

20. Bunyip Basin

20.1 Location of Water Resources

The Bunyip Basin is located within the South East Coast Drainage Division in eastern Victoria. The basin includes the Lang Lang and Bunyip Rivers, which flow into Western Port Bay and the Patterson River, which flows into Port Phillip Bay. The south eastern suburbs of Melbourne are located within the Bunyip Basin. A map of the river basin is shown in Figure 20-1.

Water Supply Protection Areas within the Bunyip Basin include the whole Koo Wee Rup WSPA. Groundwater Management Areas (GMAs) within the Bunyip Basin include the whole Frankston GMA and Nepean GMA, and part of the Morbid GMA.

20.2 Responsibilities for Management of Water Resources

Southern Rural Water is responsible for managing groundwater pumping and private diversions within the Bunyip Basin. Melbourne Water as bulk water supplier and South East Water as retail water supplier are responsible for water supply to that part of the metropolitan area in the Bunyip Basin including Dandenong, Frankston, Pakenham and the Mornington Peninsula. This water is imported into the Bunyip Basin from the Yarra/Thomson supply system. Melbourne Water owns and operates Tarago reservoir and the Tarago-Western Port Pipeline. Gippsland Water supplies towns in the east of the basin including Drouin and Neerim South and Warragul in the Latrobe Basin. The Port Phillip and Westernport Catchment Management Authority is responsible for waterway management in the Bunyip Basin.

20.3 Seasonal Overview

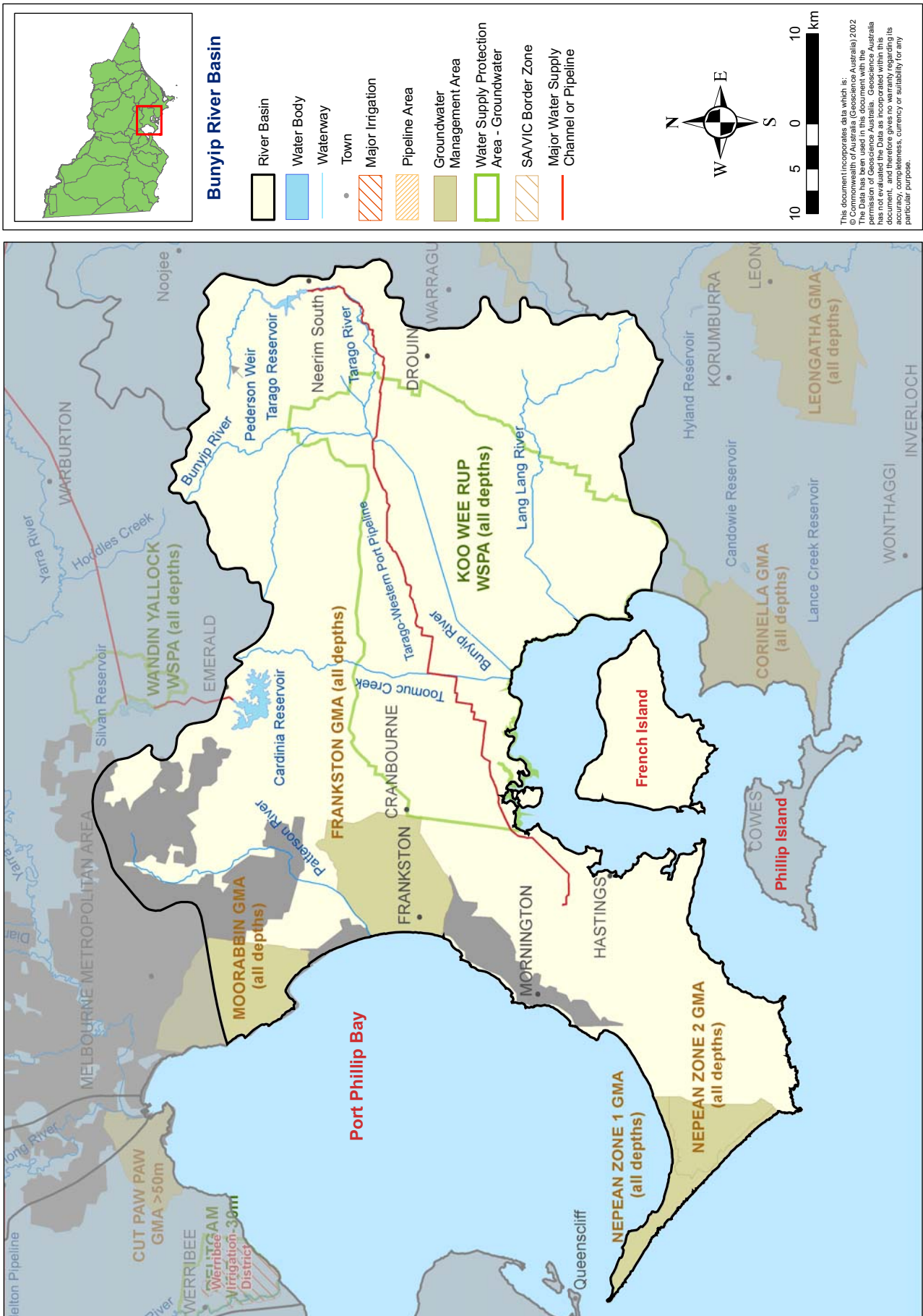
In 2003/04 the rainfall recorded in Bunyip Basin was a slightly lower than average to the east with streamflows in the Tarago River only 80 per cent of their long-term average. However, across the Basin, streamflow were on 122 per cent of the long-term average. In 2003/04 rainfall was higher than average on the Mornington Peninsula.

