along much of the NSW coast and adjacent tablelands where rainfall was generally below normal. After a relatively wet second half of 2003, the first half of 2004 was dry in many parts of the south-east, especially southern inland New South Wales and northern Victoria. Canberra had its driest autumn on record, as did areas to its north. 2003-04 also saw generally near-normal rainfall in the south-west of Western Australia, although the Perth area itself was somewhat drier than average. In Tasmania, a very wet July-September quarter was followed up by a very dry October-December quarter, with many locations setting records in one or both periods.

The all-Australian mean rainfall for 2003-04 was 541mm, 15% above the 1961-90 average. The major contributors to this were Western Australia (43% above normal, 7th highest on record) and the Northern Territory (40% above normal, 7th highest on record). The largest negative deviations occurred in New South Wales, which was 17% below normal. Murray-Darling Basin rainfall was 9% below normal, although still above the levels recorded in 2002-03 or 2001-02.

Australian temperatures were above normal in 2003-04, although not to the same extent as in 2002-03. Daytime maximum temperatures were 0.55°C above the 1961-90 average, and overnight minimum temperatures 0.44°C above. These ranked as 7th and 9th highest, respectively, since monthly Australia-wide records commenced in 1950. These warmer than average temperatures are consistent with natural variability overlaid on the longer term warming trend.

The most significant warmth occurred in Queensland, where maximum temperatures were 1.05°C above average (third highest on record) and minimum temperatures 0.78°C above (fourth). This continues the pattern of recent years: for maximum temperatures in Queensland, 2003-04 ranks third behind 2002-03 and 2001-02. Both maximum and minimum temperatures were 1 to 2°C above average across much of the southern half of Queensland away from the coast, as well as parts of adjacent states.

Only a small proportion of Australia was cooler than normal in 2003-04. Maximum temperatures were below normal along parts of the southern coastal fringe (most notably western Victoria) and northern Western Australia, whilst the most significant areas of below-normal maximum temperatures were in the inland southeast, locally

CLIMATE CONDITIONS IN
2003-04 *continued*

reaching 1°C below average in north-western Victoria and the Riverland of South Australia.

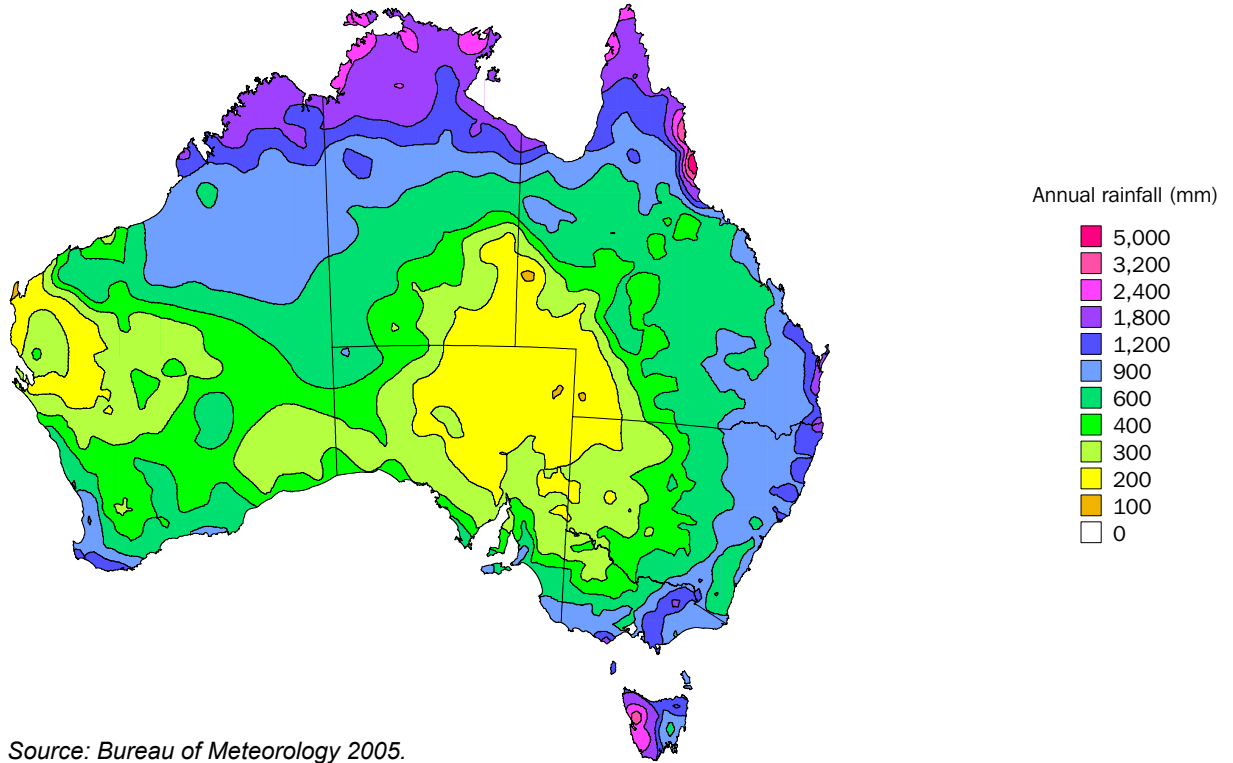
Long-term rainfall deficits which have existed since 1996 in southern Victoria, south-western Western Australia and parts of southern coastal Queensland continued in 2003-04, with all three regions receiving generally near- to below-average rainfall over the 12-month period.

