

25. Barwon Basin

25.1 Location of Water Resources

The Barwon Basin is located within the South East Coast Drainage Division in western Victoria. The Barwon River originates in the Otway Ranges and receives inflows from the Leigh River and the Moorabool River before it flows into the ocean in Barwon Heads. A map of the river basin is shown in Figure 25-1.

Water Supply Protection Areas within the Barwon Basin include the part of the Bungaree WSPA. Groundwater Management Areas within the Barwon Basin include part of the Gerangamete GMA.

25.2 Responsibilities for Management of Water Resources

Southern Rural Water is responsible for managing groundwater pumping and private diversions. Barwon Water supplies the urban demands of Greater Geelong and Central Highlands Water supplies the demands of Ballarat. The Corangamite Catchment Management Authority is responsible for waterway management in the Barwon Basin.

25.3 Seasonal Overview

Rainfall in the Barwon Basin was slightly lower than the long-term average during 2003/04. Streamflows in the basin were only 62 per cent of the long-term average.

The supply to Geelong was not restricted during 2003/04. Restrictions to Ballarat are covered under the Moorabool Basin, where its main supply of water comes from.

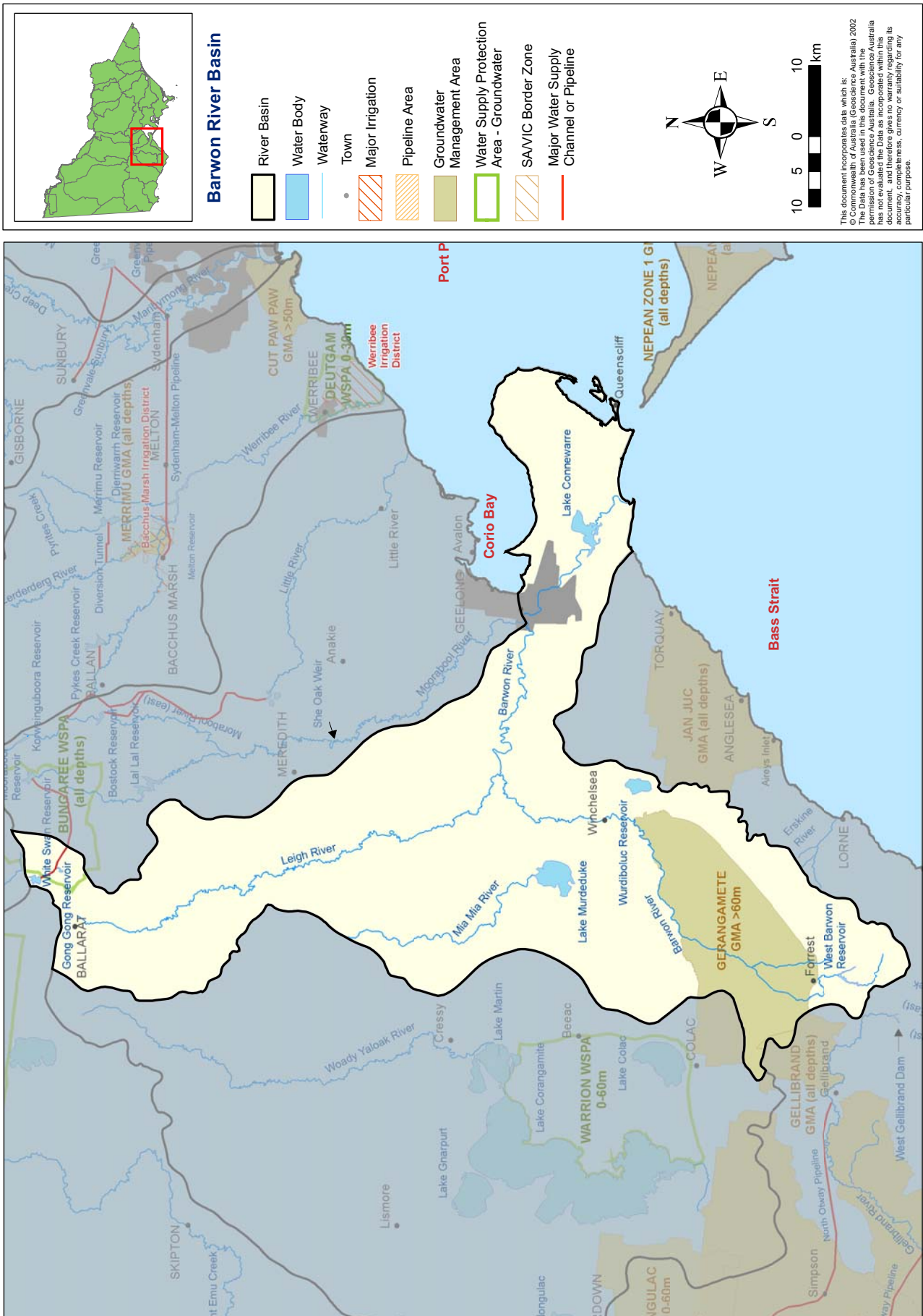
Over the period from March 2004 to May 2004, there was an irrigation ban in place for Zone B of the Barwon River, Stage 4 restrictions in Zone A and Stage 3 restrictions in Zone C. Over the same period, the Leigh River was also on Stage 3 restrictions.

