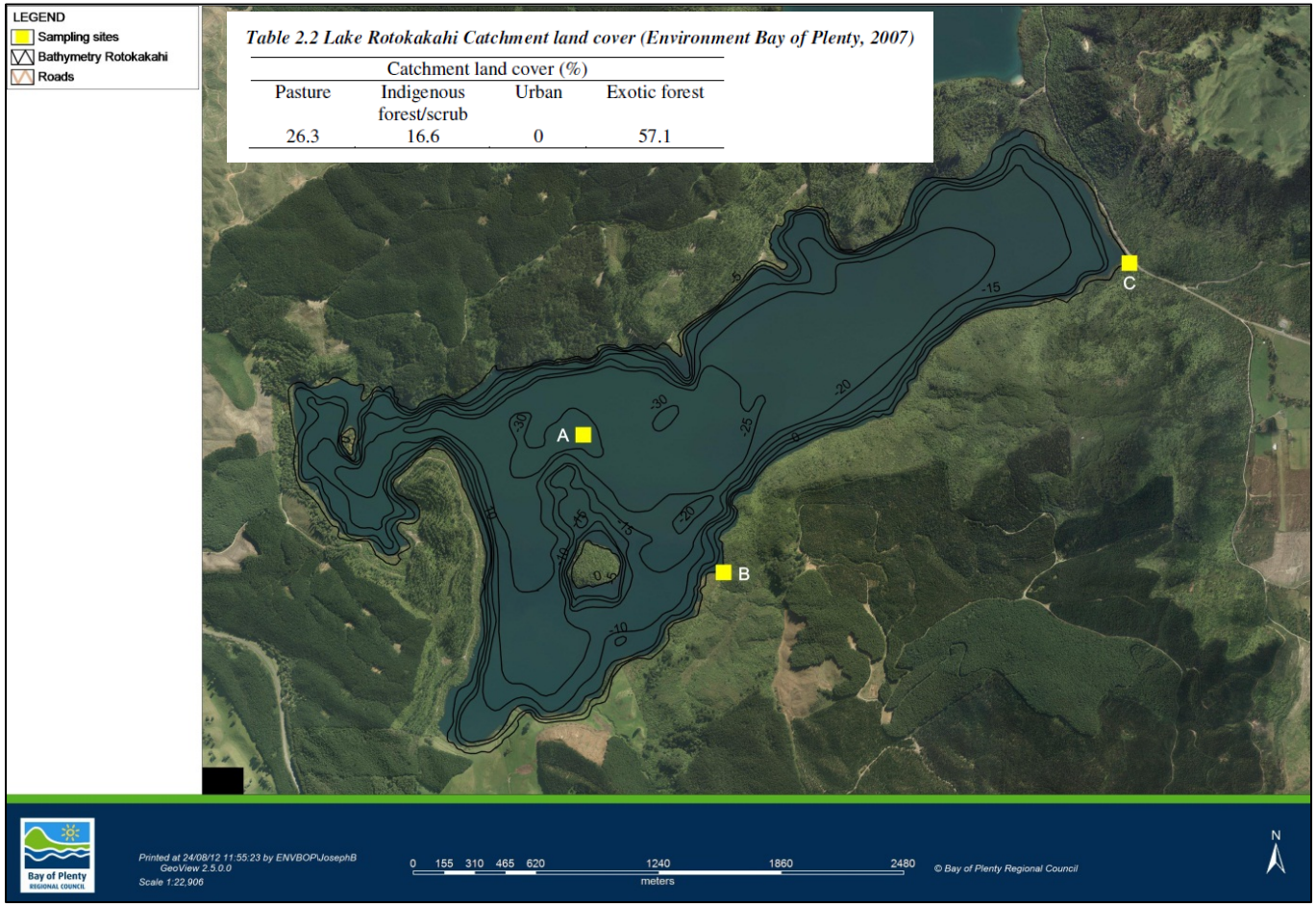
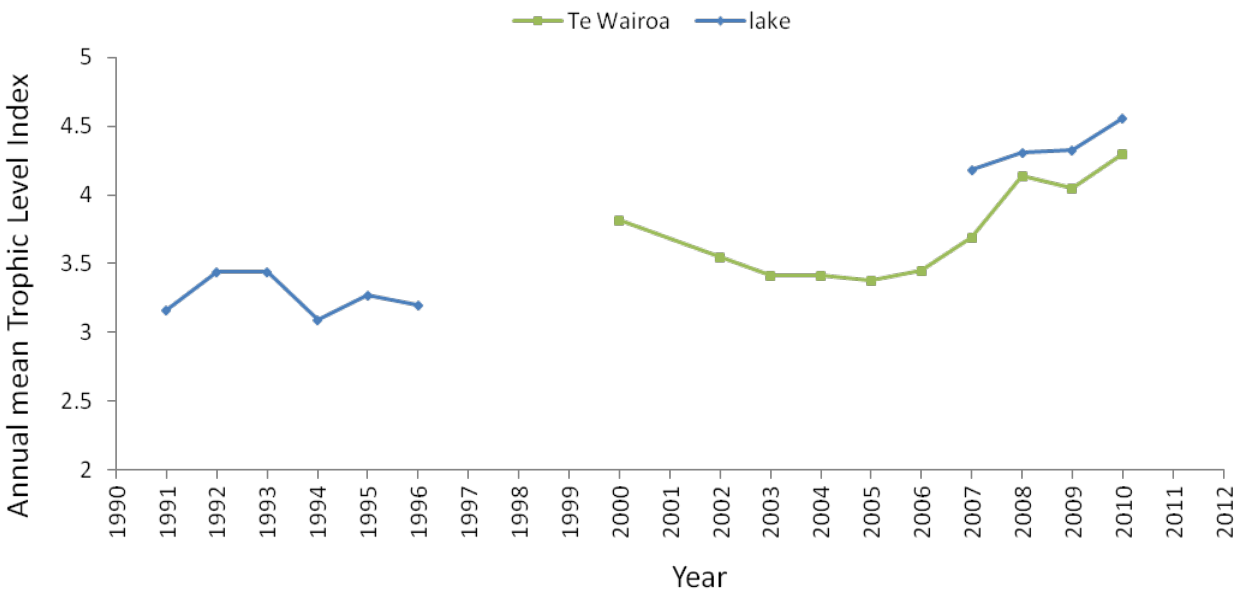
A water quality model for Lake Rotokakahi

