NSW DEPARTMENT OF
PRIMARY INDUSTRIES

Irrigation Profile - Readers' Note

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Greater Macquarie Catchment Irrigation Profile

compiled by Meredith Hope, for the Water Use Efficiency Advisory Unit

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

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

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TABLE OF CONTENTS

List of Figures

List of Tables

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1. EXECUTIVE SUMMARY

The Greater Macquarie Catchment Irrigation Profile was developed out of a study to obtain regional and industry-based assessments of water use efficiency (WUE) and Irrigation Efficiency (IE)[1]. Readily accessible irrigation data were collected from state and Commonwealth sources, from published research and industry reports and from unpublished reports.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 available, by water source and by catchment,

- the number of licences
- the number of enterprises that irrigate
- the entitled volume or area authorised for irrigation
- the area irrigated and water used in total and by crop type
- the method of irrigation
- irrigated crop yields
- the value of irrigation.

This Profile does not attempt to calculate WUE and IE from these data or analyse their reliability and accuracy. This analysis 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 Irrigation in the Greater Macquarie catchment

The Greater Macquarie catchment[2] is located in central NSW, west of the Great Dividing Range. It has an area of 87 201 km^2, or 8% of the Murray-Darling Basin (MDB). The catchment comprises three smaller catchments: from north to south, the Castlereagh, the Macquarie and Bogan catchments (see Figure 1. Note that for water management purposes, the Bogan catchment is usually grouped with the Macquarie catchment, and so the division between them has therefore not been provided in Figure 1.).

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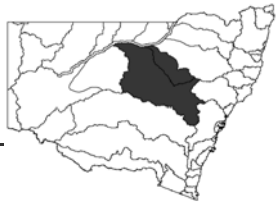
[1] WUE is defined as the volume of crop produced per unit of water delivered to the crop and is usually expressed as tonnes per megalitre (t/ML). IE is a measure, expressed as a percentage, of the volume of water used or delivered by a system relative to the total volume of water entering the system (Alexander and Foley 1998).

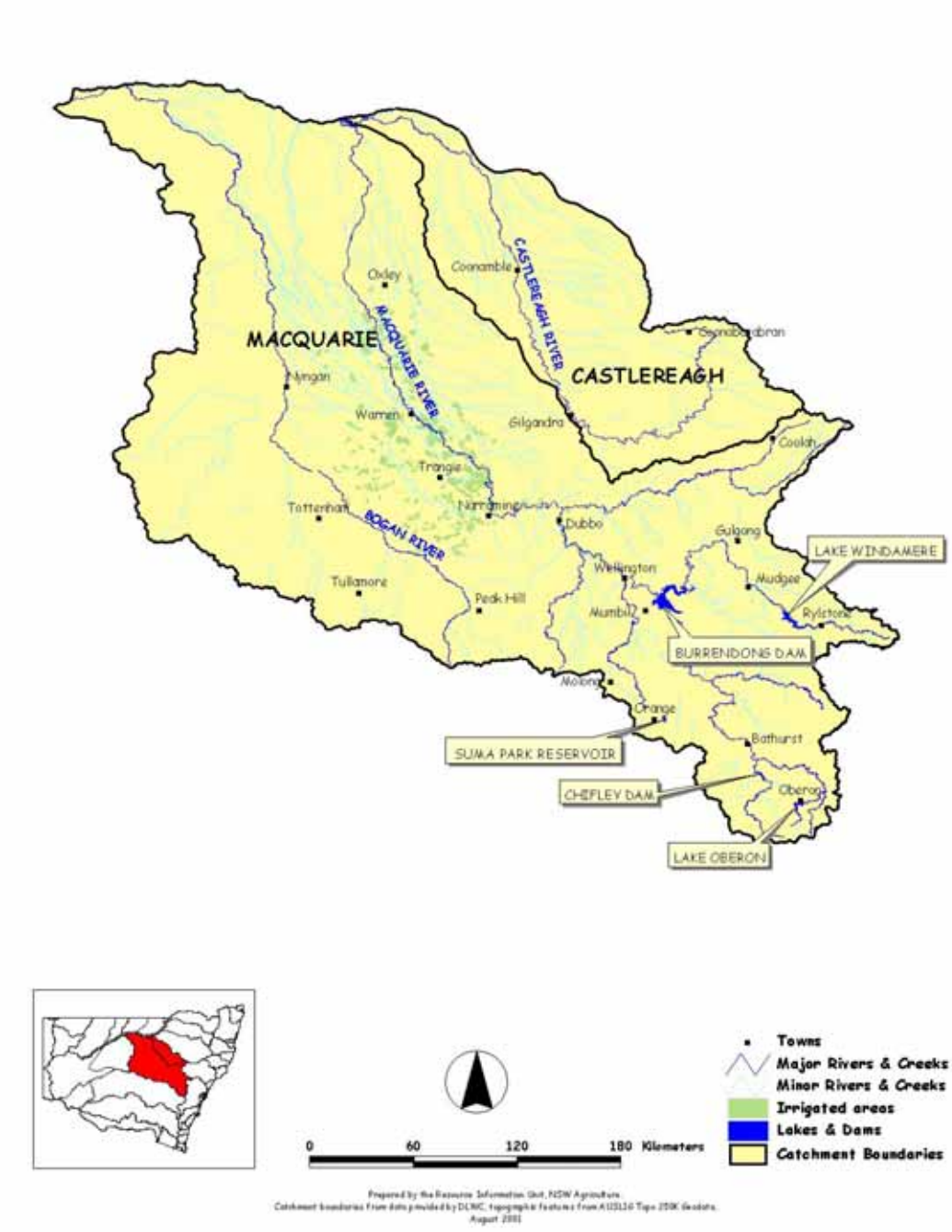
[2] Note that for water management purposes, the Greater Macquarie catchment is constituted as the Central West water management area under the *Water Management Act* 2000.



