NSW DEPARTMENT OF
PRIMARY INDUSTRIES

Irrigation Profile - Readers' Note

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Murrumbidgee Catchment Irrigation Profile

compiled by Meredith Hope and Marcus Wright, for the Water Use Efficiency Advisory Unit, Dubbo

The Water Use Efficiency Advisory Unit is a NSW Government joint initiative between NSW Agriculture and the Department of Sustainable Natural Resources.

NSW Agriculture (2003)

This Irrigation Profile is one of a series for NSW catchments and regions. It was written and compiled by Meredith Hope and Marcus Wright (NSW Agriculture) for the Water Use Efficiency Advisory Unit, 37 Carrington Street, Dubbo, NSW, 2830.

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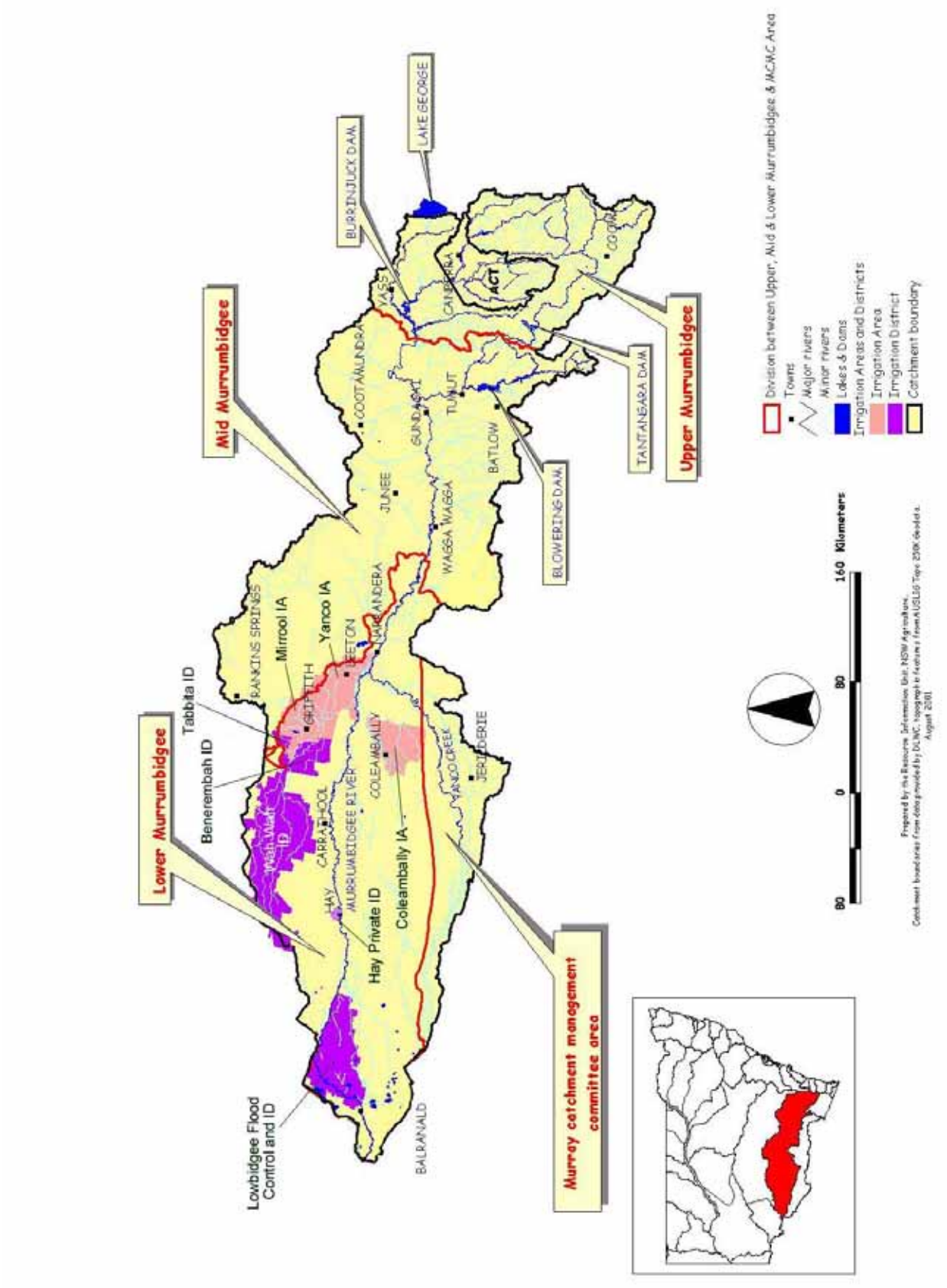
Figure 1. The Murrumbidgee catchment



1. EXECUTIVE SUMMARY

The *Murrumbidgee Catchment Irrigation Profile* was developed from a study to obtain catchment and industry based assessments of water use efficiency (WUE)[1] and irrigation efficiency (IE)[2].

