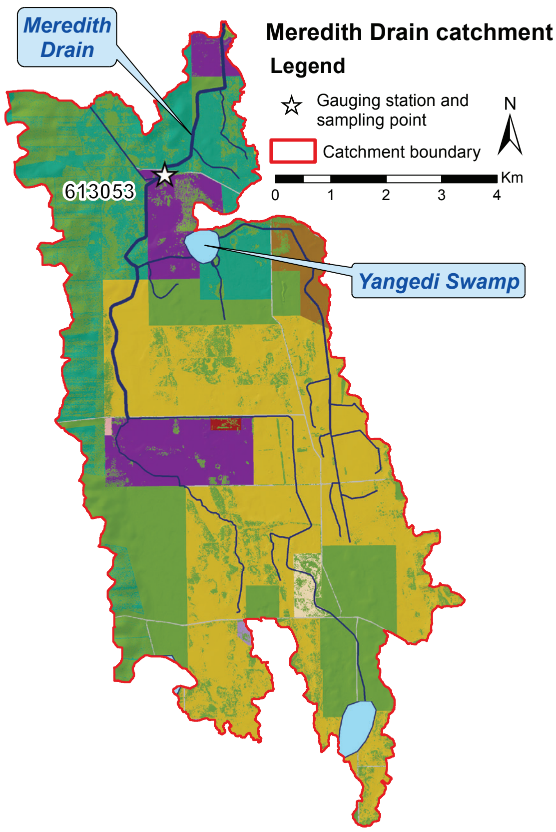
Meredith Drain

The Meredith Drain catchment is bordered by the Harvey catchment to the east and the Myalup State Forest to the west. It discharges to the Harvey River downstream of Samson South Drain.

The catchment's monitoring site is located at the Johnston Road flow gauging station (613053). The drain has been monitored since 1982 and has a history of very high total nitrogen and phosphorus concentrations. Before 1987 Meredith Drain flowed year-round. Since then it has stopped flowing from around January to June, except for 1993 and 1999 when it flowed year-round. No flow monitoring has been done since July 2010.

The Meredith Drain catchment lies on subdued dune-swale terrain, containing leached sands. Half of the catchment is subject to seasonal inundation and most of the catchment has a high or very high risk of phosphorus leaching to waterways (90%).



Two thirds of the catchment has been cleared, mostly for agriculture such as stock grazing and plantations. There is also a piggery present.

Meredith Drain, Johnston Road – December 2006

Land use classification (2006)[1]		Area (km^2)	Area (%)
Cattle for beef (predominantly)		20	36
Cattle for dairy		1.1	2.1
Conservation and natural		20	36
Horticulture		0.07	0.13
Industry, manufacturing and transport		0.49	0.88
Intensive animal use		0.11	0.19
Lifestyle block		0.37	0.66
Mixed grazing		5.2	9.2
Plantation		8.5	15
Viticulture		0.04	0.07
Total		**56**	**100**

In 2014 Meredith Drain had the highest median TN and TP concentrations of the six sites sampled in the Harvey catchment.

It also had the third-highest median TN and TP concentrations of all 13 sites within the Peel-Harvey catchments.

Nutrient summary: median concentrations, loads and status classification at 613053

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Annual flow (GL)	0.64	2.1	0.90	3.5	6.2	0.75	2.2	3.5	1.4	-	-	-	-	-
TN median (mg/L)	2.7	2.3	2.3	2.0	2.6	1.9	2.7	2.7	2.4	1.7	2.7	2.5	2.6	2.8
TP median (mg/L)	0.58	0.32	0.34	0.42	0.70	0.25	0.50	0.44	0.51	0.13	0.42	0.33	0.41	0.38
TN load (t/yr)	1.6	5.8	2.3	10	18	2.1	6.2	10	3.9	-	-	-	-	-
TP load (t/yr)	0.31	1.2	0.58	2.4	4.4	0.37	1.4	2.3	0.81	-	-	-	-	-

