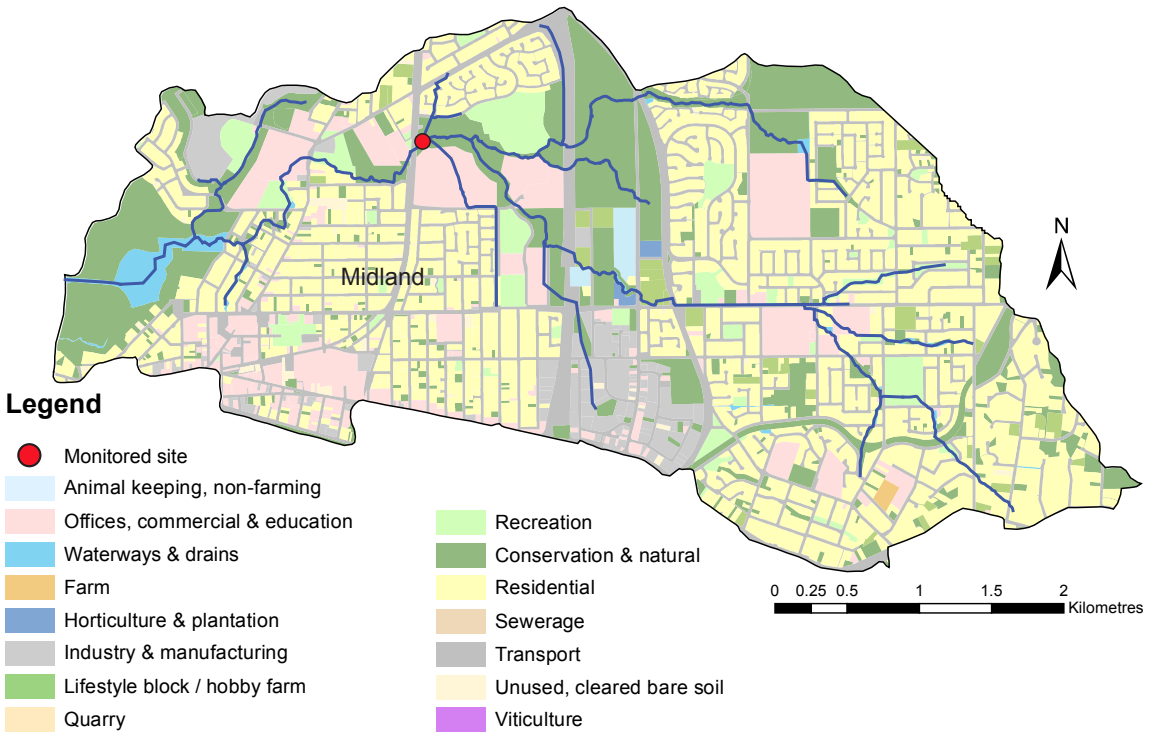
Blackadder Creek

Blackadder Creek was originally a natural creek but sections have been modified into a series of drains. It discharges into the Upper Swan Estuary, upstream of Ray Marshall Park in Midland. Just upstream of its confluence with the Swan Estuary, Blackadder Creek flows through a small area of floodplain wetlands, the Blackadder wetlands.

Most of the catchment has been cleared for urban residential use and very little remnant vegetation remains. Most of the intact bushland is in poor condition except for the regionally significant Talbot Brook Reserve which is in reasonably good condition. As most of the land adjoining Blackadder Creek is publicly owned, on-ground works are easier to undertake.

Soils in the catchment comprise shallow red and yellow earths on the Darling Scarp at the catchment's eastern edge; gravelly and sandy acidic soils (Forrestfield and Guildford soils); and alluvial red and yellow soils to the west of the monitoring site. Depth to groundwater in the catchment ranges from around 0.5 to 3 m.

