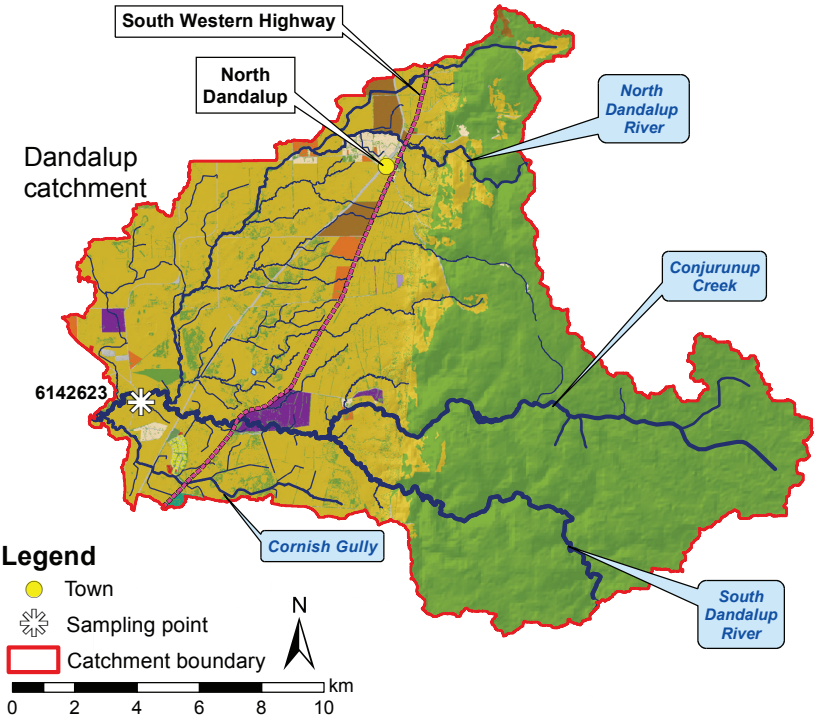
South Dandalup River

The Dandalup catchment includes the North and South Dandalup rivers below their dams, Conjurunup Creek and Cornish Gully. The South Dandalup River flows into the Murray River.

Water quality is monitored on the South Dandalup River at Patterson Road (6142623), downstream of the confluence with the North Dandalup River. There is no flow-gauging station located in the catchment.

Half the catchment lies on the Darling Plateau where the soils are mostly ironstone gravel with hard acidic red or yellow soils. West of the Darling Scarp sandy acidic yellow mottled soils dominate. Less than 5% of the catchment is subject to seasonal inundation, coinciding with a small section of sandy and clayey swamps and leached sands. About a quarter of the catchment (west of the South Western Highway) has a high or very high risk of phosphorus leaching to waterways.

To the east of the scarp the catchment is relatively undisturbed. West of the scarp the land has been cleared, mostly for agriculture such as stock grazing.



Upstream view of the South Dandalup River at Patterson Road – February 2008

Land use classification (2006)[1]	Area (km²)	Area (%)
Animal keeping – non-farming (horses)	1.7	0.68
Cattle for beef (predominantly)	100	41
Cattle for dairy	3.0	1.2
Conservation and natural	129	53
Horticulture	0.06	0.03
Industry, manufacturing and transport	3.2	1.3
Lifestyle block	1.9	0.78
Mixed grazing	2.5	1.0
Offices, commercial and education	0.09	0.04
Plantation	0.20	0.08
Recreation	0.15	0.06
Residential	0.39	0.16
Total	**243**	**100**

The South Dandalup River was the only site in the Peel-Harvey catchment to have an emerging increasing TN trend[2] (2010–14).

It was also one of two sites to have an emerging increasing TP trend[2] (2010–14).