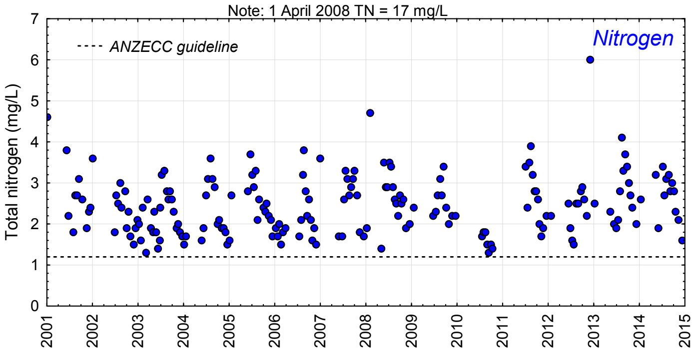
Status classification[2]: Low, Moderate, High, Very high

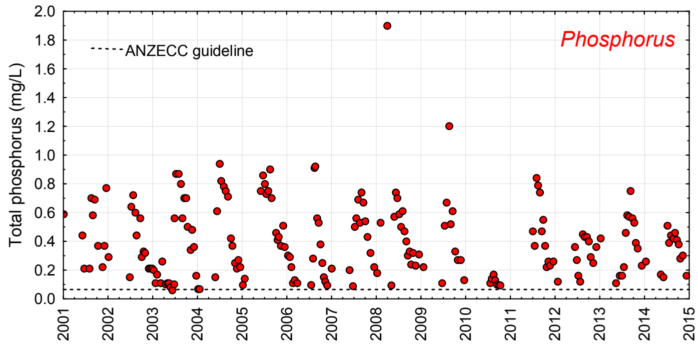
Status reported for three-year period end (i.e. 2012–14 reported in 2014)

TN = total nitrogen TP = total phosphorus

(- Not applicable)

Total nitrogen (TN) and total phosphorus (TP) concentrations (2001–14) at 613053





TN concentration:

Between 2001 and 2014 all TN samples exceeded the ANZECC[3] guideline for the protection of lowland rivers (1.2 mg/L). On average 5.2% of TN samples exceeded 3.6 mg/L, three times the guideline.

The percentage of samples exceeding 3.6 mg/L increased slightly from the 2005–09 period (5.4%) to the 2011–14 period (7.8%).

TN trend:

Trend analysis[2] was not undertaken using data from 2010 to 2014 inclusive as 2010 was an atypical year.

Five years of continuously increasing, decreasing or relatively consistent concentrations are needed to calculate a trend.

TP concentration:

Between 2001 and 2014, all but one TP sample (2003) exceeded the ANZECC[3] guideline for the protection of lowland rivers (0.065 mg/L).

On average 18% of TP samples exceeded ten times the guideline (0.65 mg/L). The annual percentage of samples greater than 0.65 mg/L ranged between 0% (2010, 2012 and 2014) and 47% (2005).

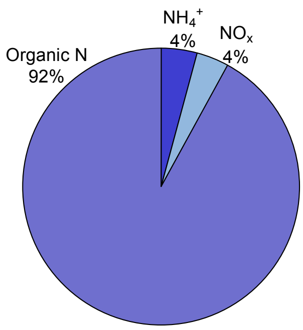
Between 2005 and 2009 23% of samples exceeded 0.65 mg/L; this decreased to 7.8% of samples between 2011 and 2014.

TP trend:

Trend analysis[2] was not undertaken using data from 2010 to 2014 inclusive as 2010 was an atypical year.

Five years of continuously increasing, decreasing or relatively consistent concentrations are needed to calculate a trend.

Nutrient fractions (2010–14) at 613053



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).

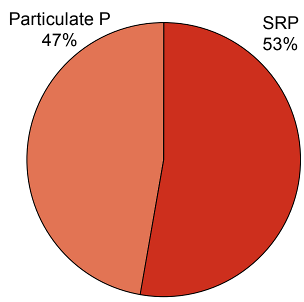
DIN is also derived from animal wastes and fertilisers but is readily available to plants and algae.

Meredith Drain, along with Coolup South Main Drain, had the equal-highest percentage of organic N of the sample sites draining to the Harvey Estuary.

Phosphorus:

Over half of the phosphorus (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.