The only reported water quality problem in the Barwon Basin occurred between Christmas 2003 and Easter in 2004, when an algal bloom occurred in the Barwon River in Geelong.

An assessment made by the Corangamite CMAs in 2003/04 found that most streams in the Barwon River were in marginal to poor condition, with few streams in excellent or good condition in water supply catchments. More than 80 per cent of the landscape is cleared and there are many threats to waterways, including high urban water demand, urban development, sedimentation and algal blooms. The proliferation of off-stream catchment dams is a major source of concern on account of their interception of run-off and reduction of streamflows.

During the summer of 2003/04 the Corangamite CMA coordinated a \$300,000 major capital works project on Wormbete Creek at Wurdale in the Upper Barwon to reduce silt entering the Barwon River and Lake Connewarre. This work improved water quality by slowing water through two rock chutes upstream and downstream of Barwon Water's siphon and preventing further erosion along three to four kilometres of the creek.

Figure 25-1 Map of the Barwon Basin



25.4 Summary of the Total Water Resources in the Basin

The total volume of water available and supplied from water resources in the Barwon Basin are shown in Table 25-1. Barwon Water transferred 1,955 ML from the Barwon Basin into the Otway Coast Basin to supply the coastal towns of Torquay and Anglesea. Barwon Water sources water from both the Barwon and Moorabool Basins to supply Geelong, which is located across both basins.

Table 25-1 Summary of total water resource and water use in Barwon Basin 2003/04

Water source	Total Water Resource (ML)	Total Extraction (ML)
Surface water	200,371	62,940
Groundwater ⁽¹⁾	Not available	Not available
Recycled water	29,770	2,120

(1) The total resource and use is not stated because not all GMAs or WSPAs in this basin have more than 90 per cent of their surface area within the river basin boundary.

25.5 Environmental Water Reserve

In 2003/04 there was no formal environmental water reserve established in the Barwon Basin. The water available to the environment at the basin outlet was 96,790 ML, which is about 62 per cent of the total amount of water in the basin. This amount consists of environmental flows required under bulk entitlements in the basin, and all other water flowing in the basin which was not taken out of the streams for consumptive uses.

At a catchment scale, the timing of private diversions in the unregulated sections of the basin during the irrigation season can have a significant impact on streamflows. A Streamflow Management Plan will be developed for the Barwon River and will outline water sharing rules to minimise the impacts of such diversions.

25.6 Surface Water Resources

25.6.1 Water Balance

A water balance for the Barwon Basin is shown in Table 25-2. Central Highlands Water operates two major storages within the basin, White Swan Reservoir and Gong Gong Reservoir. In July 2003 the storage volume was 16 per cent of total capacity. During the year, White Swan storage increased as a result of inflows and transfers from the Moorabool Basin. At the end of the year its volume was 31 per cent of total capacity. Barwon Water operates the West Barwon Dam and Wurdee Boluc Reservoir. Storage volumes also increased, from 46 to 54 per cent.

The inflows in the Barwon Basin were 155,900 ML. This is equivalent to only 62 per cent of the average catchment inflows which are 250,800 ML/year (NLWRA, 2001). The Moorabool River also flows into the Barwon River just upstream of Geelong.

Central Highlands Water transferred 13,510 ML from the Moorabool Basin into the Barwon Basin to supply water to Ballarat. Skipton, which is part of the Ballarat water supply system, is located within the Hopkins Basin and a portion of this volume was transferred to Skipton. Barwon Water transferred 217 ML from the Barwon Downs bore field, which is located in the Otway Coast Basin into the Geelong water supply system.

