

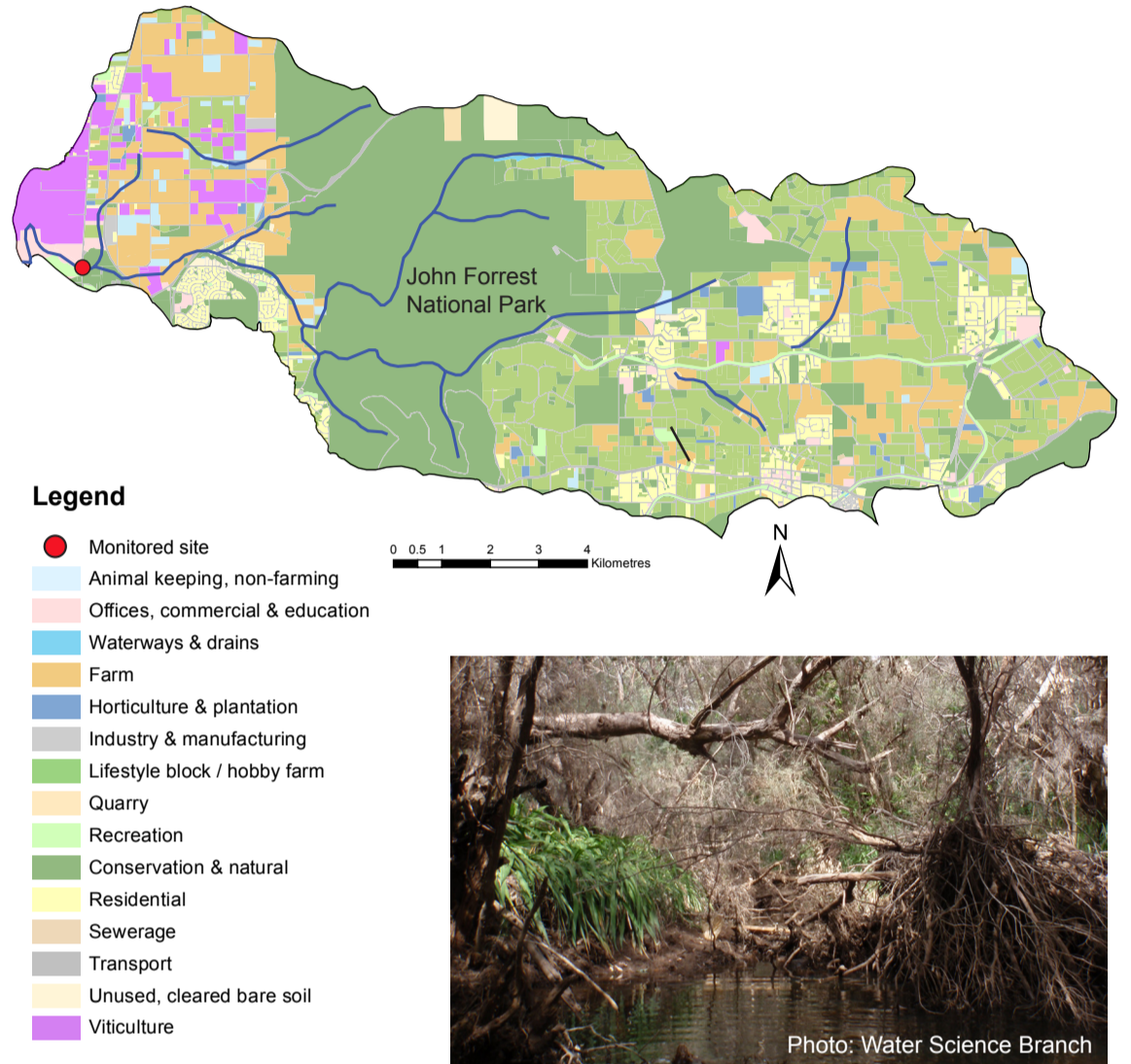
Jane Brook

Jane Brook is an ephemeral waterway in a largely natural state, with much of its riparian zone in the upper catchment still vegetated. It drains the Darling Scarp before flowing through the coastal plain and into the Swan River upstream of Middle Swan Bridge. Strelley Brook, a small tributary of Jane Brook, flows through the largely cleared coastal plain portion of the catchment and into Jane Brook just upstream of its confluence with the Swan River.