The remaining P was present as particulate P which consists of sediment bound forms of P and organic waste materials.

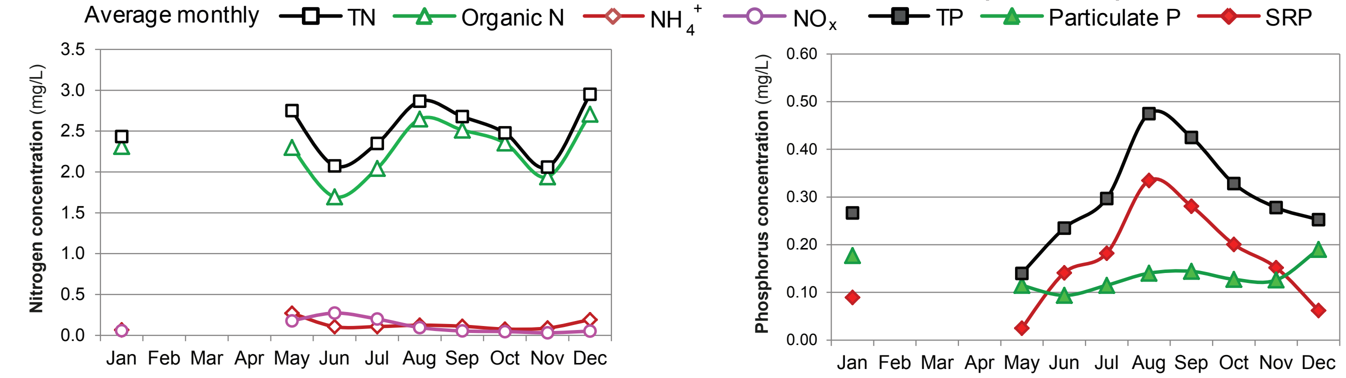


Particulate P is not readily available for uptake by plants and algae, but may become available over time as particles decompose or release bound P.

Meredith Drain had the highest percentage of SRP of the sample sites draining to the Harvey Estuary. It was one of four sites with SRP greater than 50%; the other three drain to the Serpentine River: Gull Road (82%), Dirk Brook–Punrak Drain (60%) and Nambeelup Brook (58%).

Meredith Drain, downstream of Johnston Road, looking upstream to the gauging station – March 2009

Seasonal variations in nutrient concentrations and riverine flow (2010–14) at 613053



Nitrogen:

Average monthly nitrogen concentrations were dominated by organic N. Increases in average organic N occurred both in winter with high flows (historically peak flows were in August and September) and during summer due to algal growth.

Average monthly concentrations of TN exceeded the ANZECC[3] guideline throughout the year, while average monthly NH_4^+ concentrations fell below the guideline during October and January. NO_x briefly exceeded guidelines after the onset of winter flows.

	ANZECC 2000[3]	Months exceeded
TN	1.2 mg/L	All*
NH_4^+	0.08 mg/L	May–Sept, Nov–Dec
NO_x	0.15 mg/L	May–Jul
TP	0.065 mg/L	All*
SRP	0.04 mg/L	Jun–Jan

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

Phosphorus:

Average monthly total phosphorus concentrations were highest at the end of winter. Average monthly SRP concentrations were greater than particulate P concentrations during winter and autumn.

All average monthly TP concentrations exceeded the ANZECC[3] guideline. Average monthly SRP concentrations also exceeded the guideline most of the year.