The estimate of in-stream losses to groundwater and evaporation is the volume of unaccounted for water after separately estimating inflows, outflows, change in storage and

consumptive use. In the Barwon Basin the inflows were back calculated by adding diversions to outflows, so no estimate of these losses is available. The losses accounted for in the water balance do not include losses occurring between the point of water diversions and the point of use. For example, the Wurdee Boluc channel losses are estimated at 8-10 per cent when channel flows around 150 ML/day. The majority of losses are due to seepage and only minor losses are due to evaporation.

Table 25-2 Balance of surface water in the Barwon Basin

Water Account Component	Volume (ML)
Storage Volume	
Volume in storage at start of year	29,675
Volume in storage at end of year	36,823
Change in storage	7,148
Inflows	
Catchment inflow ⁽¹⁾	155,900
Inflows from the Moorabool River	3,050
Transfers from other basins	13,781
Irrigation return flow	0
Treated effluent discharge back to river ⁽²⁾	27,640
Subtotal	200,371
Diversions	
Urban diversions	29,480
Unregulated licensed private diversions	2,560
Catchment farm dams	30,900
Subtotal	62,940
Losses	
Evaporation losses from major storages	7,610
Losses from catchment farm dams	12,380
In-stream losses to groundwater and evaporation ⁽³⁾	13,510
Subtotal	33,500
Water passed at outlet of basin	
River outflows to the ocean	96,790
Volume available to the environment in the Barwon Basin	96,790

(1) Inflows have been back-calculated from outflows plus diversions

(2) Assumes non-reused water is discharged to waterways

(3) Assumed to be zero because not readily available

25.6.2 Catchment Farm Dams

The capacity of catchment farm dams in the Barwon Basin is estimated to be around 41,000 ML. Average annual usage from the dams is estimated to be 30,900 ML, and after allowing for losses, the total catchment runoff that is harvested by the dams is estimated to be 43,300 ML. Specific information on catchment farm dam behaviour for 2003/04 was not readily available and the values provided in the table below are based on estimates of the average annual impact.

Catchment farm dams used for irrigation and commercial use are in the process of being licensed, and when the licences have been processed, the relevant volume will be accounted for under licensed diversions.

Table 25-3 Catchment Farm Dam Information

Type of catchment farm dam	Capacity (ML)	Usage (ML)	Total water harvested (ML)
Stock and domestic	10,370	5,190	n/a
Irrigation	30,610	25,710	n/a
TOTAL	40,980	30,900	43,280

n/a = information not available

25.6.3 Water Entitlement Transfers

There was no temporary or permanent transfer of water rights, diversion licences or sales water within the basin in 2003/04.

25.6.4 Volume Diverted

The volume of water diverted under each water authority's bulk entitlement is shown in Table 25-4. Compliance with individual bulk entitlement volumes is deemed to occur if water use is not more than the maximum volume that could have been diverted in 2003/04. Licences on unregulated streams are generally not metered and hence compliance has not been assessed.

The bulk entitlement volumes within the Barwon Basin refer to the total volume that can be extracted over any consecutive three-year period. The bulk entitlements became effective in 2003/04. Therefore the volume that could be extracted in 2003/04 was equal to the bulk entitlement volume.

The Yarrowee-White Swan bulk entitlement includes up to 10,500 ML extracted from the Upper West Moorabool system as specified in the Upper West Moorabool bulk entitlement.

Table 25-4 Volume of water diverted under surface water entitlements in the Barwon Basin

Entitlement	Bulk entitlement (ML)	Net transfer of entitlement (ML)	Maximum volume divertible in 2003/04 (ML) ⁽³⁾	Amount diverted (ML)	Complied?
<i>Barwon Water</i>					
Upper Barwon System ⁽¹⁾	43,467	0	68,258	29,476	Yes
<i>Central Highlands Water</i>					
Yarrowee - White Swan System ⁽²⁾	12,267	0	36,800	2,434	Yes
Total volume of bulk entitlements	55,734	0	105,058	31,910	
<i>Unregulated licensed diverters</i>	3,576	0	3,576	2,564	

(1) The bulk entitlement volume refers to the volume that can be extracted over any consecutive three year period.

(2) The bulk entitlement volume includes water diverted from the Moorabool Basin. This water is accounted for under the bulk entitlements held by Central Highlands Water in the Moorabool Basin.