Water quality is monitored fortnightly at a site near Lloyd Street in Midland, approximately 450 m below the confluence of Blackadder and Woodbridge creeks. This site monitors what nutrients are leaving the upper catchment, but not the influence of nutrient sources between the sampling site and the confluence with the Swan Estuary. There is a closed landfill site downstream of the monitoring site next to the estuary, which may be affecting nutrient concentrations and contributing other pollutants.



Weeds smothering vegetation along Blackadder Creek, October 2010 (left); A fyke net set in Blackadder Creek as part of a river health assessment, October 2010 (right).

Blackadder Creek – facts and figures

Weeds lining Blackadder Creek, August 2010.

Average rainfall (2012–16)	~ 680 mm per year (Perth metro)
Catchment area	17 km^2
Per cent cleared area (2005)	80%
River flow	Ephemeral No major water supply dams in catchment
Average annual flow	No flow data available as catchment not gauged
Main land uses (2005)	Residential and transport (roads).

Nutrient Summary: concentrations, rainfall and targets

Year	Site	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Annual rainfall (mm)	009225	466.8	703.0	807.8	607.2	503.8	860.8	608.2	782.4	674.4	617.8	715.8
TN median (mg/L)	SWN8	0.77	1.00	0.99	1.25#	0.99	1.25#	0.64	1.00	1.10#	0.73	0.93
TP median (mg/L)	SWN8	0.067	0.047	0.046	0.049	0.045	0.050	0.049	0.050	0.037	0.040	0.038

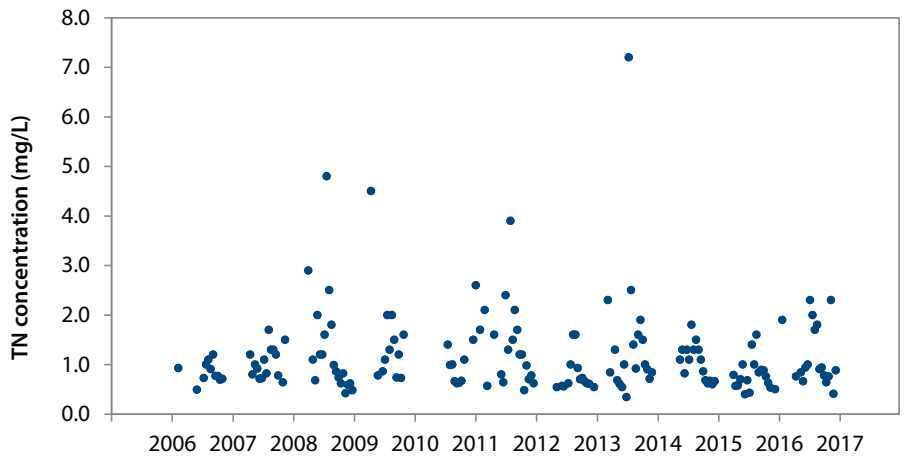
TN short term target = 2.0 mg/L TN long term target = 1.0 mg/L TP short term target = 0.2 mg/L TP long term target = 0.1 mg/L

insufficient data to test target failing both short and long-term target passing short but failing long-term target passing both short and long-term target

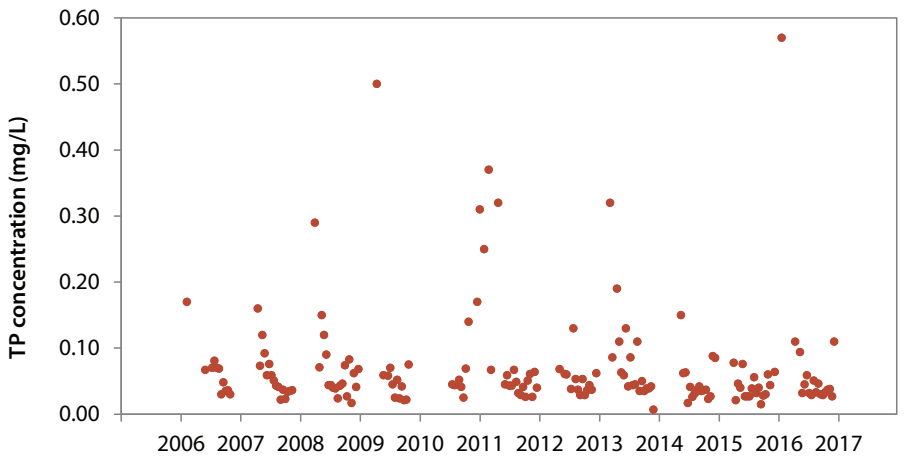
* Best estimate using available data. # Statistical tests that account for the number of samples and large data variability are used for testing against targets on three years of winter data. Thus the annual median value can be above the target even when the site passes the target (or below the target when the site fails).