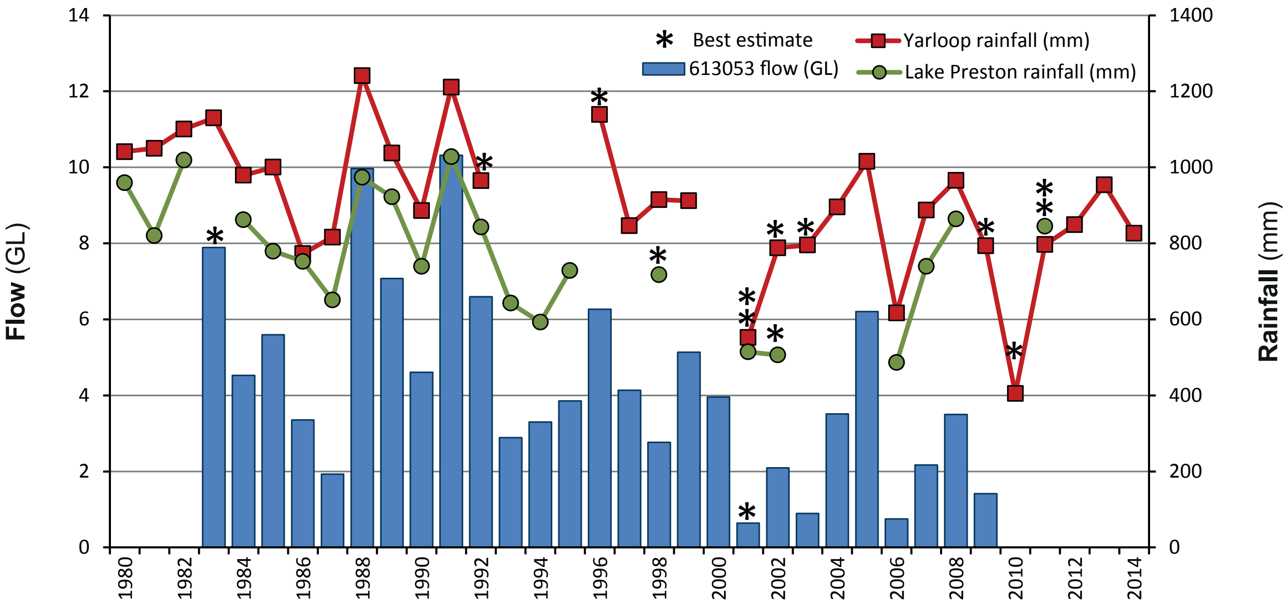
Weed growth downstream of Meredith Drain – January 2009

Long term flow and rainfall (1980–2014)

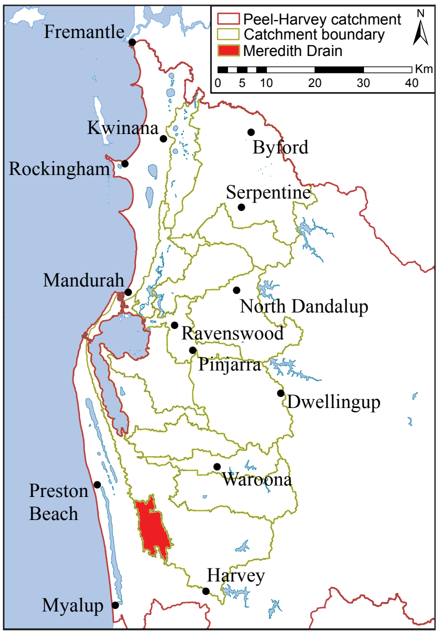
Flow was recorded at Meredith Drain between April 1982 and July 2010, with a brief cessation between December 1982 and March 1983. The Bureau of Meteorology records daily rainfall to the east of the Johnston Road gauging station at Yarloop (9624). Records are available from 1947, however data from 1993 and 1994 are unavailable and intermittent thereafter. Rainfall data was also collected to the west at Lake Preston, again good records are available until 1996 when data becomes sporadic.

Both total annual flow and rainfall appear to be declining. Before 1987 Meredith Drain flowed year-round, since then it ceases to flow from around January to June. Total annual flow ranged from 0.64 GL in 2001 to 10 GL in 1991 and appears to be closely correlated to rainfall.