The Greater Macquarie catchment has a semi-arid climate and a summer-dominant rainfall pattern in the north, tending to a winter-dominant rainfall pattern in the south. Annual rainfall decreases from east to west, while evaporation and temperature increase.

Since the construction of Burrendong and Windamere dams, the variability of river flow has been reduced. The irrigation industry in the Macquarie catchment, especially downstream of Narromine, is a major beneficiary of this secure supply. Irrigation occurs adjacent to the Macquarie River or in the seven off-river irrigation schemes of Narromine, Trangie–Nevertire, Tenandra, Buddah Lake, Marthaguy, Nevertire and Greenhide. Irrigation is far less prominent in the Castlereagh and Bogan catchments. These catchments are unregulated (that is, there is no dam to control the catchment's water) and irrigated agriculture relies on supplies that are variable and small.

Figure 1. The Greater Macquarie catchment



Note: The irrigation areas (shaded in light green) present only that irrigation which occurs in the seven off-river irrigation schemes and enterprises along the river. It should be noted that irrigation also occurs above Dubbo around Wellington and Mudgee but that these data have not been presented on this map.

Of the total value of agriculture in the Greater Macquarie catchment in 1996–97 ($1197 million), around 22% can be attributed to irrigation. Total irrigation values have remained reasonably static, ranging from $170 million to $263 million between 1990–91 and 1996–97. Roughly 80% of this total irrigated value can be attributed to irrigated cotton. In 1996–97, cotton was worth $110 million. Fruit and nuts (excluding grapes) and then cereals for grain were the next most valuable irrigated commodities.

In the Macquarie catchment, cotton is mostly grown on the riverine plains west and north-west of Narromine. Summer crops such as oilseeds and cereals and perennial crops such as citrus are also grown in this area.

Vegetables are grown in selected pockets along the Macquarie River (for example, around Wellington). Wine grapes are irrigated in the tablelands around Mudgee and Orange and in the Bell subcatchment around Bathurst. Vegetable growers tend to be opportunistic and production rates vary accordingly. Depending on cotton markets, cotton growers may also turn to growing vegetables.

Stone fruit and lucerne are grown in the Castlereagh catchment while fodder, seed crops and cotton are grown in the Bogan catchment. Some enterprises are located in the Bogan catchment but are fed by water that is channelled overland from the Macquarie River.

Information on irrigated yields is limited, but does show cotton yields have been increasing slowly in the region since the early 1990s. In 1989–90, cotton yielded an average of 1.3 t/ha; in 1993–94, the average was 1.7 t/ha. In 1996–97, an average of 2.3 t/ha was being produced.

Of the 1 150 000 ha of land irrigated in NSW, approximately 5% or 56 000 ha is in the Greater Macquarie catchment (Table 1): most of this is concentrated in the Macquarie catchment. In 1996-97, irrigated cotton comprised more than half of the total irrigated area. Irrigated cotton areas have been increasing as a proportion of the total irrigated areas over the last few years. This trend has been largely driven by improving markets and less favourable returns from alternative agricultural activities.

It is difficult to say accurately how much water irrigated agriculture uses in the Greater Macquarie catchment. The figure could be between 352 600 ML and 372 500 ML, representing around 5% of the total volume that is thought to be extracted by irrigation across NSW from all water sources. A more accurate figure is not available due to the scarcity of data from groundwater and unregulated stream sources. Most water (between 92% and 97%) is supplied from the regulated system to irrigators adjacent to the Macquarie River or to the seven off-river irrigation schemes.

There are many licences for irrigation in the region, although the number that are likely to be active is far less. Of the estimated 24 000 licences in NSW, 8.5%, or 2030 licences, are in the Greater Macquarie catchment. A large number (828) of these are for extraction of water along unregulated streams.

