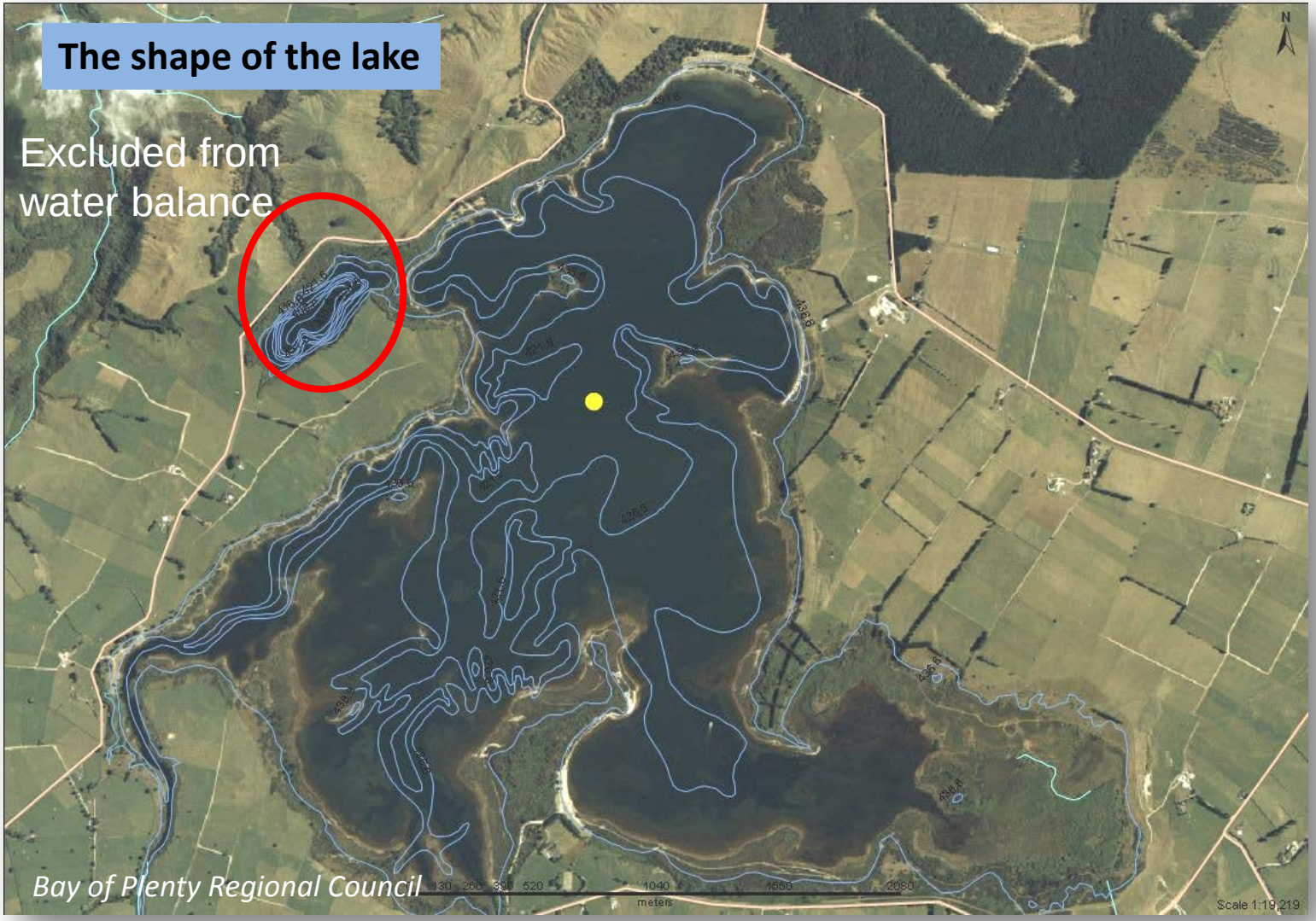
A water quality model for Lake Rerewhakaaitu