Soils in the catchment range from lateritic and ironstone gravels in the upper reaches to the east, to red and yellow earths on the western plains. Groundwater tends to have a relatively minor contribution to flow in Jane Brook.

Agriculture is the dominant land use in the catchment. Viticulture and poultry farming are the principal land uses in the lower Jane Brook catchment, while the upper catchment supports pasture. Little native vegetation remains in the lower catchment below the Darling Scarp, which includes expanding areas of intensive housing developments. Large tracts of natural bushland remain in the steep middle catchment along the scarp, including a portion of the John Forrest National Park. The upper catchment above the scarp is rural and urban with patchy areas of bushland remaining. Much of the brook's fringing vegetation remains intact.

Water quality is monitored fortnightly at the Department of Water and Environmental Regulation gauging station near the catchment's lower end, shortly before the brook flows into the Swan River. This site is positioned to indicate what nutrients are leaving the catchment and entering the Swan River, so the data may not represent nutrient concentrations in upstream areas.



Jane Brook in Swan View, November 2012.

Jane Brook – facts and figures

Average rainfall (2012–16)	~ 680 mm per year (Perth metro)
Catchment area	137 km ² (total)
Per cent cleared area (2005)	49%
River flow	Ephemeral (June to December) No major water supply dams in catchment
Average annual flow	~ 6.8 GL per year (2012–16 average)
Main land uses (2005)	Conservation and natural, farming, rural residential blocks

Modified rock cascade on Jane Brook, along the Railway Reserve Heritage trail. July 2007.



Photo: Lynette Galvin

Nutrient Summary: concentrations, estimated loads and targets

Year	Site	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Annual flow (GL)	616088	8.1	9.0	10.2		1.1*	17.4	8.0*	13.2	5.9*	1.4*	5.6*
TN median (mg/L)	SWN7	0.54	0.64	0.56	0.63	0.43	0.86	0.54	0.61	0.56	0.38	0.56
TP median (mg/L)	SWN7	0.009	0.017	0.017	0.021	0.011	0.032	0.019	0.013	0.030	0.016	0.034
TN load (t/yr)	SWN7	7.06	7.82	9.17		0.72*	16.17	7.48*	13.61	5.08*	0.94*	4.76*
TP load (t/yr)	SWN7	0.12	0.12	0.16		0.01*	0.30	0.33*	0.67	0.20*	0.03*	0.19*