Changes in nutrient concentrations over time in Blackadder Creek

Total nitrogen concentrations over the 2006 to 2016 monitoring period



Total phosphorus concentrations over the 2006 to 2016 monitoring period



Trend

Visually it appears that total nitrogen (TN) concentrations may have decreased slightly over the reporting period. This was not verified by trend testing however with neither a short- or long-term trend detected (2012–16 and 2007–16 respectively). There were a few samples with higher than normal TN concentrations and these may be due to a point source in the catchment periodically discharging N to the creek.

Target

Blackadder Creek has been passing the short- and long-term TN targets for the reporting period.

Sections of Blackadder Creek are almost completely choked with exotic vegetation, November 2012. Photo: Kelli O'Neill

Trend

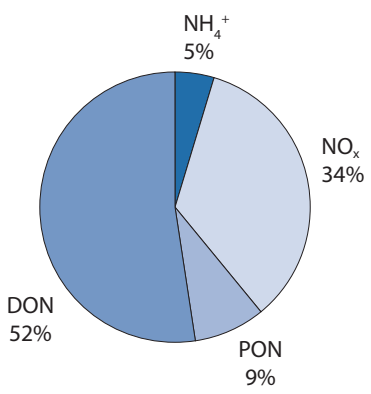
Total phosphorus (TP) concentrations appear to have been reasonably stable over the reporting period. The reason for the cluster of points with high concentrations during the summer of 2010 to 2011 is unknown. No trend in TP concentrations was detected.

Target

Blackadder Creek has been passing the short- and long-term TP targets for the reporting period.

Nutrient fractions in Blackadder Creek

Average composition of nitrogen (N) in Blackadder Creek over the 2012 to 2016 monitoring period

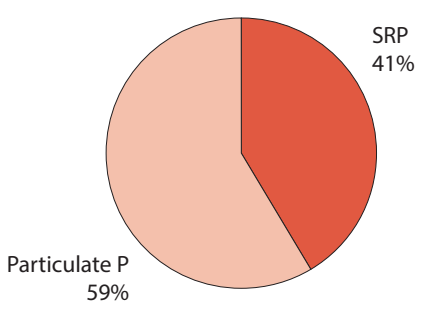


Nitrogen

Nearly two-thirds of the N was present as organic N which consists of both dissolved (DON) and particulate (PON) fractions. DON largely comprises organic compounds leached from peaty subsoils and degrading plant and animal matter and is available for uptake by plants, algae and bacteria. Particulate organic N is composed of plant and animal debris and needs to be further broken down to become available to plants and algae. Dissolved inorganic N (DIN, consisting of ammonium – NH_4^+ and N oxides – NO_x) made up the remaining N and is derived from fertilisers used on home gardens and parks, industrial discharges, animal waste and septic tank leachate. This form of N is readily available for plant and algal uptake.

There were no flow data for Blackadder Creek so loads have not been calculated.