Lake Rotokakahi



Lake Rotokakahi sampling locations. A = central-lake station, B = small spring-fed inflow, C = Lake Outlet (Te Wairoa Stream). 2011 aerial photography.

Lake Rotokakahi



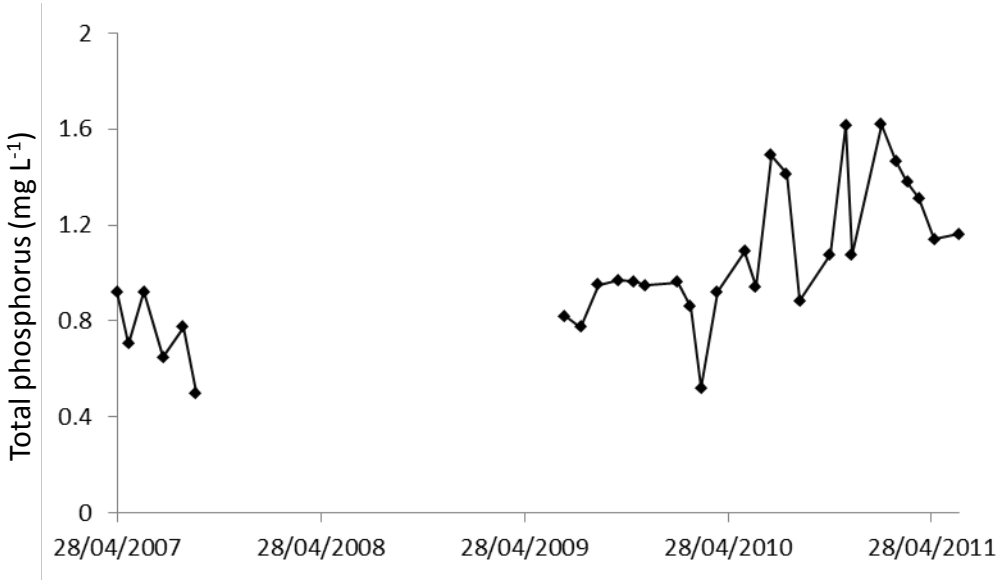
Trophic Level Index values for Lake Rotokakahi and Lake Outlet from 1990 to 2011 (Butterworth, 2012).