TN short term target = 2.0 mg/L

TN long term target = 1.0 mg/L

TP short term target = 0.2 mg/L

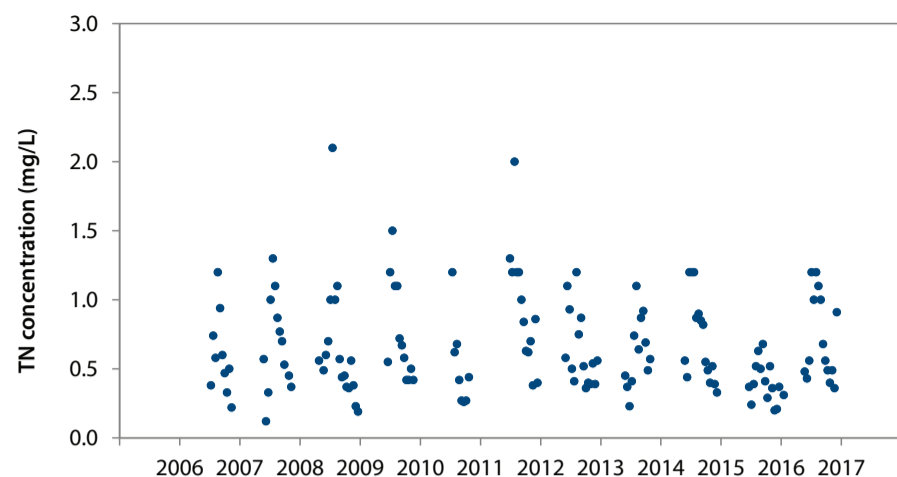
TP long term target = 0.1 mg/L

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 Jane Brook

Total nitrogen concentrations over the 2006 to 2016 monitoring period



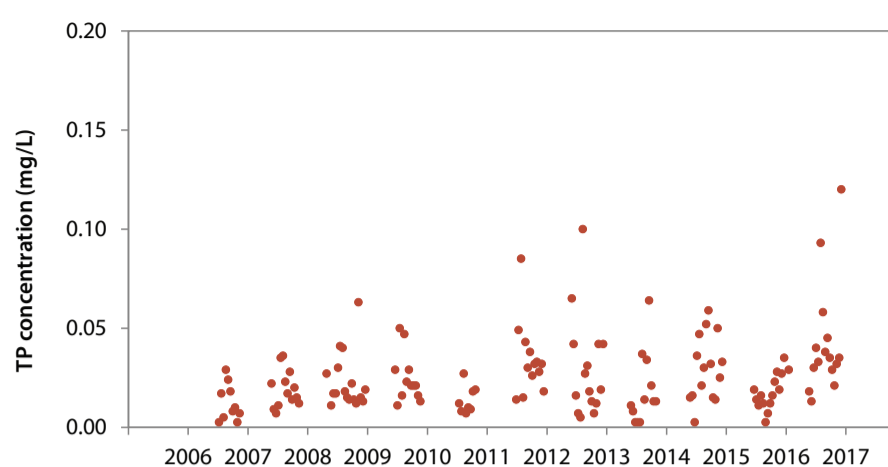
Trend

Total nitrogen (TN) concentrations fluctuated over the reporting period. No trends were detected over either the short- or long-term (2012–16 and 2007–16 respectively).

Target

Jane Brook has been passing the short- and long-term TN targets for the entire reporting period.

Total phosphorus concentrations over the 2006 to 2016 monitoring period



Trend

Like with TN, total phosphorus (TP) concentrations have fluctuated over the reporting period. There were no short- or long-term trends detected (2012–16 and 2007–16 respectively).

Target

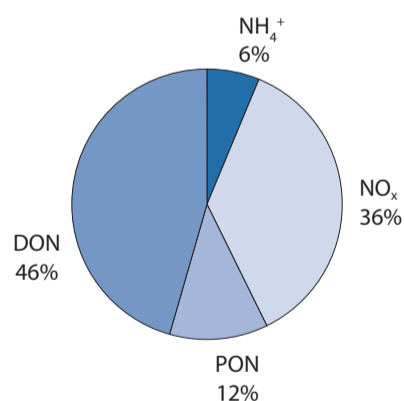
Jane Brook has been passing the short- and long-term TP targets for the entire reporting period.



Jane Brook in Swan View. Note the erosion of the bank on the left-hand side of the photograph, November 2011. Photo: Water Science Branch.

Nutrient fractions and estimated loads in Jane Brook

Average composition of nitrogen (N) in Jane Brook over the 2012 to 2016 monitoring period



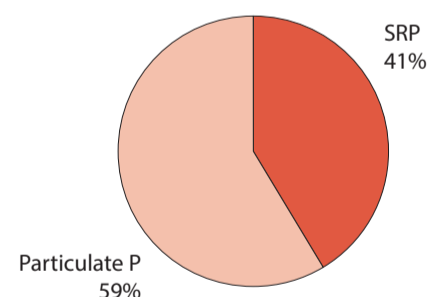
Nitrogen

Just under half of the nitrogen (N) in Jane Brook was present as dissolved inorganic N (DIN, consisting of ammonium – NH_4^+ and N oxides – NO_x). These forms of N are readily available for plant and algal growth. The remaining N was present as organic N which is made up of dissolved organic N (DON) and particulate N (PON).