Average composition of phosphorus (P) in Blackadder Creek over the 2012 to 2016 monitoring period



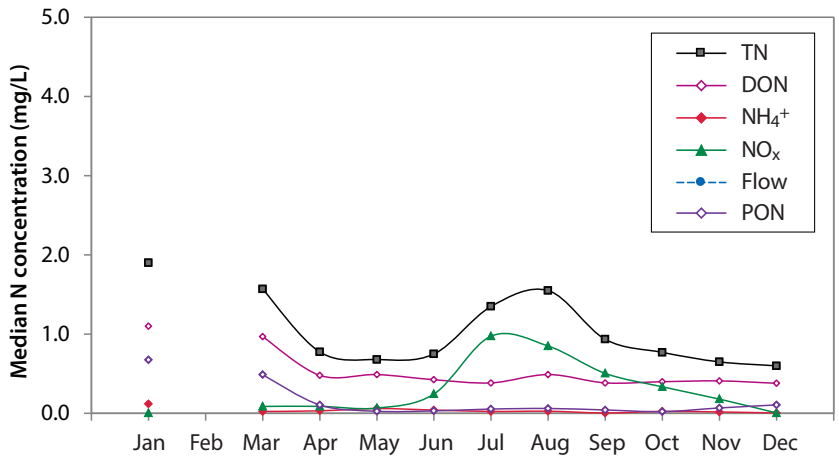
Phosphorus

Particulate P made up just over half of the P present. This form of P is derived from organic waste material and sediment-bound forms of P. Particulate P is not readily available for plant and algal uptake, though some may become available as particles decompose or bound phosphate is released. The remaining P was present as soluble reactive phosphorus (SRP), which is readily used by plants and algae. Likely sources for this kind of P include fertilisers used on home gardens and parks, industrial discharges, animal waste and septic tank leachate.

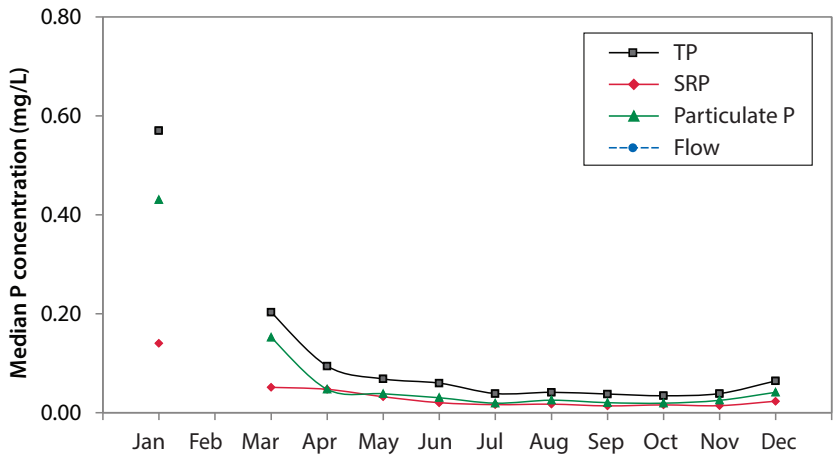
There were no flow data for Blackadder Creek so loads have not been calculated.

Seasonal variation in nutrient concentrations in Blackadder Creek

Nitrogen seasonal variation over the 2012 to 2016 monitoring period



Phosphorus seasonal variation over the 2012 to 2016 monitoring period



Nitrogen

TN and NO_x showed a seasonal response, with concentrations rising in autumn through winter and falling again in spring through summer. These increases coincided with the onset of winter rains and reflect N being transported to the creek by surface, subsurface and groundwater flows at various times of the year. Infiltration of rainwater causes regional rises in groundwater levels, increasing the amount of groundwater entering the creek and any dissolved N (especially NO_x) it may contain. The high concentrations in January and March were due to rainfall recorded in 2016 and 2013 respectively (all other years the brook was dry in these months). This rainfall flushed N into the brook via surface runoff.

Phosphorus

P concentrations did not show a clear seasonal response, with concentrations being fairly steady from around June to December. P enters the creek through surface and subsurface flows as well as via groundwater. The high concentrations in January and March were due to rainfall in 2016 and 2013 respectively. This would have flushed P into the brook, causing these high concentrations.