Table 1. Overview of irrigation in the Greater Macquarie catchment, 1996–97

Source of water	Total irrigated area (ha)	Total water used by irrigated agriculture (ML)	Number irrigation licences	Number enterprises irrigating	Yield of major irrigated crop (t/ha)	Value of irrigation ($m)
NSW total	*1 150 000*	*7 700 000*	*24 000*	*7 846*	*cotton 1.8*	*2 496*
All sources	55 556 (over 50% is cotton)	nd *est. 352 600 to 372 500*	2030	560	cotton 2.3	263 (cotton 110)
Regulated	Nd *76 050 (1993–94) (around 50% is cotton)*	341 000	584	nd *361 (1993–94)*	cotton 2.3	nd
Unregulated	12 000 (around 30% is cotton)	nd *8 600 to 28 500 (1989–92)*	828	nd *424 (1993–94)*	nd	nd
Groundwater	nd *4 156 (1993–94)*	nd *3 000 (1980)*	700	nd *133 (1993–94)*	nd	nd
Farm dams	nd *5 286 (1993–94)*	nd	na	nd *153 (1993–94)*	nd	nd
Reticulated	nd *49 (1993–94)*	nd	na	nd *7 (1993–94)*	nd	nd

nd = no data, na = not applicable. The 1996–97 season was used as it was the most current year with greatest amount of data across the chosen categories.

The total number of enterprises irrigating in the Greater Macquarie catchment was 7% of the total number of enterprises irrigating in NSW. Both regulated and unregulated rivers provide the water for most of these enterprises. Fewer enterprises irrigate crops using groundwater, town water supplies (that is, reticulated water), and farm dam water.

Irrigation data issues raised in the Greater Macquarie catchment relate to the general scarcity of irrigation data, the scales at which data have been reported, and the reliability of available irrigation data.

1.2 General scarcity of irrigation data

In the past, data have been collected for different purposes to those currently needed. For example, Water Management Advisory Committees (WMCs) are developing water sharing plans for catchments across the state and need information on how and where water is being used. Information on crop areas, crop water use, yields, irrigation methods and the value of irrigation is needed to help develop water sharing plans and target assistance to irrigators who may need to adjust to new water sharing rules. This Profile has shown that these data were sometimes scant or never collected. Information is particularly needed on extraction from unregulated streams.

Estimation of the volume of water applied to a crop area (for example, megalitres per hectare) is a surprisingly difficult figure to obtain. In some cases, such as irrigation along unregulated streams in the tablelands, crop water use data have never been collected and so it is impossible to estimate the volume applied to a crop on a per hectare basis. In the Lower Macquarie, some enterprises supply water to crops from both groundwater and regulated supplies. The rate at which water has been supplied to crops on these enterprises is difficult to determine due to a lack of information about the groundwater component. In summary, great care is needed when calculating irrigation application rates.

1.3 Scarcity of irrigation data at useful scales

Point-scale data collected by the ABS and ABARE are confidential and have been reported at Statistical Local Area, catchment, groups of catchments or Agro-Ecological Region scales. These scales limit how useful this data are to natural resource managers, who often work at much finer levels, such as river reach.

1.4 Reliability of irrigation data

The reliability of data varied with water source. For example, data from regulated supplies were more reliable than data from unregulated and groundwater supplies.

The reliability of irrigation data is not consistently reported by state agencies. This situation makes it easier for users of these data to manipulate or analyse information inappropriately and draw incorrect conclusions.

1.5 Conclusion

A more comprehensive and consistent approach to the collection of irrigation statistics is needed. This would help to ensure that data are comparable across different water sources and industries.

The following improvements are needed:

- Greater emphasis needs to be given to collecting reliable crop area and water use information. These data underpin many debates on WUE and IE and on how water should be shared and managed in NSW.
- Data are needed at scales that are large enough to protect point-scale confidentiality but small enough to allow users to aggregate information to useful scales.
- Protocols for providing data to users are needed. For example, information providers need to attach reliability ratings to data. This would help users make better decisions on manipulating data.
- Two-way flow of information between agencies and irrigators needs to be fostered. Typically, data have been obtained from irrigators by agencies. These data need to flow back to irrigators in forms that might help them make better water management decisions.
- Two-way flow of information between agencies needs to be fostered. The value of the data collected by the DLWC to other agencies such as NSW Agriculture is great. These data are useful, for example, in devising extension programs to improve WUE and IE.

In summary, a more comprehensive and consistent approach to the collection of irrigation statistics is needed. Such an approach would help to ensure that data are comparable across different water sources and industries. Protocols for the collection, management and distribution of irrigation data are required to ensure that data are accurate and reliable. This comprehensive approach can only be developed with the full involvement of the many agencies and irrigator groups that require these data.