Nutrient summary: median concentrations, loads and status classification at 6142623

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Annual flow (GL)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TN median (mg/L)	0.54	0.57	0.57	0.54	0.53	0.40*	0.81	0.61	0.55	0.47	0.82	0.63	0.68	1.1
TP median (mg/L)	0.077	0.082	0.074	0.084	0.086	0.062*	0.084	0.080	0.078	0.071	0.077	0.084	0.093	0.11
TN load (t/yr)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP load (t/yr)	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Status classification[2] Low Moderate High Very high

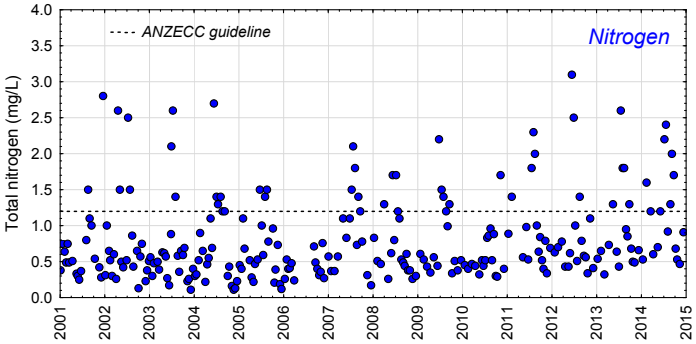
Status reported for three-year period end (i.e. 2012–14 reported in 2014)

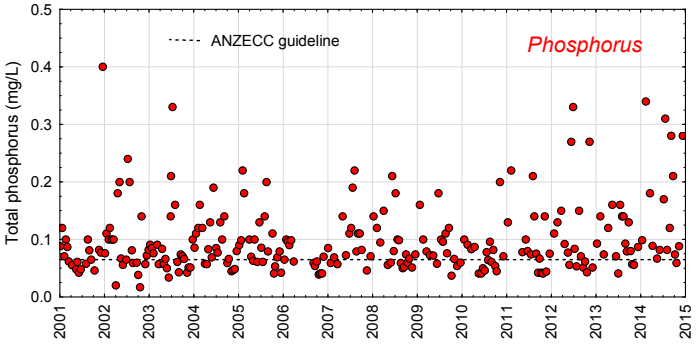
TN = total nitrogen TP = total phosphorus

* Best estimate using available data

(- not applicable)

Total nitrogen (TN) and total phosphorus (TP) concentrations (2001–14) at 6142623.





Note: The annual percentage of samples that exceeded ANZECC[1] guidelines presented below excludes 2006 due to the absence of winter samples.

TN concentration:

The annual percentage of TN samples that exceeded the ANZECC[3] guideline for lowland rivers (1.2 mg/L) ranged between 6% (2010) and 38% (2014).

Between 2001 and 2014, 18% of samples exceeded the guideline. The value increased from 16% (2005–09, to 23% (2010–14).

TN trend:

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

An emerging increasing trend (0.073 mg/L/yr) was detected.

North Dandalup River

TP concentration:

The annual percentage of samples that exceeded the ANZECC[3] guideline for lowland rivers (0.065 mg/L) ranged between 53% (2001 and 2010) and 94% (2014).

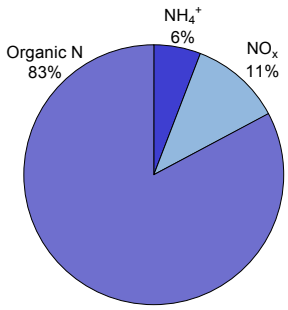
Between 2001 and 2014, 68% of samples exceeded the guideline. The value increased from 67% (2005–09, to 73% (2010–14).

TP trend:

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

An emerging increasing trend (0.009 mg/L/yr) was detected.

Nutrient fractions (2010–14) at 6142623



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.

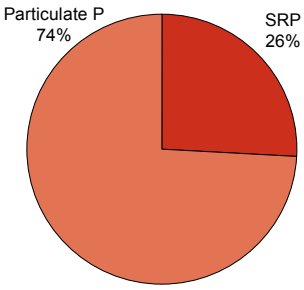
Of the seven catchments that drain into the Peel Inlet, the sample site on the South Dandalup River had the highest percentage of NH_4^+ (6%).

