



Calculating loads

Loads were calculated for those sites where there was sufficient flow and nutrient data available.

Annual loads are calculated by multiplying daily flow with daily nutrient concentration and aggregating over the year. Daily concentration measurements are not available as samples were taken weekly at best, so daily concentration data needs to be in-filled to calculate loads. To calculate the in-filled nutrient data the locally estimated scatterplot smoothing (LOESS) algorithm (Cleveland 1979) was used.

LOESS creates a flow-concentration curve by fitting a low-degree polynomial to a subset of the flow-concentration data to estimate the concentration for the flow at the centre point of the data subset. This is done for each flow value in the dataset. For days on which nutrient data were collected daily loads are calculated from observed concentrations and flows. For days with no data, daily loads are calculated from the daily flow and the estimated concentration from the LOESS flow-concentration curve. The assumption of the LOESS algorithm is that there is a relationship between flow and concentration.

References

Cleveland, WS 1979, 'Robust locally weighted regression and smoothing scatterplots', *Journal of the American Statistical Association*, Vol 74, pp. 829-836.

Hall, J 2010, *Water quality management in urban catchments of the Swan Coastal Plain: analysis of the Bartram Road catchment*, Water Science Technical Series, report no. 22, Department of Water, Western Australia.



Calculating loads using modelled data

The Streamflow Quality Affecting Rivers and Estuaries (SQUARE) model reports estimated flow, nitrogen and phosphorus loads from a catchment. It can also estimate the source of the nutrient loads within the catchment.

The following catchments have been modelled:

- Swan-Canning
- Peel-Harvey
- Leschenault
- Geographe Bay
- Scott River

Nutrient sources

Land use and associated nutrient export rates were used to determine the sources of nutrients exported from a catchment.

Estimated loads

The loads presented in this section differ to those calculated from water quality and flow data at one site using a LOESS algorithm as they have been modelled utilising land use statistics and calibrated with water quality and flow data.

Nitrogen (kg/ha/year)	Remediation priority	Phosphorus (kg/ha/year)
> 6.0	High	> 1.0
3.0 – 6.0	Medium	0.5 – 1.0
< 3.0	Low	< 0.5

Remediation priority

Using the nutrient load per cleared area a simple remediation prioritisation ranking was determined.

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