Readily accessible irrigation data were collected from State and Commonwealth sources, published research and industry reports and unpublished reports. These data were assigned a reliability rating using a system developed by the National Land and Water Resources Audit (1999).

The report summarises, where possible by water source and catchment, what is known about:

- the number of irrigators
- the number of licences
- the entitled volume or area authorised for irrigation
- the area irrigated and water used in total and by crop type
- irrigation methods
- yields of irrigated crops
- the value of irrigation to agriculture

in the Murrumbidgee catchment.

This report does not attempt to analyse the reliability and accuracy of these data or calculate WUE from the data. This will be carried out in a subsequent report.

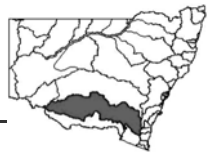
Users of this document are advised to proceed with caution. The data presented in this report should be treated carefully and with respect for the various collection, storage and retrieval processes that can impact on information reliability.

1.1 Overview of the Murrumbidgee catchment

The Murrumbidgee catchment is located in southern NSW (Figure 1) west of the Great Dividing Range and covers approximately 84 000 km^2 or about 8% of the Murray-Darling Basin. The landscape ranges from mountainous/undulating country in the east around Lake George and Burrinjuck Dam to broad semi-arid plains in the west

[1] WUE refers to the volume of crop produced (harvested dry matter) per unit of water delivered to the crop. This is usually expressed as tonnes per megalitre (t/ML) (Alexander & Foley 1998).

[2] IE is a measure, expressed as a percentage, of the volume of water used or delivered by a system relative to the total volume of water entering the system (Alexander & Foley 1998).



around Griffith and Balranald. The catchment has a semi-arid climate with an annual rainfall that declines in a westerly direction from approximately 990 mm in the east to 320 mm in the west. Rainfall is mostly winter dominant. Annual long-term evaporation increases from 1300 mm in the east to approximately 1800 mm in the west of the catchment.

Regulation of the Murrumbidgee River has allowed irrigation to thrive in the catchment. Water is stored in Burrinjuck and Blowering dams during winter and then used to supply irrigation farms downstream during summer. Burrinjuck Dam receives inflows from the upper catchment while Blowering Dam receives most of its inflow from the Snowy Mountains Hydro-Electric Scheme.

Irrigation farms are concentrated mostly on the riverine plains, especially in the region now managed by Murrumbidgee Irrigation (MI) and Coleambally Irrigation Co-operative Limited (CICL). This region, previously known as the Murrumbidgee Irrigation Area (MIA) and the Coleambally Irrigation Area (CIA), was initially developed by the government to foster regional development through irrigation in inland NSW. Massive diversion weirs and supply and drainage canals were constructed to support the numerous irrigation farms.

Technically, the lands of the MIA and CIA no longer exist. However, since the terms MIA and CIA are still in common usage this Profile will continue refer to them.

In addition to the MIA and CIA, there are many individual irrigation farms along the length of the Murrumbidgee River that pump river water directly to their farms. Groundwater is also extracted for irrigation purposes along the length of the Murrumbidgee catchment, especially around the Darlington Point region just south of the MIA. Irrigation farms dependent on unregulated supplies and farm dams are scattered in the upper catchment. Unlike farms extracting water from the regulated system, these enterprises are limited by access to a secure supply of water. During summer, when the demand for irrigation water is at a peak, river flows tend to be at their lowest. Farm dams are also used to support irrigation enterprises in the upper catchment. There are very few enterprises that irrigate from reticulated (town water) supplies and most of these are located around Wagga Wagga.

The Murrumbidgee catchment produces irrigated commodities ranging from annual crops such as rice, pasture, cereals, vegetables and oilseeds to perennial crops such as wine grapes, citrus and stone fruit. The bulk of these crops are grown in the MIA and CIA. There is also an important irrigation industry in the Batlow region where apples are grown.

In 1996–97, the total value of agriculture in the catchment was $1140 million and, of this, 42% or $476 million was attributable to irrigation. Roughly 80% of this total value can be attributed to irrigation in the MIA and CIA. The total value of irrigation has increased steadily since 1991, when it was $294 million. The most valuable crops were rice and fruit and nuts (excluding grapes) each worth $127 million (1996–97 figures).

Of the 1 150 000 ha of land irrigated in NSW, nearly thirty per cent (329 201 ha) is in the Murrumbidgee catchment. Cereals represent nearly 50% of the total area irrigated in the catchment while pasture represents 38%. Perennial horticulture comprises 4.5%.