Significant events which occurred on shorter timescales included:

- An exceptional heatwave affected much of south-eastern Australia during the middle weeks of February. Statewide February temperature records were set in NSW (48.5°C at Ivanhoe) and Victoria (46.7°C at Ouyen), and equalled in South Australia (47.9°C at Marree), whilst many individual locations set February record high temperatures in those three states, as well as in southern Queensland. The duration of the heatwave also set many records, with Wilcannia experiencing 16 consecutive days over 40°C from 6-21 February and Adelaide 17 consecutive days over 30°C from 4-20 February. Oodnadatta had an Australian record nine consecutive nights above 30°C from 12-20 February. The eastern coastal cities were only intermittently affected, but Brisbane reached 41.7°C on 21 February, its hottest day since 1940 and third-hottest on record.
- A notable spring heatwave occurred in late September. On 22 September, state September records were set in Victoria (37.6°C at Mildura), NSW (39.5°C at White Cliffs and Menindee) and South Australia (41.5°C at Moomba). Later in the month, an Australian September record of 43.1°C was set on the 27th at West Roebuck, near Broome, with Fitzroy Crossing (42.9°C) also breaking the previous record on the same day.
- Whilst few records were broken, extreme heat also affected parts of central Australia in early January. Birdsville reached 48.5°C on 5 and 6 January, the highest temperature in Queensland since 1990, and Oodnadatta's seven consecutive nights above 30°C equalled the Australian record, a record subsequently broken in February.
- Tropical Cyclone Fay brought very heavy rain to parts of inland Western Australia in late March. Nifty Copper Mine, east of Port Hedland, had 525mm in 24 hours on 28 March, the fourth-highest daily fall on record for Western Australia. Telfer's two-day total of 359mm on 28-29 March was also well in excess of their annual mean of 313mm.
- An intense low-pressure system brought a variety of severe weather through southern Australia from 22-24 August. Southern Western Australia saw its most extensive snowfalls since 1992, major flooding developed on the South Esk River in northern Tasmania, whilst severe winds caused damage in the south-eastern mainland, particularly in metropolitan Sydney.
- Damaging frosts occurred in parts of inland south-eastern Australia on 28 September. The Goulburn Valley in Victoria was severely affected with major damage to fruit crops. Charlotte Pass had a minimum of -15.0°C, the second-lowest September temperature on record in Australia. This event was followed by a very cool October in south-eastern Australia, with Victoria and Tasmania having their coldest October in the post-1950 period.
- Two severe thunderstorm events, on 3 December and 28 January, caused significant flash flooding in parts of suburban Melbourne. Both events saw daily totals in excess of 100mm in some suburbs, most falling within a two-hour period. The inner north and north-eastern suburbs were worst-hit in the December event, whilst in January the flooding was centred in the inner east.

