

Biogeochemical controls on nutrient loadings in the Derwent River Catchment, Tasmania

B.C. PROEMSE¹, C.M. HOGAN¹, J. WHITEHEAD²,
C. COUGHANOWR², L. BARMUTA¹

¹School of Biological Sciences, University of Tasmania, Private Bag 55, 7001, Tasmania, Australia (*correspondence: bernadette.proemse@utas.edu.au)

²Derwent Estuary Program, 134 Macquarie St, Hobart, 7001, Tasmania, Australia

The Derwent River Catchment is Tasmania's most populated river basin, covers a fifth of Tasmania's land surface and supplies potable water to the densest population centres in the state. Despite considerable progress in managing point-source effluent discharges to the Derwent, there has been a gradual increase in nutrient concentrations, resulting in unexpected benthic blue-green algal blooms in the river and filamentous algal blooms in the upper estuary, starting in the the summer of 2014/15. Increased stressors such as land use change, urbanisation, and this year's elevated temperatures and reduced river flows owing to the worsening El Niño and Indian Ocean Dipole signals, are challenging the state of the Derwent River.

The Derwent River watershed consists of distinct sub-catchments whose tributaries are influenced by various factors including hydro-regulation for power generation, geology (karst), agricultural use such as dairy farming, fish farming, and waste water treatment plant effluents. Here we use hydrometric, hydrochemical and isotopic data to identify nutrient contributions to the upper Derwent River before it enters the estuary. Monthly sampling of 14 sites including main tributaries and sites along the River Derwent has been conducted since September 2015, and samples have been analysed for the major ion chemistry (Cl, SO₄, NO₃, PO₄, HCO₃, NH₄, Na, K, Ca, Mg), water isotopes ($\delta^{18}\text{O}$, $\delta^2\text{H}$), and isotopic fingerprinting of nutrients ($\delta^{15}\text{N-NO}_3$, $\delta^{18}\text{O-NO}_3$, $\delta^{34}\text{S-SO}_4$). Our results reveal the biogeochemical linkages to nutrient loading in the Derwent River Catchment and help inform best practice management to mitigate pollution.