Water quality model objectives

- Reproduce the recent decline in water quality
- Determine the main drivers for decline in water quality
- Simulate nutrient reduction scenarios for improving water quality and/or re-establish Kakahi population

Model input

- Reasonably good inflow data available for the period 2009-2011, eg. Below

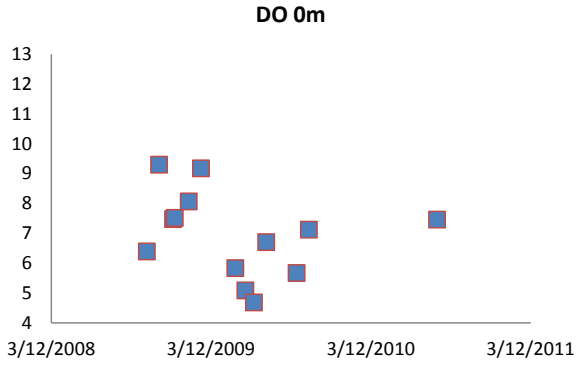


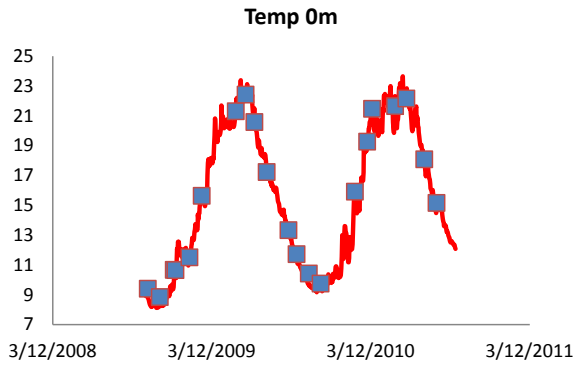
- In the absence of more sophisticated hydrological input data, model period limited to 2009-2011

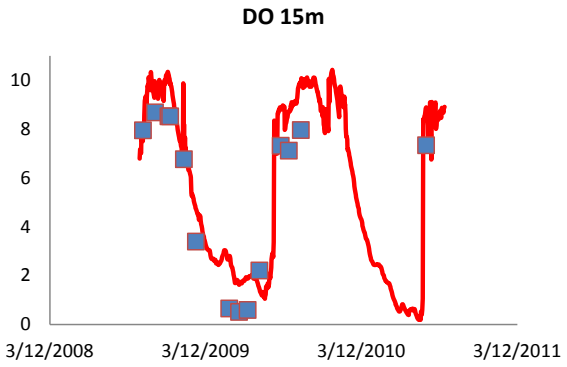
Nutrient budget

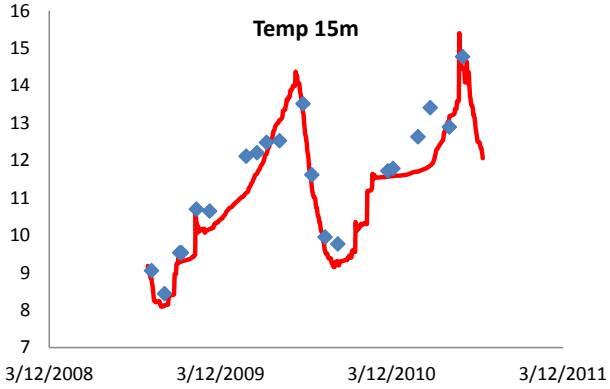
Nutrient load calculations	Year	TN load (t/yr)	TP load (t/yr)	Water inflow (m3/yr)
Surface inflow	**2008**	6,427	0,508	320075
	2009	5,564	0,440	239918
	2010	6,264	0,495	307664
Groundwater inflow	**2008**	0,522	0,208	8968121
	2009	0,496	0,203	7658220
	2010	0,795	0,352	8751996
Rainfall	**2008**	1,182	0,087	6484337
	2009	0,934	0,069	5126087
	2010	1,138	0,084	6245255
Emphemeral inflow	**2008**	0,839	0,333	515246
	2009	0,642	0,263	309390
	2010	1,368	0,605	546217
SUM	**2008**	7,788	1,048	
	2009	6,703	0,906	
	2010	8,426	1,453	
	Average	**7,639**	**1,136**	