Irrigation bans were imposed for Dandenong Creek from January 2004 to March 2004. Bans were also in place for Toomuc Creek, Stony Creek, Dunns Creek and Mantons Creek and stage 1 restrictions for Monbulk Creek and Lang Lang River during March 2004. SRW licensed diverters used 66 per cent of entitlement during the irrigation season.

Several rivers within the Bunyip Basin flow into Westernport Bay, which has high environmental values and has wetlands listed under the Ramsar Convention. Increased sediments flowing into the bay from rivers are thought to damage important sea grass beds. In 2003/04 work such as stabilising river and creek banks and beds, revegetation and building sediment traps has been undertaken by Melbourne Water to reduce the sediment input into the bay.

In 2003/04 Melbourne Water undertook works in Cardinia Creek to protect native fish including the Australian Grayling. Melbourne Water constructed three rock weirs, which not only enable better fish movement along the creek, but also help to control erosion.

Figure 20-1 Map of the Bunyip Basin



20.4 Summary of the Total Water Resources in the Basin

The total volume of water available and supplied from water resources in the Bunyip Basin are shown in Table 20-1. There was a net transfer of water into the basin which is not listed in the available resource or extraction. South East Water purchases all of the water supplied to urban demands in metropolitan Melbourne from Melbourne Water. This water (154,740 ML) was transferred from the Yarra Basin. Gippsland Water diverts water from the Tarago River and Tarago Reservoir to supply the urban demands of Warragul and Noojee in the Latrobe Basin. In 2003/04, 4,340 ML was diverted.

Table 20-1 Summary of total water resource and water use in Bunyip Basin 2003/04

Water source	Total Water Resource (ML)	Total Extraction (ML)
Surface water	433,110	28,845
Groundwater ⁽¹⁾	Not available	Not available
Recycled water	143,230	17,520

(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

20.5 Environmental Water Reserve

In 2003/04 there was no formal environmental water reserve established in the Bunyip Basin. The water available to the environment at the basin outlet was 344,190 ML, which is about 88 per cent of the total inflows. This amount consists of water flowing in the basin, which was not taken out of the streams for consumptive uses.

20.6 Surface Water Resources

20.6.1 Water Balance

Melbourne Water operates Tarago Reservoir which is not currently used to supply metropolitan Melbourne. Tarago Reservoir is currently only used to supply small volumes of water to Neerim South and irrigators in the Koo Wee Rup area. Inflows into the Basin during the year were around 22 per cent higher than the long-term average of 354,000 ML/year (NLWRA, 2001).

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. The losses accounted for in the water balance do not include losses occurring between the point of water diversions and the point of use.

Table 20-2 Balance of surface water in the Bunyip Basin

Water Account Component	Volume (ML)
Storage Volume	
Volume in storage at start of year	27,600
Volume in storage at end of year	23,900
Change in storage	-3,700
Inflows	
Catchment inflow	432,460
Irrigation return flow	0
Treated effluent discharge back to river ⁽¹⁾	650
Subtotal	433,110
Diversions	
Urban diversions	4,335
Regulated licensed private diversions	2,980
Unregulated licensed private diversions	6,010
Catchment farm dams	15,520
Subtotal	28,845
Losses	
Evaporation losses from major storages	1,800
Losses from catchment farm dams	570
In-stream losses to groundwater and evaporation	61,405
Subtotal	63,775
Water passed at outlet of basin	
River outflows to the ocean	344,190
Volume available to the environment in the Bunyip Basin	344,190

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

20.6.2 Catchment Farm Dams

The capacity of catchment farm dams in the Bunyip Basin is estimated to be around 21,730 ML (Table 20-3). Average annual usage from the dams is estimated to be 15,520 ML, and after allowing for losses, the total catchment runoff that is harvested by the dams is estimated to be 16,100 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 20-3 Catchment Farm Dam Information

Type of catchment farm dam	Capacity (ML)	Usage (ML)	Total water harvested (ML)
Stock and domestic	8,030	4,010	n/a
Irrigation	13,700	11,510	n/a
TOTAL	21,730	15,520	16,100

n/a = information not available

20.6.3 Water Entitlement Transfers

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

20.6.4 Volume Diverted

The volume of water diverted under each water authority's bulk entitlement is shown in Table 20-4. 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. It should be noted that no bulk entitlements for the Bunyip Basin were completed at the start of 2003/04 and values are not reported against these bulk entitlements. Licences on unregulated streams are not currently metered and hence compliance has not been assessed.

