Coolup South Main Drain

The Coolup (Harvey) catchment drains to the Harvey Estuary. There are two main waterways, Coolup South Main Drain which drains the southern portion of the catchment and an unnamed watercourse which drains the north. Several lakes and wetlands are located within the catchment, including Lake Mealup and Lake McLarty which lie within the Ramsar listed Peel-Yalgorup system.

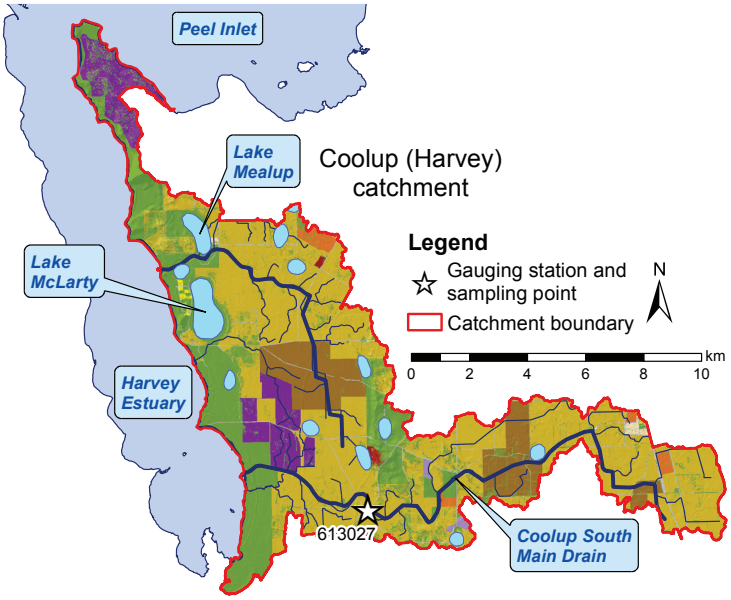
Water quality is monitored in Coolup South Main Drain at the gauging station at Yakaboon on the Old Bunbury Road (613027).

Flow was measured at the gauging station from July 2005. The drain stopped flowing for extended periods between November and June, March and April were the only months when flow stopped every year (2006–13).

The soils in the catchment are mostly sandy, including areas of leached sands and limestone gravel. While only a small area of the catchment is subject to inundation (10%) over half has a high or very high risk of phosphorus leaching to waterways (56%).

Most of the catchment has been cleared, predominantly for agriculture such as stock grazing. A narrow strip of undisturbed vegetation remains to the east of the Harvey Estuary (Lake McLarty Nature Reserve). Two piggeries are located within the catchment.

Land use classification (2006)[1]		Area (km²)	Area (%)
Animal keeping – non-farming (horses)		1.3	1.2
Cattle for beef (predominantly)		57	50
Cattle for dairy		11	9.4
Conservation and natural		34	30
Horticulture		0.34	0.30
Industry, manufacturing and transport		2.0	1.8
Intensive animal use		0.33	0.29
Lifestyle block		0.33	0.29
Mixed grazing		7.6	6.7
Residential		0.20	0.18
Total		**113**	**100**



Coolup South Main Drain 613027 – May 2005

Nutrient summary: median concentrations, loads and status classification at 613027

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Annual flow (GL)	-	-	-	-	5.4*	0.27	2.9	4.4	2.7	0.39	2.1	1.5	3.6	2.1
TN median (mg/L)	1.6	-	-	-	1.8	1.7	2.6	2.2	1.8	1.7	2.1	1.8	2.2	2.1
TP median (mg/L)	0.24	-	-	-	0.29	0.25	0.50	0.31	0.23	0.12	0.31	0.25	0.33	0.31
TN load (t/yr)	-	-	-	-	12*	0.52	6.8	9.3	6.1	0.80	4.7	3.2	8.1	4.6
TP load (t/yr)	-	-	-	-	1.9*	0.07	1.0	1.5	0.90	0.11	0.69	0.44	1.2	0.66