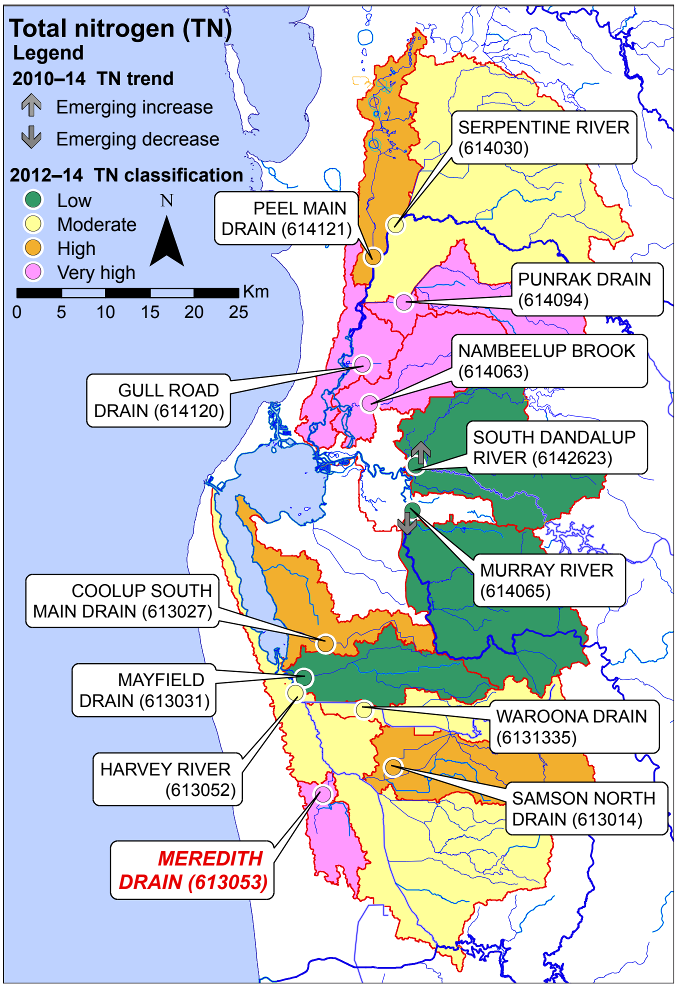
Meredith Drain at Johnston Road – March 2005

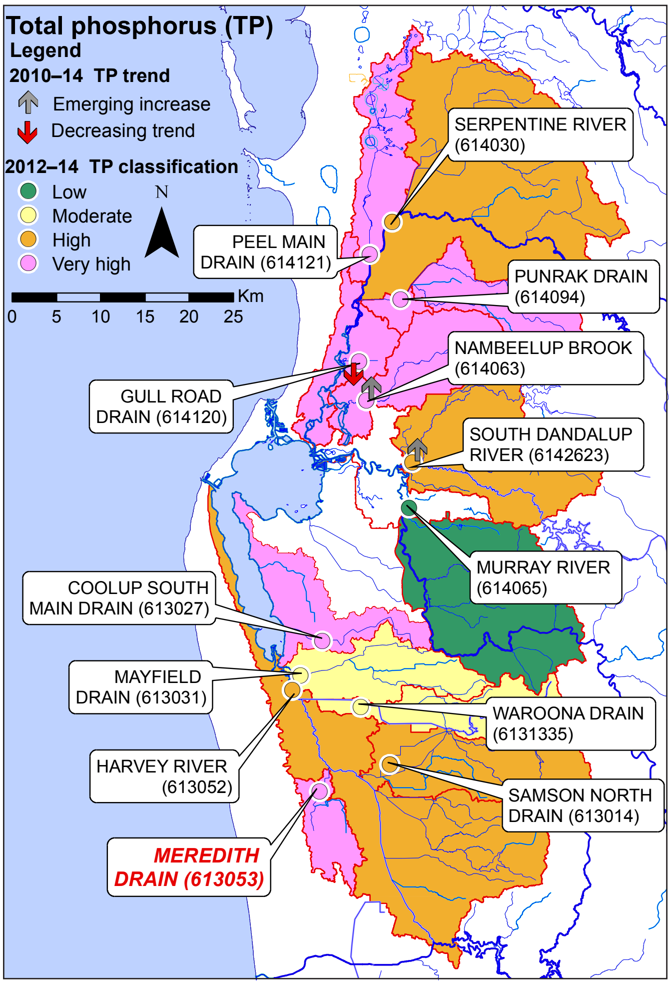


How Meredith Drain fits within the Peel-Harvey catchment: location and statistics



Catchment	Receiving waterbody	Sample site (AWRC)	Area (km^2)	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-nutrient-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.

www.water.wa.gov.au

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