Downstream view at Patterson Road – February 2008

Phosphorus:

Nearly three-quarters of the phosphorus (P) was present as particulate P, which consists of sediment-bound forms of P and organic waste materials.

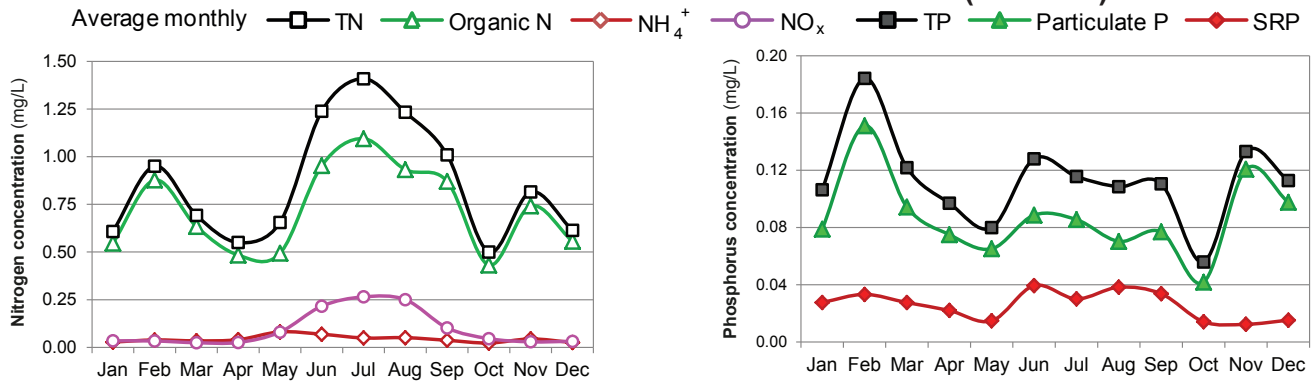
Particulate P is not readily available for uptake by plants and algae, but may become available over time as organic matter decomposes or soil particles release bound P.



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.

The South Dandalup River had the lowest percentage of SRP of the 13 sites sampled in the Peel-Harvey catchment (26%).

Seasonal variations in nutrient concentrations and riverine flow (2010–14) at 6142623



Nitrogen:

Average monthly nitrogen concentrations were hightest in winter with increases also occurring in February and November.

A substantial increase in average monthly NO_x concentrations during winter was possibly due to excess fertilisers and animal wastes being mobilised and flushed into the system.

Average monthly TN and NO_x concentrations exceeded ANZECC[3] guidelines throughout winter. In May there was an increase in average monthly NH_4^+ concentrations and this exceeded the guideline.

	ANZECC 2000[3]	Months exceeded
TN	1.2 mg/L	Jun–Aug
NH_4^+	0.08 mg/L	May
NO_x	0.15 mg/L	Jun–Aug
TP	0.065 mg/L	Nov–Sept
SRP	0.04 mg/L	None

Phosphorus:

Average monthly TP and organic P concentrations were highest in February and November possibly from summer storms.

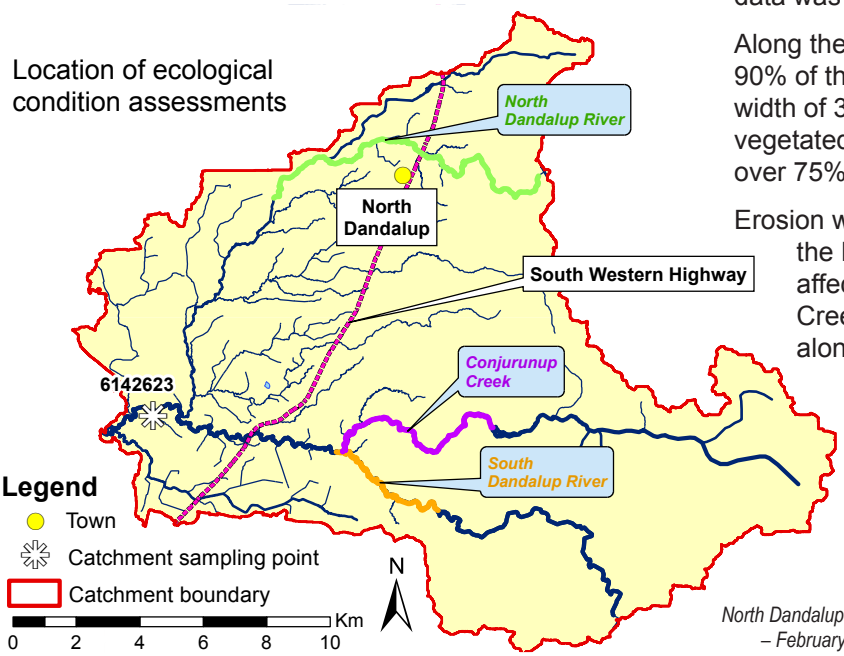
Average monthly SRP concentrations fluctuated with increases occurring in summer and winter.