Table 20-4 Volume of water diverted under surface water entitlements in the Bunyip Basin

Entitlement	Bulk entitlement (ML)	Net transfer of entitlement (ML)	Maximum volume divertible in 2003/04 (ML)	Amount diverted (ML)	Complied?
<i>Gippsland Water</i>					
Tarago River (Warragul and Drouin)	n/a	0	n/a	4,073	n/a
Tarago River (Neerim South)	n/a	0	n/a	261	n/a
<i>Southern Rural Water</i>					
Tarago River	n/a	0	n/a	2,975	n/a
<i>Melbourne Water</i>					
Bunyip and Tarago Rivers	n/a	0	n/a	0	n/a
<i>Minister of Environment</i>					
Bunyip and Tarago Rivers	n/a	0	n/a	0	n/a
Total volume of bulk entitlements	n/a	0	n/a	7,309	
<i>Unregulated licensed diverters</i>	11,568	0	11,568	6,007	

n/a indicates that the bulk entitlement conversion order was not finalised at the start of 2003/04

20.6.5 Compliance with Passing and Environmental Flow Obligations in Bulk Entitlements

There were no bulk entitlements in operation in the Bunyip Basin in 2003/04.

20.6.6 Compliance with Streamflow Management Plans

There are no Streamflow Management Plans (SFMP) currently in operation in the Bunyip Basin. There are none planned for the next five years.

20.7 Groundwater Resources

A summary of licensed volume and use in Groundwater Management Areas that overlap the Bunyip Basin, excluding stock and domestic use, is shown in Table 20-5. An estimate of stock and domestic use within these management areas is provided in Table 20-6.

The Bunyip Basin contains the whole Koo Wee Rup WSPA, Nepean GMA and Frankston GMA, in addition to part of the Moorabbin GMA. The volumes described in Table 20-5 are totals for the management areas and include the area that falls outside the Bunyip Basin. Groundwater

allocation and use for unincorporated areas has not been included in the 2003/04 water accounts.

It can be seen in these tables that the licensed allocation in the Nepean GMA is above the PAV. Estimated use in 2003/04 was well below the PAV but stock and domestic use from this GMA is significant. The Koo Wee Rup PAV has an allocation greater than the PAV, but usage in 2003/04 was estimated to be around half of the PAV. The Moorabbin GMA is around 53 per cent allocated but it is undergoing increasing levels of development from golf courses, parks and industries substituting reticulated potable water for alternative sources.

Table 20-5 Compliance with Licensed Groundwater Volumes

Water Supply Protection Area/Groundwater Management Area ⁽¹⁾	GMA/WSPA Depth Limits ⁽²⁾	PAV (ML/yr)	Licensed Allocation ⁽³⁾ (ML)	Metered Use (ML)	Estimated Use in Unmetered Areas ⁽⁴⁾ (ML)	Total Water Resource ⁽⁵⁾ (ML)
Frankston GMA	All Depths	3,200	1,096	Not available	526	3,200
Koo Wee Rup WSPA	All Depths	14,898	12,578	5,273	Not applicable	14,898
Moorabbin GMA (63%)	All Depths	4,305	2,273	Not available	1,091	Not available ⁽⁶⁾
Nepean GMA	All Depths / 0 - 40	5,000	5,657	Not available	2,715	Not available ⁽⁶⁾

(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 (except Grampians Wimmera Mallee Water).

(4) 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.

(5) The sum of PAVs or licensed volume, which ever is greater.

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

Table 20-6 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⁾
Frankston GMA	199	398
Koo Wee Rup WSPA	600	1,200
Moorabbin GMA	238	476
Nepean GMA	1,162	2,324

(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.

20.8 Recycled Water

The volume of water recycled in the Bunyip Basin is shown in Table 20-7. Gippsland Water, South East Water and Melbourne Water operate sewage treatment plants within the Bunyip Basin. The largest is the Eastern Treatment Plant (ETP), operated by Melbourne Water, which has a total effluent volume of 130,700 ML. In 2003/04, 11 per cent of effluent at the ETP was reused. Of this the majority was used in on-site recycling. Recycled effluent was also used in the eastern irrigation scheme on golf courses, recreational areas and residential gardens. Melbourne Water also sells recycled water to some customers. Other treatment plants recycled 20 per cent of effluent, totalling 12 per cent recycled in the basin.

Table 20-7 Volume of recycled water

Sewage Treatment Plant	Water Authority	Total volume of effluent (ML)	Volume reused (ML)
Drouin	Gippsland Water	433	185
Neerim South	Gippsland Water	55	0
Blind Bight	South East Water	145	145
Cranbourne	South East Water	154	154
Somers (Hastings)	South East Water	1,267	118
Kooweerup	South East Water	119	119
Lang Lang	South East Water	57	50
Longwarry	South East Water	111	111
Mt Martha (Mornington)	South East Water	5,525	571
Pakenham	South East Water	1,459	1,123
Boneo	South East Water	3,168	48
Somers Package Plant	South East Water	1	0
Eastern Treatment Plant	Melbourne Water	130,736	14,893
TOTAL		143,230	17,517