In 1996–97, it was estimated that the total volume of water extracted from all sources was around 2 430 963 ML (Table 1). This volume cannot be accurately determined, as data on the extraction of water from some sources were either scant, or were never collected. The greatest amount of data relates to irrigation from the regulated system. Of the volume entitled to irrigation from the regulated system, roughly three-quarters is used by irrigators in the MIA and CIA.

Of the total water extracted by irrigated agriculture from the regulated system, a large proportion is used on rice and pasture. The remaining water was used on other broadarea crops such as wheat, maize and oats and horticultural crops such as citrus, vines and vegetables.

Depending on climate, irrigators have used between 62% and 95% of the volume entitled to irrigation from regulated rivers. By comparison, less than half the total area authorised for irrigation from unregulated streams was actually irrigated. Licences on unregulated streams were converted from area-basis to volume-basis in 2000. In future, levels of activity will be determined from volumes extracted rather than areas irrigated.

Of the estimated 24 000 licences in NSW, nearly 9% are in the Murrumbidgee catchment. Most of these licences are owned by single enterprises. However, there are also special corporate licences that supply water to many enterprises. For example, MI and CICL each own one licence and supply water to many enterprises.

Information on the number of enterprises irrigating is perhaps more telling than licence figures. Of the total number of enterprises irrigating in NSW in 1996–97 (7846), either 24% or 45% were in the Murrumbidgee catchment. In compiling this *Profile*, difficulty was experienced in obtaining a more reliable estimate of the number of enterprises irrigating in the catchment.

Most of the enterprises irrigating in the Murrumbidgee catchment rely on water from either the regulated or unregulated river supply (Table 1). There are far fewer enterprises using water from groundwater, farm dams and reticulated water supplies.

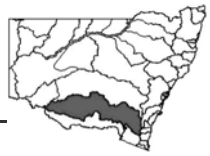


Table 1. Irrigation data for 1996–97 season in the Murrumbidgee catchment

Source of water	Total irrigated area (ha) [a]	Total water used by irrig. ag. (ML/y)	Number irrigation licences	Number enterprises irrigating [b]	Value of irrigation ($m/y)
Murrumbidgee catchment – all sources	329 201 or 348 692	nd *est. 2 430 963*	2 050	1896 or 3802	476 (rice and perennial hort. excl. grapes, 127 each)
MIA (all sources)	nd *157 516 (00–01)*	661 000[3]	1 bulk water licence	2733	325
CIA (all sources)	nd *71 000 (1997–98)*	nd *521 000[4] (1997–98)*	1 bulk water licence[5]	345 plus 35 on Coleambally Outfall drain	57
Regulated (all enterprises including corporations)	nd *315 007 (1993–94) (likely to be an overestimate)*	2 264 188[c]	801	nd *1851 (1993–94) Likely to be overestimated*	nd
Unregulated	8 335	nd *16 775 (avg. 1989–90 to 1994–95)*	502	nd *520 (1993–94)*	nd
Groundwater	nd *11 118 (1993–94)*	nd *est. 150 000*	747	nd *78 (1993–94)*	nd
Farm dams	nd *5881 (1993–94)*	nd	na	nd *100 (1993–94)*	nd
Town water supply	nd *27 (1993–94)*	nd	na	nd *5 (1993–94)*	nd
NSW Total	*1 150 000*	*7 700 000*	*24 000*	*7 846*	*2 496*

nd= no data; na = not applicable; **a.** The area irrigated from different sources does not add up to the area irrigated from all sources. Data for different water sources were collected using different collection methods; **b**. Numbers of enterprises for each water source do not add to the total number of enterprises irrigating. Some enterprises use more than one source of water to irrigate crops and consequently that enterprise may be counted more

[3] This figure is the estimated surface water component for 1996-97 (655 107 ML) plus around 5500 ML for groundwater extraction.

[4] This figure was estimated from the surface water component (460 877 ML) plus estimate groundwater use of 60 000 ML. The final figure has been rounded up. Note that the surface water component of 460 877 ML has a small amount of groundwater (around 4000 ML to 5000 ML) already included. The CICL bore pumps water directly into the main surface water supplies for the area. This groundwater component cannot be separated from the surface water component when it is metered at the farm gate.

[5] This has a surface and groundwater component.

than once. **c.** This volume was calculated by taking the diverted volume from the river for irrigation in 1996-97 (2 648 188 ML) and then subtracting the estimated volume that is 'lost' between the river off-take and the farm gate (384 GL). The lost volume includes seepage and evaporation. Meter inaccuracies also contribute to this volume.