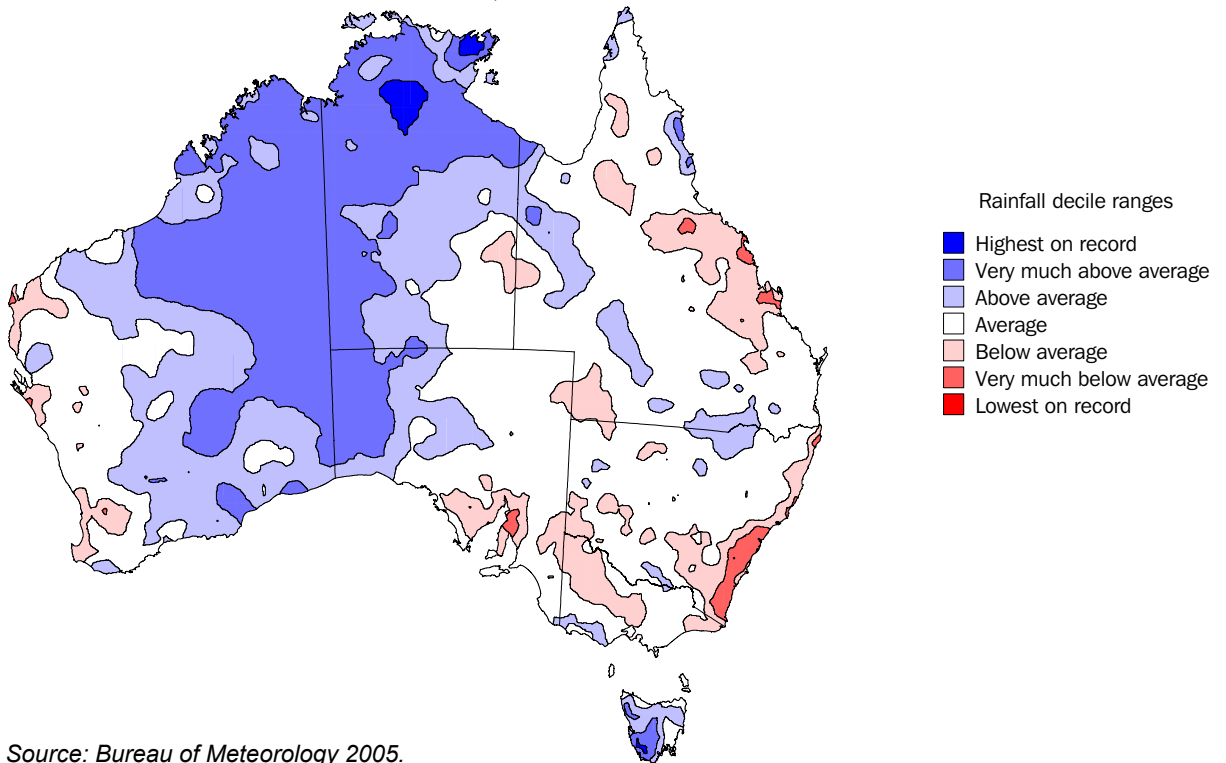
Source: Bureau of Meteorology 2005.