Status classification[2] Low Moderate High Very high

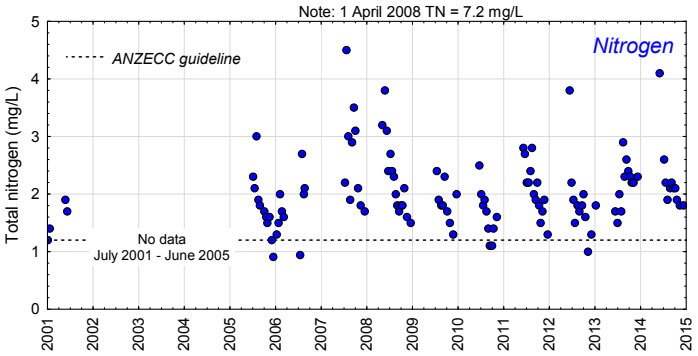
Status reported for three-year period end (i.e. 2012–14 reported in 2014)

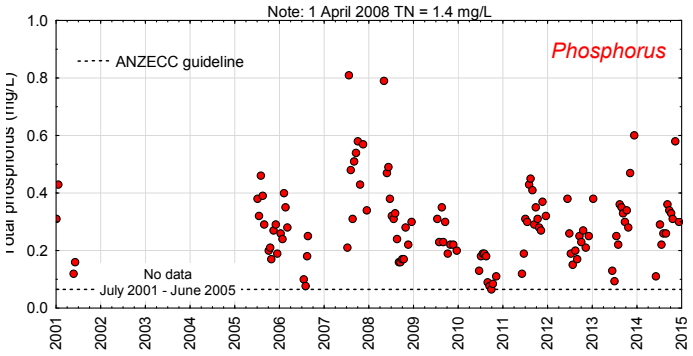
TN = total nitrogen TP = total phosphorus

* Best estimate using available data

(- not applicable)

Total nitrogen (TN) and total phosphorus (TP) concentrations (2001–14) at 613027





TN concentration:

The annual percentage of TN samples that exceeded the ANZECC[3] guideline for lowland rivers (1.2 mg/L) ranged between 75% (2001) and 100% (2007–09, 2011 and 2013–14).

In total, 94% of samples exceeded the guideline.

TN trend:

Trend analysis[2] used data from 2010 to 2014 inclusive.

The data was adjusted for flow and no trend was detected.

TP concentration:

Between 2001 and 2014, all but one sample (2010) exceeded the ANZECC[3] guideline for lowland rivers (0.065 mg/L).

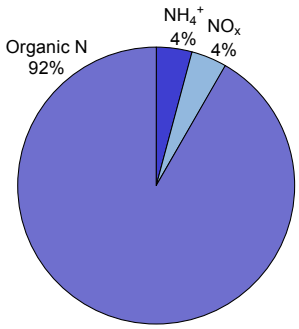
TP trend:

Trend analysis[2] used data from 2010 to 2014 inclusive.

The data was adjusted for flow and no trend was detected.

17 August 2005

Nutrient fractions (2010–14) at 613027



Nitrogen:

Most of the nitrogen (N) was organic in nature. Organic N consists of both dissolved organic and particulate N. It is derived from degrading plant and animal matter and fertilisers. It often needs to be further broken down before it can be used by plants and algae.

The remaining N was dissolved inorganic N (DIN) such as ammonium (NH_4^+) and N oxides (NO_x).

DIN is also derived from animal wastes and fertilisers but is readily available to plants and algae.

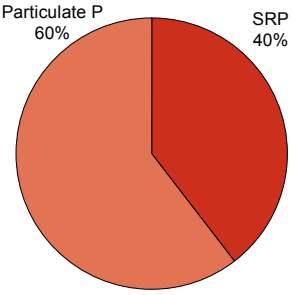
South Coolup Main Drain along with Meredith Drain had the equal highest percentages of organic N of the catchments that discharge to the Harvey Estuary.