(3) Refers to the volume that could be diverted under the bulk entitlement, however, the volume of water may not be physically available for extraction.

25.6.5 Compliance with Passing and Environmental Flow Obligations in Bulk Entitlements

Central Highlands Water made substantial progress towards finalising the monitoring proposal for the Yarrowee-White Swan bulk entitlement. Works were installed to pass the required passing flows under this order and install monitoring.

Barwon Water complied with the passing and environmental flow obligations under their Upper Barwon bulk entitlement in 95per cent of days.

25.6.6 Compliance with Streamflow Management Plans

There is no Streamflow Management Plan (SFMP) currently in operation in the Barwon Basin. A SFMP for the entire Barwon Basin is scheduled for development.

25.7 Groundwater Resources

A summary of licensed volume and use in Groundwater Management Areas that overlap the Barwon Basin, excluding stock and domestic use, is shown in Table 25-5. An estimate of stock and domestic use within these management areas is provided in Table 25-6.

The Barwon Basin contains part of the Bungaree WSPA and Gerangamete GMA. The volumes described in the Table 25-5 are totals for the management areas and include the area that falls outside the Barwon Basin. Groundwater allocation and use for unincorporated areas has not been included in the 2003/04 water accounts.

The Gerangamete GMA has not been assigned a PAV because it is managed under a single groundwater licence to Barwon Water to supply water to Geelong. Specific comments on the Bungaree WSPA were contained in the water accounts for the Moorabool River catchment.

Table 25-5 Compliance with Licensed Groundwater Volumes

Water Supply Protection Area/Groundwater Management Area ⁽¹⁾	GMA/WSPA Depth Limits ⁽²⁾	PAV (ML/year)	Licensed Allocation ⁽³⁾ (ML)	Metered Use (ML)	Estimated Use in Unmetered Areas ⁽⁵⁾ (ML)	Total Water Resource ⁽⁶⁾ (ML)
Bungaree WSPA (24%)	All Depths	4,400	5,272	3,737	Not applicable	Not available ⁽⁷⁾
Gerangamete GMA (86%)	> 60	Not available ⁽⁸⁾	8,000 ⁽⁴⁾	Not available	3,840	Not available ⁽⁷⁾

(1) The percentage of the GMA/WSPA by surface area within the river basin is given in the parentheses; where there is no percentage given, the entire management area falls within the river basin. Those GMA/WSPA with < five per cent surface area within the basin have not been included.

(2) This column indicates the aquifer depth limits for which the GMA/WSPA applies.

(3) Allocated volume includes domestic and stock usage.

(4) The Gerangamete PAV is 80,000 ML over a 10 year period.

(5) In non-metered areas estimate of use is based on the State average use for metered areas ('State Average' meaning the average percentage metered use versus PAV) equalling 48 per cent.

(6) The sum of PAVs or licensed volume, whichever is greater.

(7) No estimate of Total Water Resource is applicable as >10 per cent GMA/WSPA is located outside the river basin.

(8) There is no PAV for Gerangamete GMA as the entitlement is managed under a Groundwater Licence.

Table 25-6 Number of Stock and Domestic Bores and Estimated Use

Water Supply Protection Area/Groundwater Management Area	No. of Stock and Domestic Bores ⁽¹⁾	Estimated Stock and Domestic Use (assuming 2ML/bore) ⁽¹⁾
Bungaree WSPA	252	504
Gerangamete GMA	5	10

(1) There are a number of licensed bores that also incorporate stock and domestic use. The estimated use for these bores is not included in the above table.

25.8 Recycled Water

The volume of water recycled in the Barwon Basin is shown in Table 25-7. Barwon Water and Central Highlands Water operate sewage treatment plants within the Barwon Basin. All effluent is reused from the smaller plants at Bannockburn, Portarlington and Winchelsea. Approximately nine per cent of the effluent from the Black Rock sewage treatment plant, which services Geelong, is reused and no effluent from Ballarat is reused. Overall seven per cent of the total basin effluent is reused.

Table 25-7 Volume of recycled water

Sewage Treatment Plant	Water Authority	Total volume of effluent (ML)	Volume reused (ML)
Bannockburn	Barwon Water	9	9
Portarlington	Barwon Water	313	313
Winchelsea	Barwon Water	38	38
Black Rock	Barwon Water	20,360	1,763
Ballarat North	Central Highlands Water	2,097	0
Ballarat South	Central Highlands Water	6,948	0
TOTAL		29,765	2,123