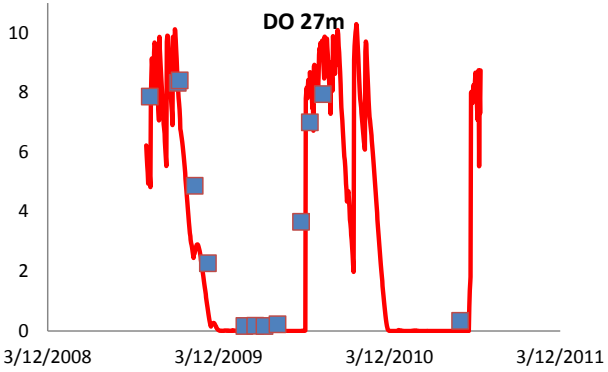
Calibration of 1D model

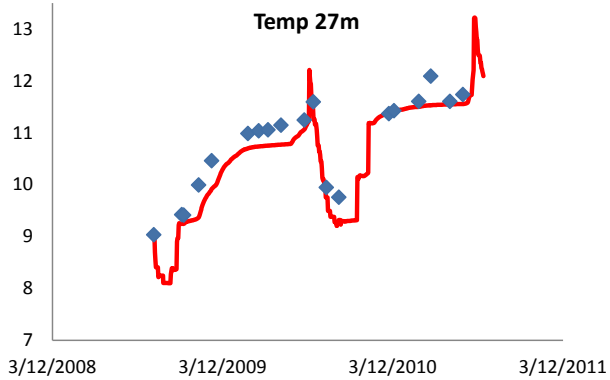






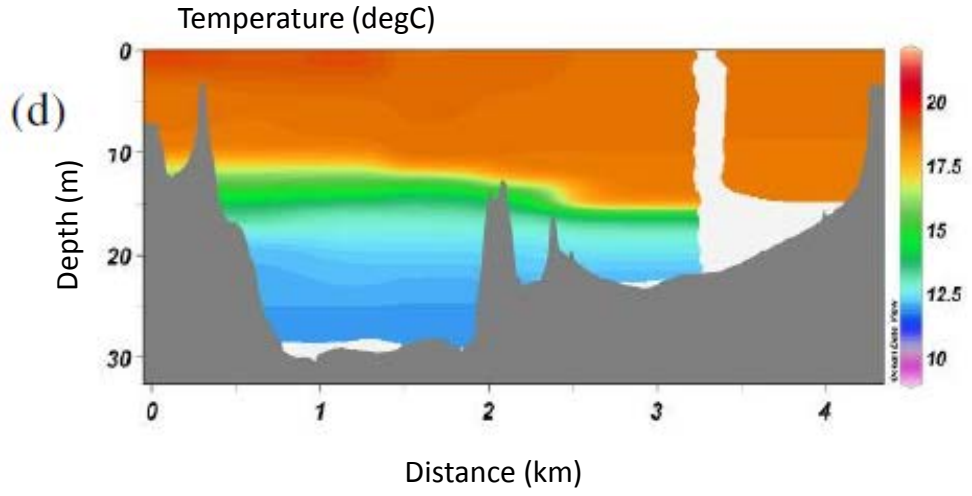


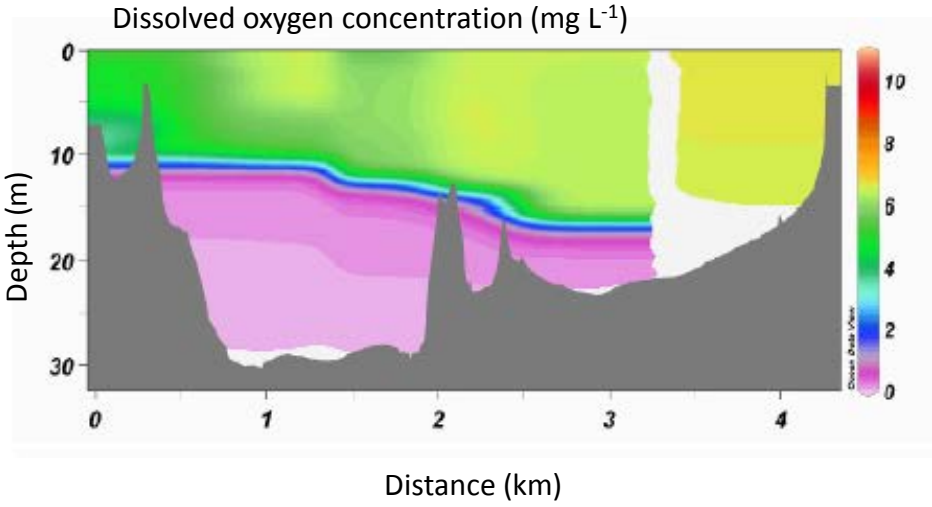




Spatially resolved data

Spatial variability in Lake Rotokakahi may influence our ability to use a 1D model





Where to from here

- 3D model setup in progress
- Increasing conceptual complexity to include Kakahi
- Possibly use of remote sensing to identify logging scheme in the catchment (useful for model scenario development)