Phosphorus:

More than half of the phosphorus (P) was present as particulate P, which consists of sediment-bound forms of P and organic waste materials.

Particulate P is not readily available for uptake by plants and algae, but may become available over time as organic matter decomposes or soil particles release bound P.

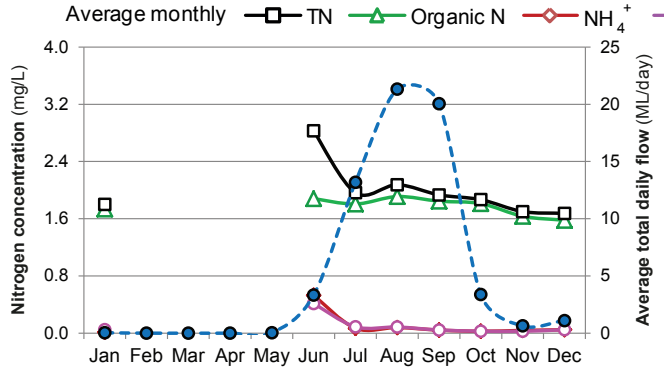
Weir – June 2005

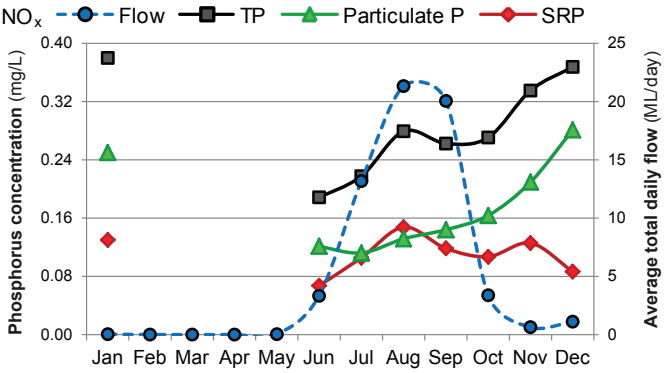


The remaining P was present as soluble reactive phosphorus (SRP). SRP is derived from fertilisers and animal wastes and is readily available for uptake by plants and algae.

South Coolup Main Drain had the second-highest percentage of SRP of the catchments that discharge to the Harvey Estuary. Meredith Drain, located to the south, had a higher percentage of SRP (53%).

Seasonal variations in nutrient concentrations and riverine flow (2010–14) at 613027





Nitrogen:

Average monthly nitrogen concentrations were dominated by organic N. The river stopped flowing for much of the summer and autumn.

Average monthly concentrations of TN exceeded the ANZECC[3] guidelines. Both average monthly NH_4^+ and NO_x concentrations exceeded guidelines during the first-flush in June.

	ANZECC 2000[3]	Months exceeded
TN	1.2 mg/L	All*
NH_4^+	0.08 mg/L	Jun
NO_x	0.15 mg/L	Jun
TP	0.065 mg/L	All*
SRP	0.04 mg/L	All*

*Except Feb–May as no data. (Jan had fewer than three samples)

Phosphorus:

Average monthly particulate P concentrations were higher than SRP during most of the year except in August when flow was greatest.

All average monthly TP and SRP concentrations exceeded ANZECC[3] guideline values.

21 July 2009

Changes in flow at Coolup South Main Drain

First-flush receding – 2 May 2005

In most years Coolup South Main Drain stopped flowing between January and June. During the years when flow was recorded (2006–14) the drain flowed consistently between July and October.