Lake Rerewhakaaitu model input

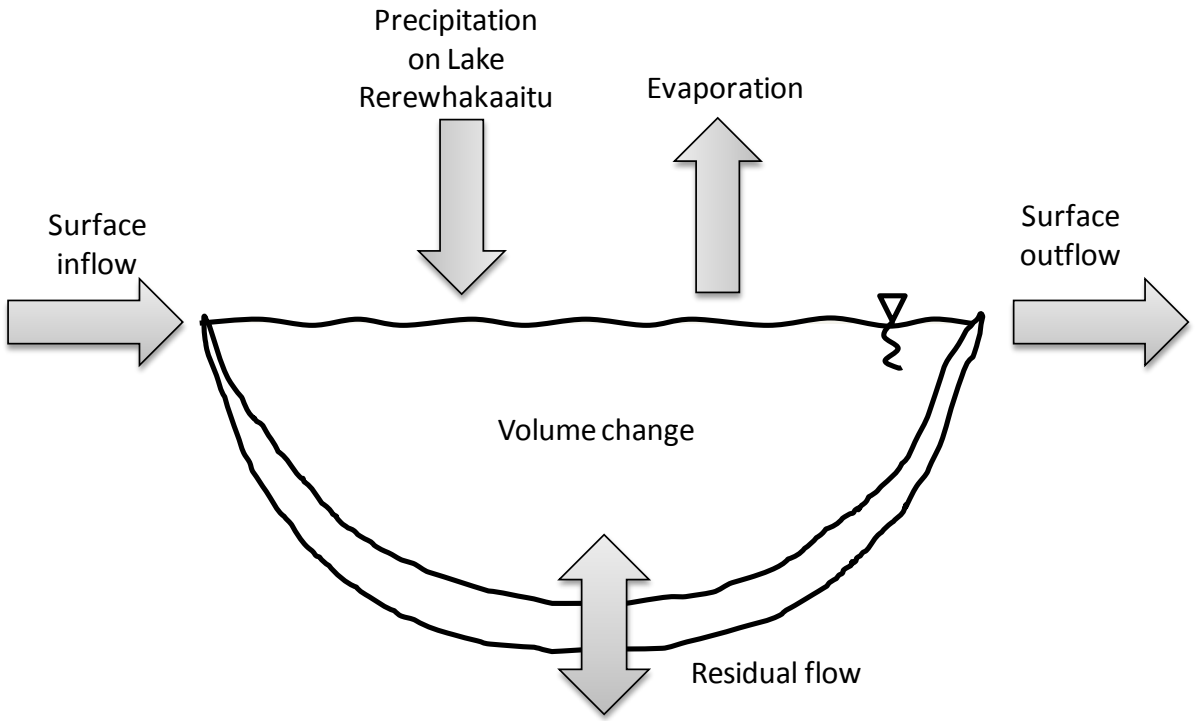


Lake Rerewhakaaitu water balance

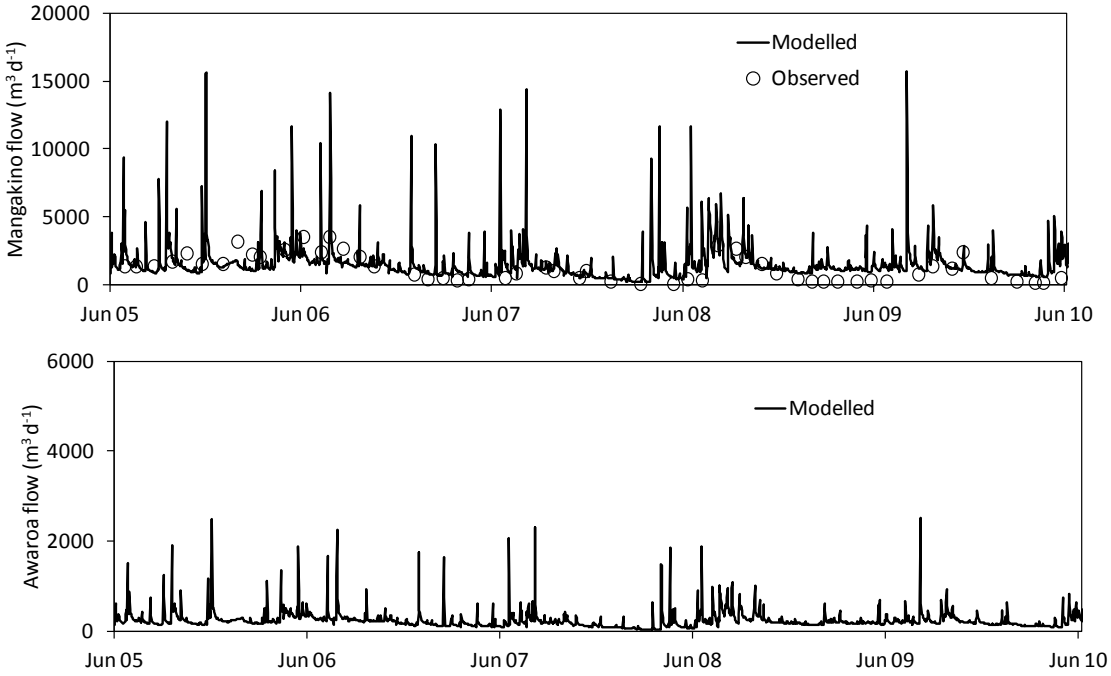
Lake water balance:

$$\frac{\Delta V}{\Delta t} = Q_{SurfInf} - Q_{SurfOut} + (P - E)A \pm Residual$$

V = Volume at time *t*
Q = Discharge
P = Precipitation
E = Evaporation
A = Surface area

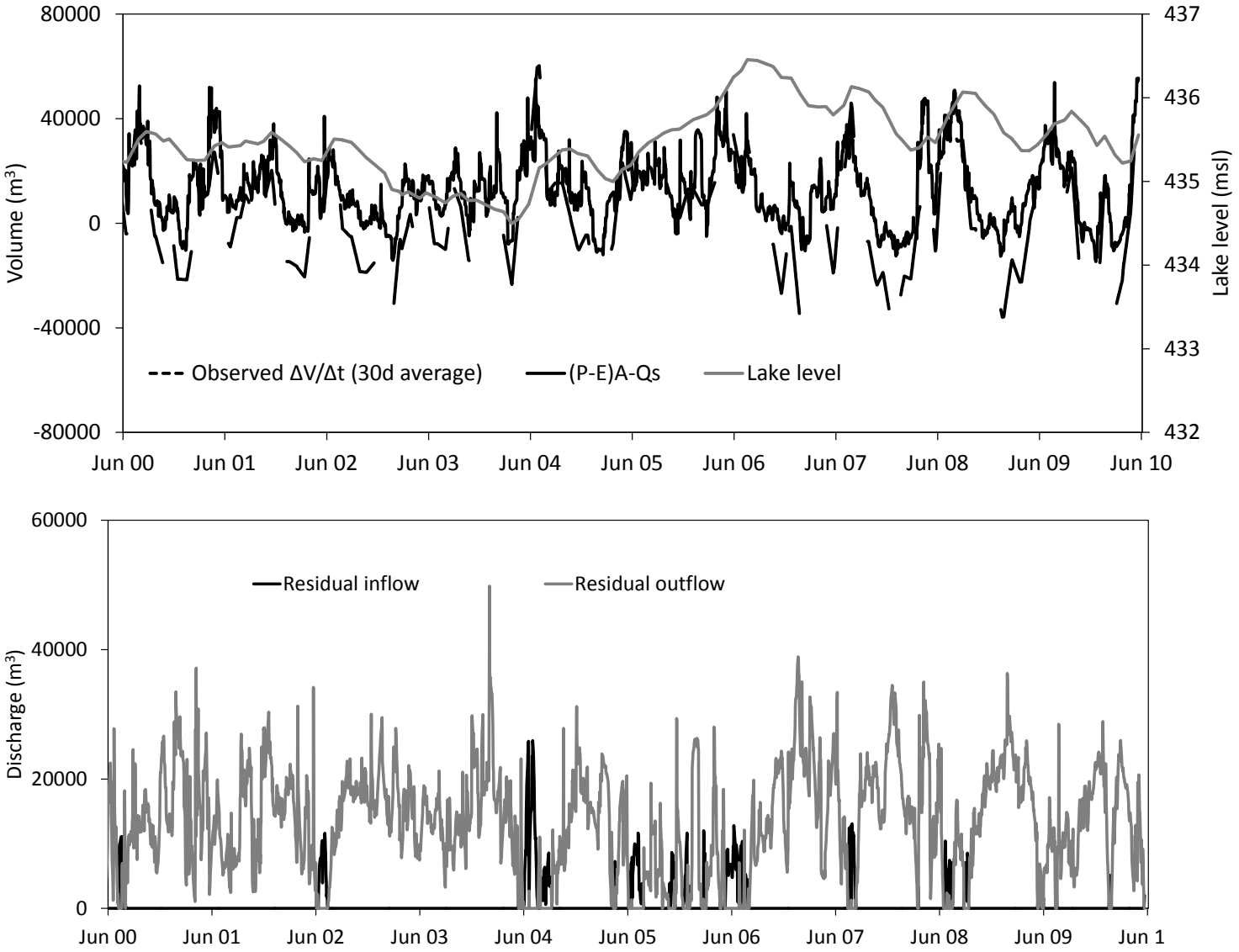


Lake Rerewhakaaitu water balance



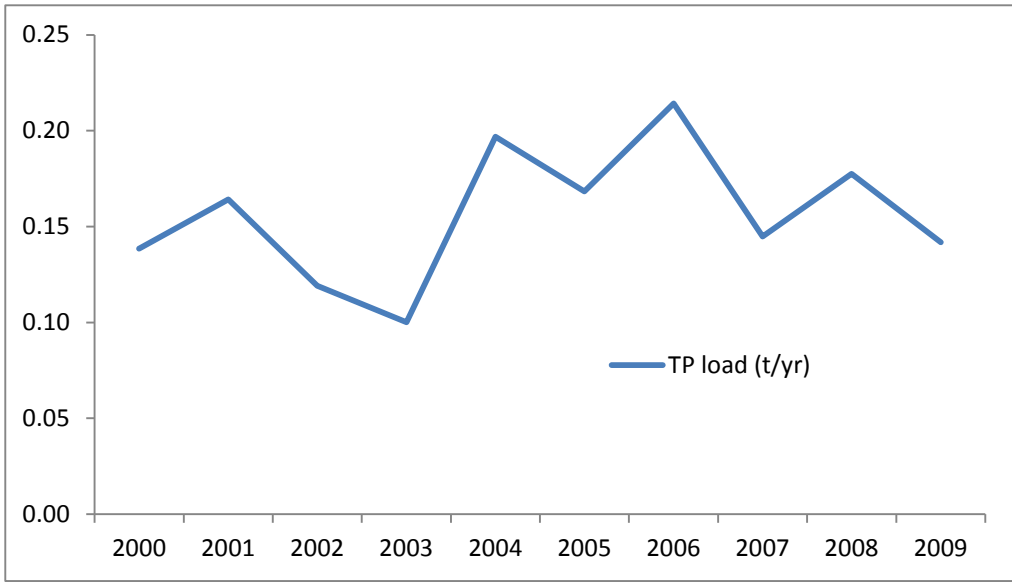
Modelled daily and observed stream flows for Mangakino stream and modelled daily stream flows for Awaroa stream. Daily flows for Mangakino were derived using a relationship with the Ngongotaha stream using a method is similar to the one used in McDowell et al. (2010). Flow data for the Awaroa Stream is sparse and only 17 measurements between 1995 and 2011 were available in this study. A comparison with measured Mangakino Stream flows and Awaroa Stream flows revealed that the latter flow values were 84% on average lower than the former flow values.