A1.1 AUSTRALIAN RAINFALL ANALYSIS, 1 JULY 2003 TO 30 JUNE 2004



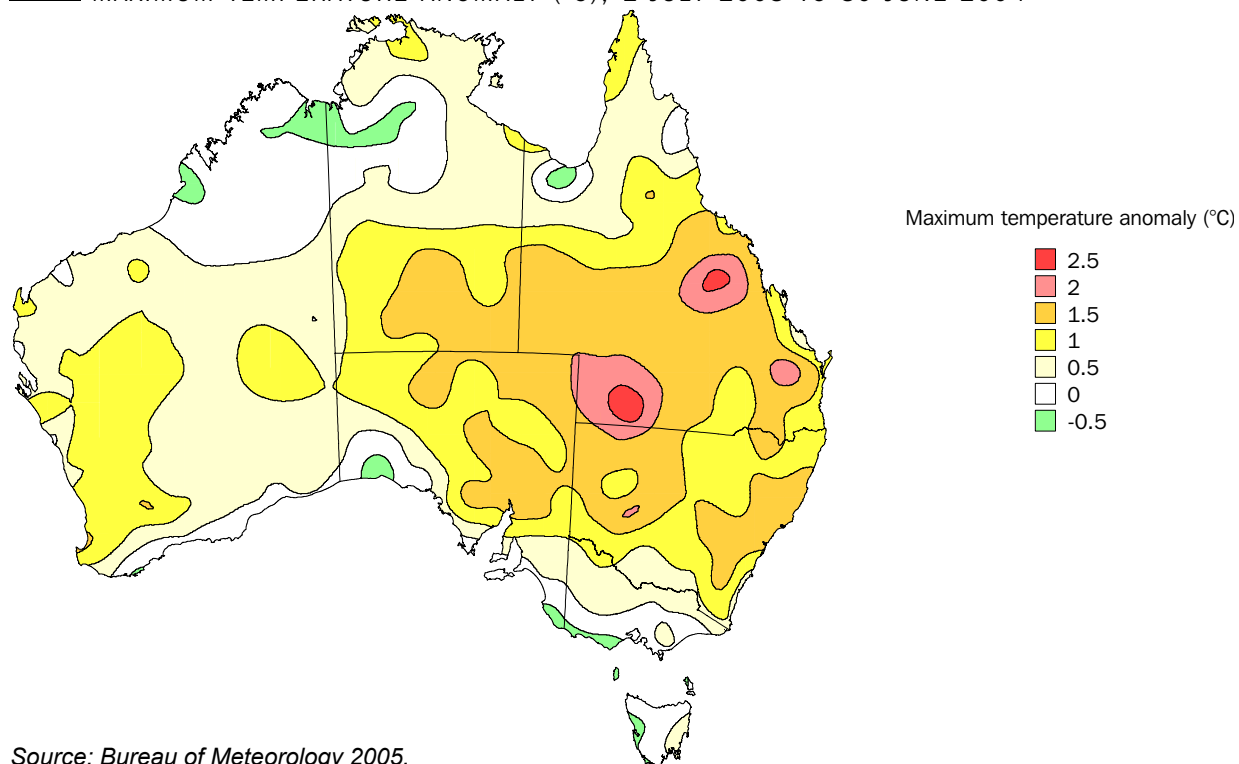
Source: Bureau of Meteorology 2005.