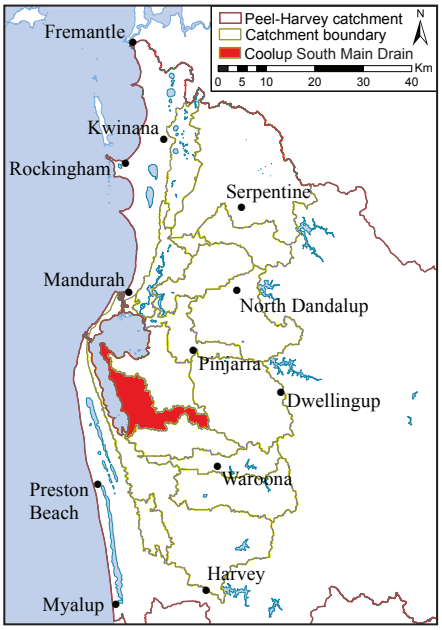
	2006	2007	2008	2009	2010	2011	2012	2013	2014
Jan		31	22	24	31	31	17		24
Feb		28	29	28	28	28	29	27	28
Mar	16	31	30	31	31	31	31	31	31
Apr	12	30	2	30	30	30	30	30	30
May		31		31	31	31	31	15	25
Jun		27		23	20	1	10		2
Jul									
Aug									
Sep									
Oct									
Nov					9				
Dec	26			7	31				4