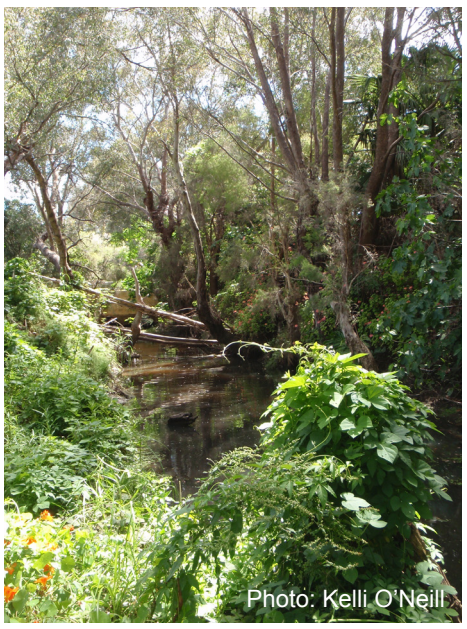


Photo: Kelli O'Neill


Photo: Kelli O'Neill


Photo: Water Science Branch


Photo: Dominic Heald

Photographs of Blackadder Creek: (Top left) Much of the riparian vegetation along Blackadder Creek is exotic, November 2012. (Bottom left) Woodbridge Creek, note the lack of native fringing vegetation, November 2012. (Right) The Blackadder Creek sampling site, August 2017.

Local nutrient reduction strategies for Blackadder Creek

Nutrient reduction strategies being undertaken or recently completed in the Blackadder Creek catchment include but are not limited to:

- The Eastern Region Catchment Management Program which is working together with the Department of Biodiversity, Conservation and Attractions (DBCA), local governments and community groups to deliver water quality and community capacity-building outcomes.
- The Woodbridge Catchment Group hosting regular planting and weeding days – involving schools, TAFE, traditional owners and other community groups to raise awareness about environmental issues.
- A Swan Regional Riverside Park Foreshore Management and Rehabilitation Plan was developed and implemented by the City of Swan with support from the State and Federal governments. On-ground works completed between 2008 and 2012 include weed control, foreshore stabilisation, seed collection, propagation and planting of local native vegetation and upgrade of a weir to prevent salt water intrusion into the Blackadder Wetland.
- The Eastern Catchment Management Plan 2012–2022 was developed to address catchment management including water quality in a coordinated approach.
- The Phosphorus Awareness Project which aims to assist the community in reducing their nutrient outputs through education, promotion and behaviour change programs.
- The DBCA's Healthy Catchments Program aims to protect the environmental health and community benefit of the Swan Canning river system by improving water quality in the catchments. This is achieved through engaging partners and focusing the effort of local governments, sub-regional groups, the community and other organisations in water quality improvement activities.

Swan Canning water quality improvement plan

The Swan Canning water quality improvement plan (SCWQIP) complements the River Protection Strategy (RPS) and presents a roadmap for reducing nutrient inputs into the Swan Canning river systems. It uses sophisticated modelling to identify nutrient sources and provides nutrient-reduction targets for each of the subcatchments.

SCWQIP load and concentration targets for Blackadder Creek

	Max. load (t/yr)	Conc. target (mg/L)	% reduction
TN	2.1	0.75	16%
TP	0.17	0.075	0%

For further information on the RPS and the SCWQIP contact rivers.info@dbca.wa.gov.au

Photo: Kelli O'Neill

Summary: Blackadder Creek

- Blackadder Creek is passing both the short- and long-term TN and TP targets.
- There is no indication that nutrient concentrations are changing at this site.
- To enable Blackadder Creek to meet the SCWQIP TN target a 16% reduction is required.
- The TP load is currently considered acceptable and no reduction in TP is required to meet the SCWQIP target.

www.dwer.wa.gov.au
www.dbca.wa.gov.au

For further information please contact the
Water Science Branch, Department of Water and Environmental Regulation
catchmentnutrients@dwer.wa.gov.au

ISSN 2209-6779 (online only)

Publication date: April 2019