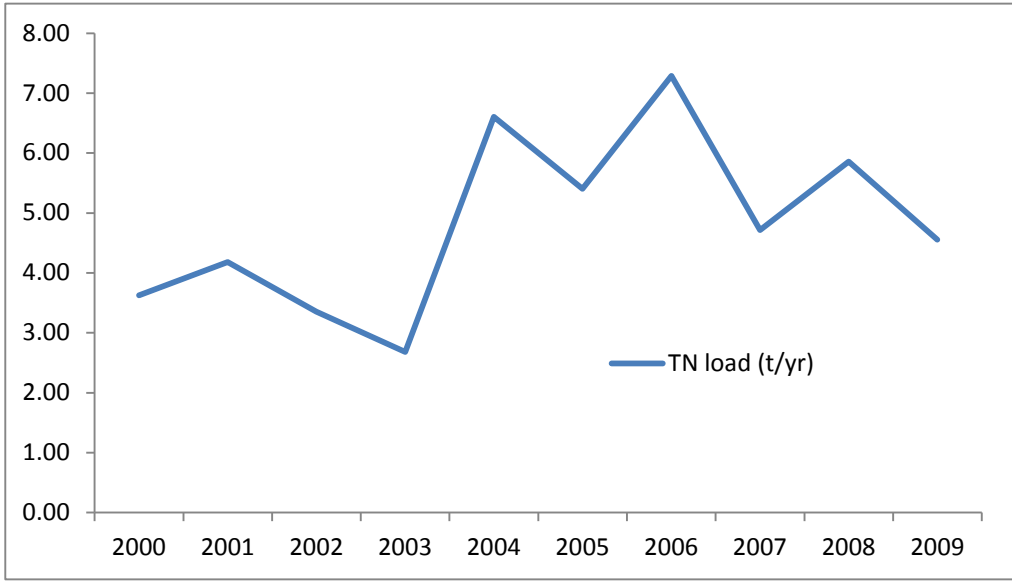
Lake Rerewhakaaitu water balance



Lake Rerewhakaaitu nutrient budget

Year	TP load (t/yr)	TN load (t/yr)
2000	0.14	3.63
2001	0.16	4.18
2002	0.12	3.35
2003	0.10	2.68
2004	0.20	6.60
2005	0.17	5.40
2006	0.21	7.29
2007	0.14	4.72
2008	0.18	5.86
2009	0.14	4.56