Flowed continuously Number of days with no flow

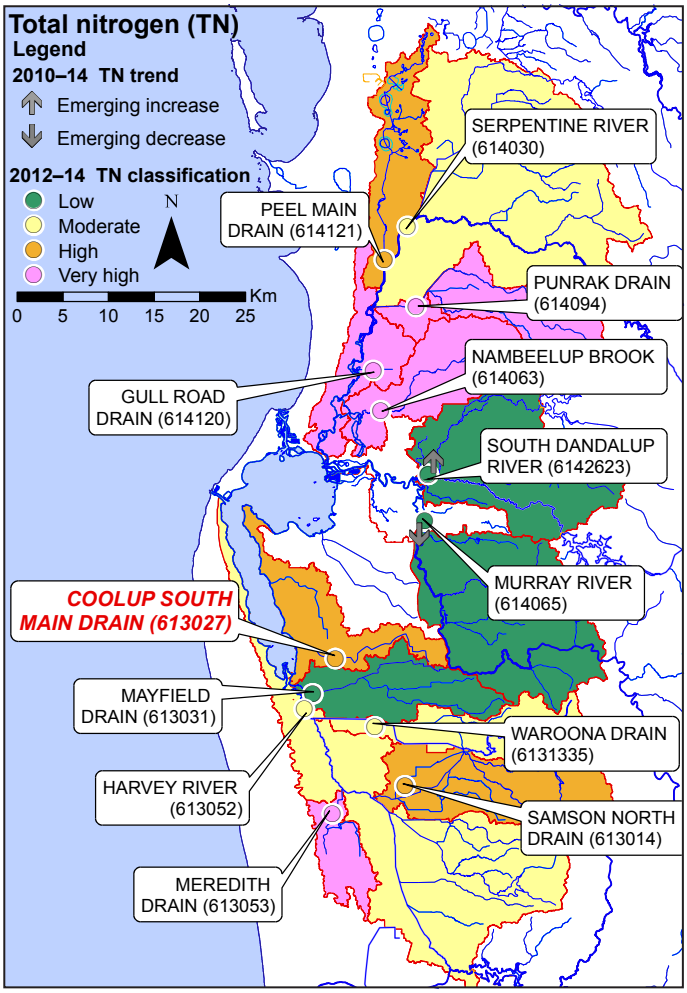
10 May 2005

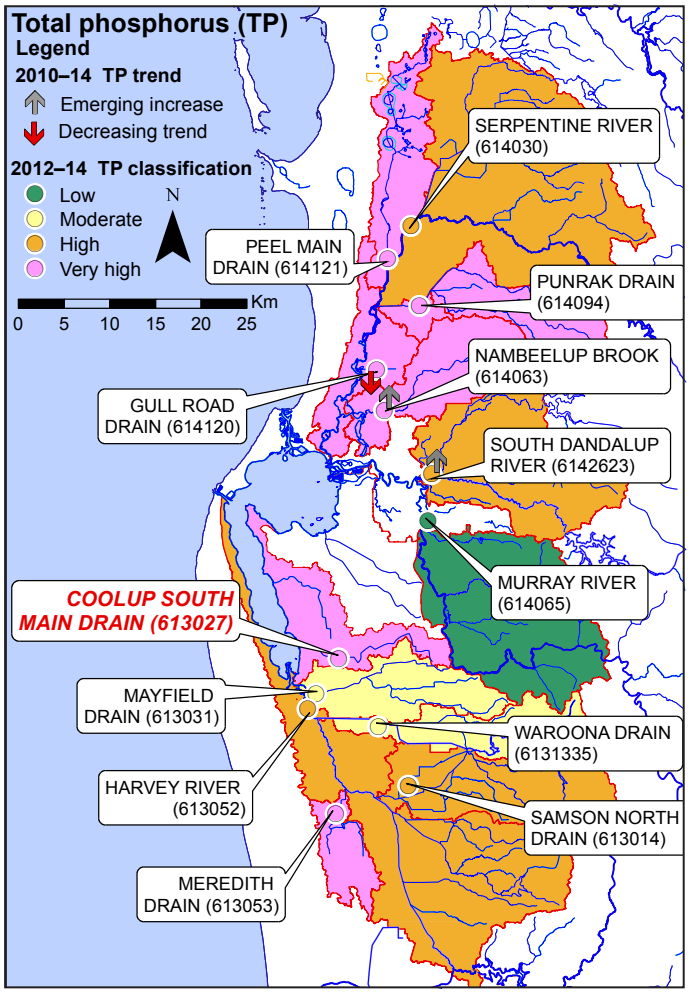
Summer pool – 16 February 2010

How Coolup South Main Drain fits within the Peel-Harvey catchment: location and statistics



Catchment	Receiving waterbody	Sample site (AWRC)	Area (km²)	2014 Flow (GL)	2014 TN median (mg/L)	2014 TP median (mg/L)
Peel Main Drain	Serpentine River	614121	120	5.0	1.7	0.19
Upper Serpentine River	Serpentine River	614030	502	28	0.79	0.13
Dirk Brook – Punrak Drain	Serpentine River	614094	134	9.6	1.9	0.21
Nambeelup Brook	Serpentine River	614063	143	9.7	3.7	0.60
Lower Serpentine River - Gull Road Drain	Peel Inlet	614120	94	-	4.4	0.93
South Dandalup River	Murray River	6142623	243	-	1.1	0.11
Mid Murray River	Murray River	614065	293	153	0.57	0.01
Coolup South Main Drain	**Harvey Estuary**	**613027**	**113**	**2.1**	**2.1**	**0.31**
Mayfield Drain	Harvey Estuary	613031	119	15	0.73	0.03
Harvey River	Harvey Estuary	613052	408	98	1.4	0.15
Drakes Brook – Waroona Drain	Harvey River	6131335	107	-	0.99	0.07
Samson North Drain	Harvey River	613014	195	-	1.5	0.18
Meredith Drain	Harvey River	613053	56	-	2.8	0.38





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[1] Kelsey, P, Hall, J, Kretschmer, P, Quinton, B & Shakya, D 2010, *Hydrological and nutrient modelling of the Peel-Harvey catchment*, Water Science Technical Series, Report no. 33, Department of Water, Western Australia.

[2] Department of Water 2015, *Catchment nutrient reports* (methods for the analysis of status classification, loads and trends), <http://www.water.wa.gov.au/water-topics/waterways/assessing-waterway-health/catchment-nutirent-reports>.

[3] ANZECC & ARMCANZ 2000, *Australian guidelines for water quality monitoring and reporting,* National Water Quality Management Strategy, Paper no. 7, Australian and New Zealand Environment and Conservation Council & Agriculture and Resource Management Council of Australia and New Zealand, Canberra.

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