1.2 Irrigation data issues

Irrigation data issues raised in the Murrumbidgee catchment relate to availability of information, the scales at which data were reported and the reliability of irrigation data.

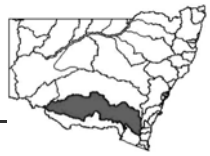
1.2.1 Data availability

Data have been collected for different purposes in the past to those currently needed. Since the implementation of water reforms and the development of water sharing plans, a much greater range of irrigation data are needed than are currently available (data on crop areas, crop water use, yield, value of production and irrigation methods). In the past, agency and community data needs were fewer and therefore fewer data were collected. For example, only details of the volume of water extracted from regulated rivers were collected by the DLWC for billing, operation or reporting purposes from each licence holder. There were no requirements to record other information such as crop areas and crop water use, yields, irrigation methods or values.

Data are needed to help target assistance for irrigators who may need to adjust practices as a result of water reform and to measure change because of extension activities aimed at improving WUE and IE. This Profile has shown that, for a range of irrigation data categories, information is scant: for example, crop area irrigated. In some instances, data had never been collected, for example, crop water use from unregulated rivers.

Information about irrigation is dispersed across the different organisations that administer water in the Murrumbidgee catchment. In order to build a comprehensive picture of irrigation in the catchment, one must approach each data-holding organisation (MI, CICL and DLWC) and make individual requests for information. This Profile identified information gaps in certain geographic regions in the catchment, such as irrigators along the regulated river system, and temporal gaps or periods where no data were collected, such as crop area data for the MIA during the 1990s.

Often useful information on irrigation, such as crop areas and water used, have been collected by one agency (for example, DLWC) but not used to full potential. Other organisations, such as NSW Agriculture, could use these data to help strategically focus extension efforts, such as those of WaterWise on the Farm, to areas where there are poor water use efficiencies.



1.2.2 Lack of data at useful scales

Point-scale data collected by the ABS and ABARE (for example, irrigation value and yield) are confidential and have been reported at SLA, catchment, groups of catchments or Agro-Ecological Region (AER) scales. AERs span many catchments and align with climatic characteristics (for example, arid interior or temperate slopes and plains). These scales limit the usefulness of data to natural resource managers, industry groups and researchers who are often working at much finer levels, for example, subcatchment or river-reach scale. These point-scale data are extremely useful in modelling the economic impact of changes to water sharing rules on irrigators or in generating profiles of irrigation for planning processes at subcatchment or river-reach scale. The ABS is considering geo-coding their data in the near future to help overcome this issue.

1.2.3 Reliability of data

Reliability of irrigation data varied according to water source. For example, data from regulated supplies were more reliable than data from unregulated supplies. The former dataset was collected from meters that measure water use whereas the latter was based on voluntary annual surveys filled out by irrigators and returned to the DLWC. The latter were often incomplete and inaccurate.

The reliability of irrigation data, for example, error bands or reliability ratings, is not consistently reported by State agencies. This makes it easier for users of the data to inappropriately manipulate or analyse irrigation data and draw spurious conclusions.

Reliability of irrigation data is affected by collection strategies. The ABS used definitions of regulated and unregulated water sources for the 1993–94 survey that were different to those used by the DLWC. Consequently, irrigated area and enterprise numbers may be overestimated for regulated water supplies and underestimated for unregulated water supplies.

1.3 Conclusion

In all Australian states, programs have been initiated to increase water use efficiency (WUE) and irrigation efficiency (IE) in irrigated agriculture. These programs require reliable and accurate irrigation data to underpin debates on efficiency.

A more comprehensive and consistent approach to the collection of irrigation statistics is needed. This would ensure that data are comparable across different water sources and industries and provide useful information to water managers and industry groups. The following measures are recommended to improve the situation:

- Recognition of the need to collect irrigation data on crop area, water used, irrigation methods and value of irrigation.
- Collection of data at scales coarse enough to protect point-scale confidentiality but fine enough to allow users to aggregate information to useful scales.

- Protocols for provision of data to users are needed. For example, information providers need to attach reliability ratings to data. This would help users make better decisions regarding how data should be treated.
- Two-way flow of information between agencies and irrigators needs to be fostered. Data need to flow back to irrigators in forms that might assist them make better water management decisions.
- Two-way flow of information about irrigation between different government agencies (for example, the DLWC and NSW Agriculture) needs to be fostered. This would aid in the strategic development and implementation of extension efforts to improve WUE and IE.

Finally, a more comprehensive and consistent approach to the collection of irrigation statistics is needed. Such an approach can only be developed with the full involvement of the many agencies and irrigators who require these data.