Average monthly TP concentrations exceeded ANZECC[3] guidelines for most of the year. However, average monthly SRP concentrations were consistently below guidelines.

Upstream tributary – August 2005

Ecological condition of North Dandalup River, Conjurunup Creek and South Dandalup River

Ecological condition was assessed along one reach of the North Dandalup (upstream end of the catchment), South Dandalup and Conjurunup creeks (assessed sites located just upstream of the confluence of these two rivers). The assessments were made with the South West Index of River Condition using data collected in autumn 2012, summer/autumn 2013 and desktop data.



In all three reaches, four native freshwater fish and crayfish species were collected: western minnow, western pygmy perch, nightfish and gilgie. Marron were also collected in the North Dandalup (although outside of the expected natural range). Abundance of the western minnow and nightfish was low in the South Dandalup.

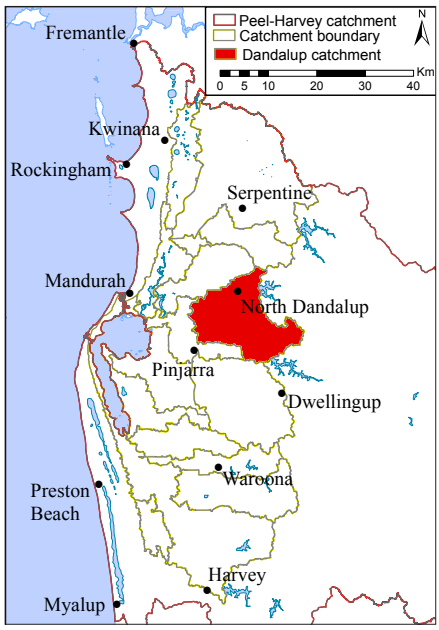
At the North Dandalup field site (located 5 km downstream of the biota sampling site), dissolved oxygen was below optimal conditions for much of the study period (January to May 2013). Dissolved oxygen data was unavailable for the other field sites.

Along the Conjurunup and South Dandalup reaches over 90% of the reach length was vegetated to an average width of 38 m. Along the North Dandalup reach 72% was vegetated to an average width of 24 m. At all field sites over 75% of the groundcover was non-native.