A1.2 AUSTRALIAN RAINFALL DECILES, 1 JULY 2003 TO 30 JUNE 2004

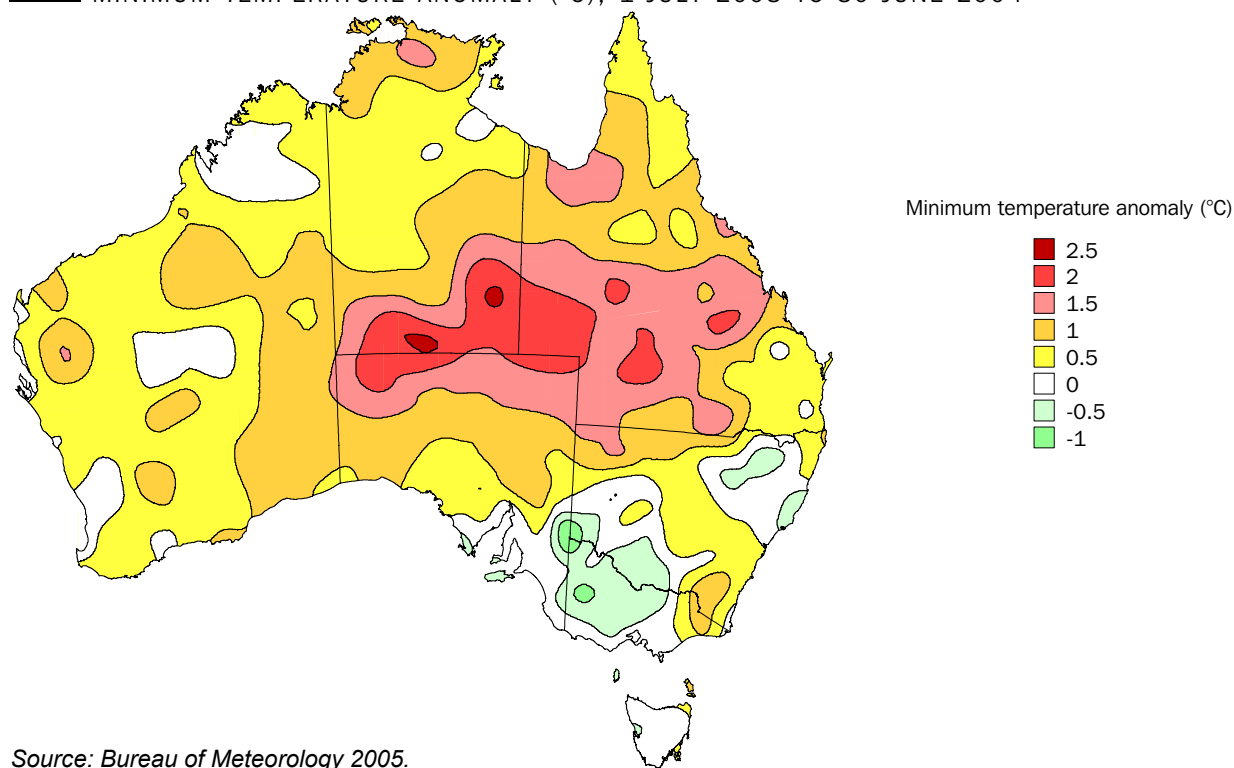


Source: Bureau of Meteorology 2005.

A1.3 MAXIMUM TEMPERATURE ANOMALY (°C), 1 JULY 2003 TO 30 JUNE 2004



A1.4 MINIMUM TEMPERATURE ANOMALY (°C), 1 JULY 2003 TO 30 JUNE 2004



GLOSSARY

Agricultural establishment	An establishment which is engaged mainly in agricultural activities.
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.
Application rate	Rate at which water is applied to an area or crop, measured in megalitres per hectare. One megalitre per hectare of irrigation equates to 100 millimetres of rainfall.
Drip irrigation	An irrigation technique that applies water to crops by methods that deliver the water to individual plants or rows of crops through drippers or weeping hoses (also termed 'trickle' techniques).
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.
Megalitre	One million litres.
Microspray	System of irrigation designed to use low pressure and small flows of water to mini-sprays and mini-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 eg. sewage water brought onto a property for the purpose of irrigation.
Sprinkler irrigation	Irrigation applied from various forms of overhead sprays (also known as spray irrigation).
Surface irrigation	Irrigation in the form of controlled flooding of paddocks or irrigation bays.
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.
Trickle irrigation	As for drip irrigation.
Water trading	The process of buying and selling water entitlements, where entitlements can include water supplied as part of a licence, allocation or other entitlement.

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- INTERNET* **www.abs.gov.au** the ABS web site is the best place to start for access to summary data from our latest publications, information about the ABS, advice about upcoming releases, our catalogue, and Australia Now—a statistical profile.
- LIBRARY* A range of ABS publications is available from public and tertiary libraries Australia-wide. Contact your nearest library to determine whether it has the ABS statistics you require, or visit our web site for a list of libraries.
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