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. PON is composed of plant and animal debris and needs to be further broken down to become available to plants and algae.

Of the nine catchments with flow data, Jane Brook had the fourth-smallest average TN load (2012–16). In terms of load per unit area, Jane Brook had the third smallest TN load ($0.03 \text{ t/km}^2/\text{yr}$).

Average composition of phosphorus (P) in Jane Brook over the 2012 to 2016 monitoring period



Phosphorus

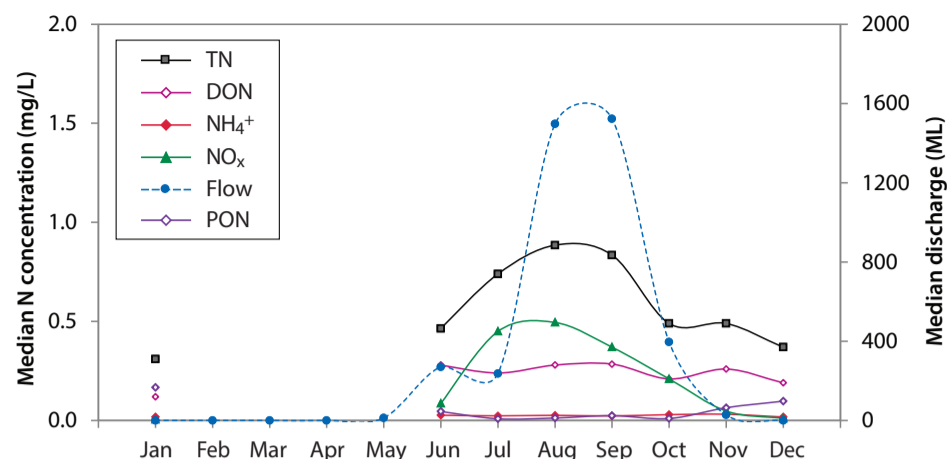
Just over half of the phosphorus (P) was present as particulate P, commonly associated with soil erosion and suspended sediments in the water column. Plants and algae do not readily absorb particulate P, however some of it will become available over time as particles decompose or release bound phosphate. The remainder of the P was present as highly bioavailable soluble reactive phosphorus (SRP). Likely sources of SRP include animal waste and fertiliser. SRP is readily used by plants and algae.

Jane Brook contributed the third-smallest average TP load (2012–16) of the nine

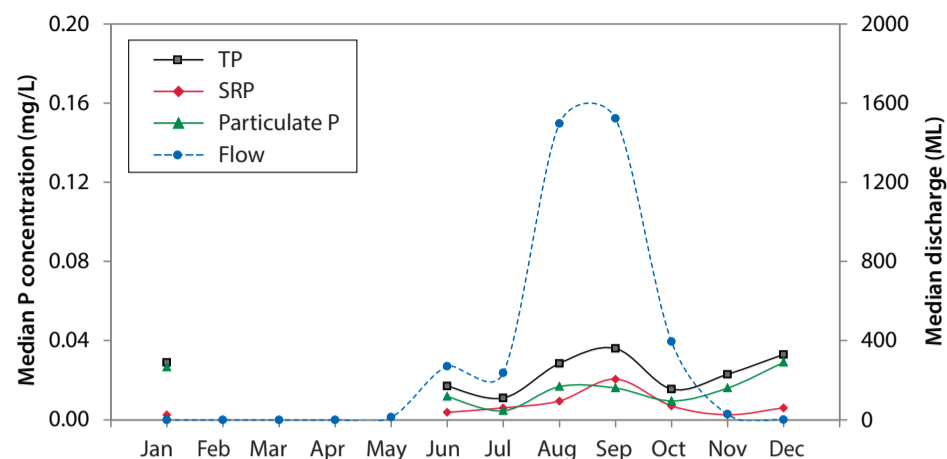
catchments with flow data. It also contributed the equal second-smallest TP load in terms of load per unit area ($0.001 \text{ t/km}^2/\text{yr}$) along with Bennett Brook and Susannah Brook.