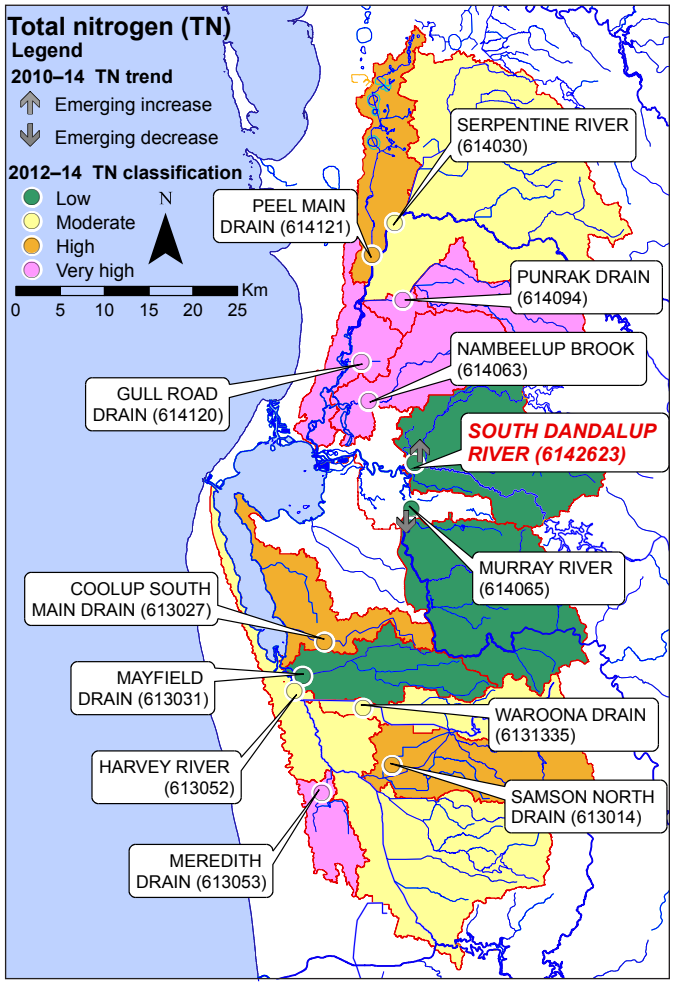
Erosion was assesed at a single site along a reach. At the North Dandalup site, 21 to 50% of the bank was affected by erosion. However both the Conjorunup Creek and South Dandalup sites were eroded along over 50% of their banks.

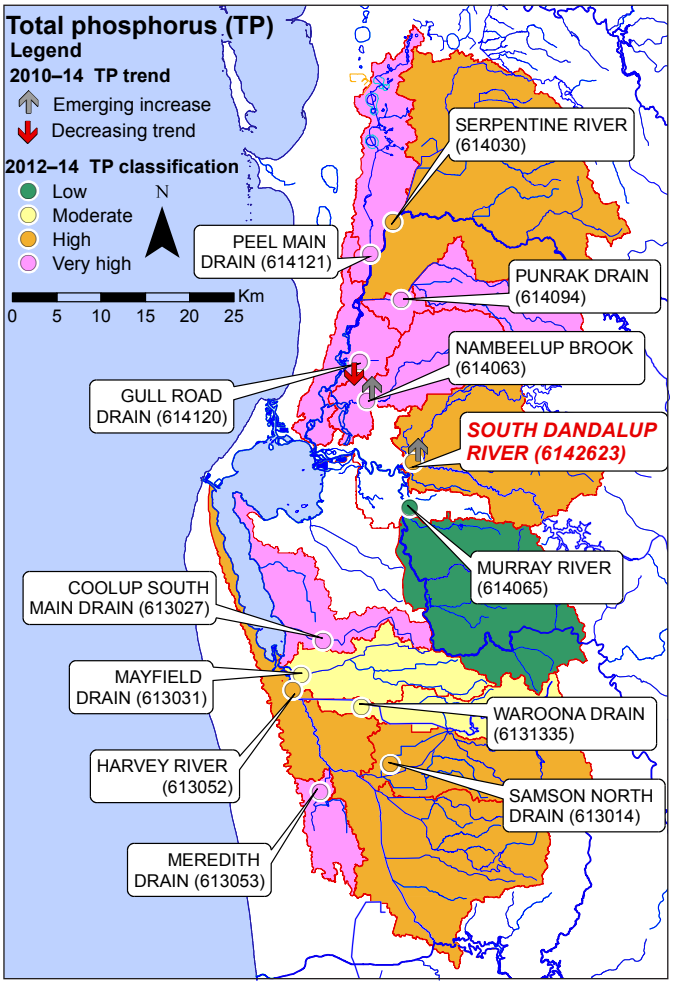
North Dandalup River – February 2013

How the South Dandalup River 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**
Middle 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





References

[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.

www.water.wa.gov.au

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