Seasonal variation in nutrient concentrations in Jane Brook

Nitrogen seasonal variation over the 2012 to 2016 monitoring period



Phosphorus seasonal variation over the 2012 to 2016 monitoring period



Nitrogen

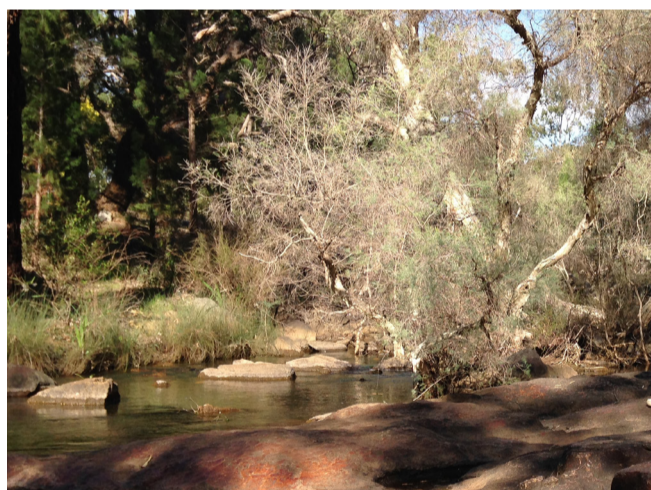
A seasonal pattern in TN and NO_x concentrations is apparent. TN and NO_x concentrations peaked early in winter, corresponding with increased flow. The direct relationship between concentration and flow suggests that much of the N is entering the brook via surface and subsurface flows. NO_x concentrations decreased from July until November when concentrations were negligible. The organic N and NH₄⁺ concentrations in

Jane Brook remained fairly constant throughout the year. The datapoints shown in January are from a single sampling event in 2016 when the brook was flowing after unseasonal rainfall.



Phosphorus

A slight seasonal pattern is apparent in P concentrations. Concentrations were highest in August and September, corresponding with the peak flows. The relationship between TP concentrations and flow suggests that surface and subsurface flow play an important role in transporting P to the brook. The datapoints shown in January are from a single sampling event in 2016 when the brook was flowing after unseasonal rainfall.



Photographs of Jane Brook: (Top left) Jane Brook in John Forrest National Park, August 2014. (Bottom left) Jane Brook in Mt Helena, November 2012. (Right) Jane Brook sampling site, September 2017.

Local nutrient reduction strategies for Jane Brook

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

- The Eastern Catchment Management Plan 2012–2022 which was developed to address catchment management including water quality in a coordinated approach.
- The Jane Brook Catchment Group's efforts to raise awareness in all sectors of the community on the importance of protecting remnant vegetation, revegetating and rehabilitating bushland, restoring streams and creeklines and working in partnership with government, industry and community groups.
- The Eastern Region Catchment Management Program is a partnership project whereby the Eastern Metropolitan Regional Council 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 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 Jane Brook

	Max. load (t/yr)	Conc. target (mg/L)	% reduction
TN	11.0	0.75	0%
TP	0.58	0.075	0%

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



Fyke net in Jane Brook as part of a river health assessment, November 2012. Photo: Water Science Branch.

Summary: Jane Brook

- Jane Brook is passing both the short- and long-term TN and TP targets.
- Of the 33 sites sampled, it has one of the lowest median TN concentrations.
- TN and TP loads are currently considered acceptable in Jane Brook and no reduction is required to meet the SCWQIP targets.
- Of the nine catchments with flow data, Jane Brook has the third-smallest TP load as well as the third-smallest TN load per unit area and the equal second smallest TP load per unit area.
- Of the 33 sites sampled, the proportion of N present as bioavailable NO_x is the sixth-highest.