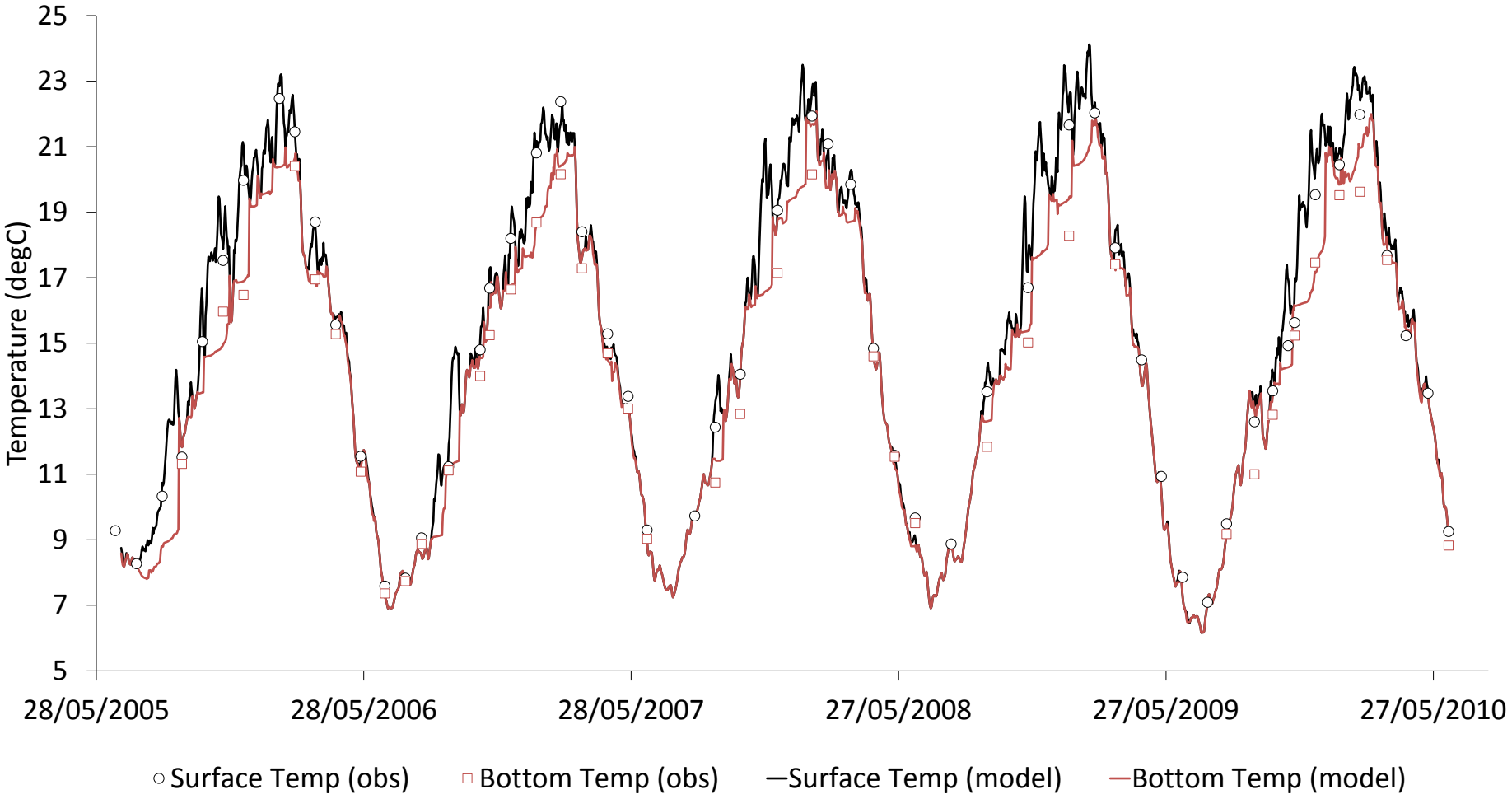


Model calibration - validation

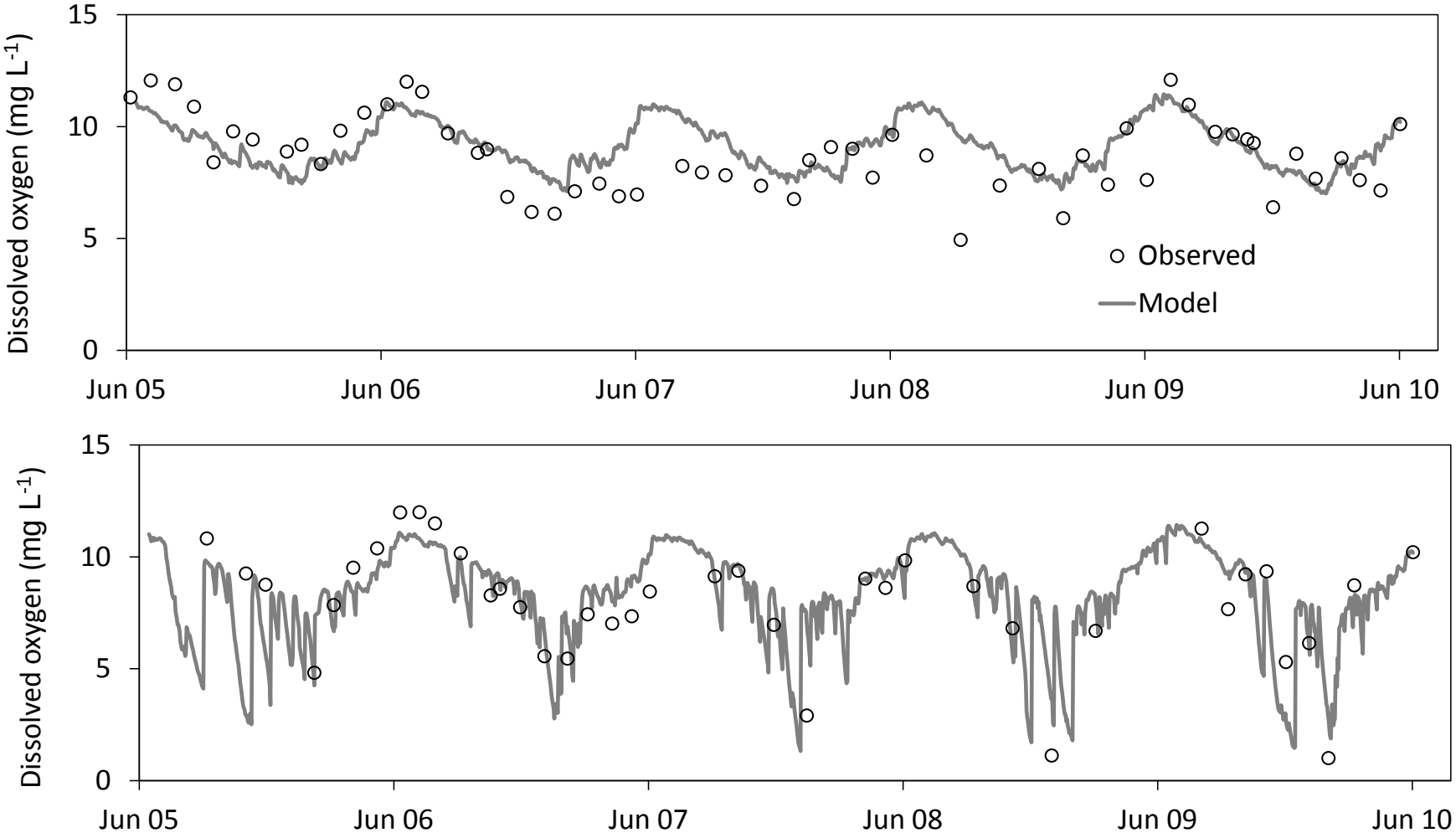
- Model calibration for the period July 2005-June 2010

- Model validation for the period July 2000-June 2005

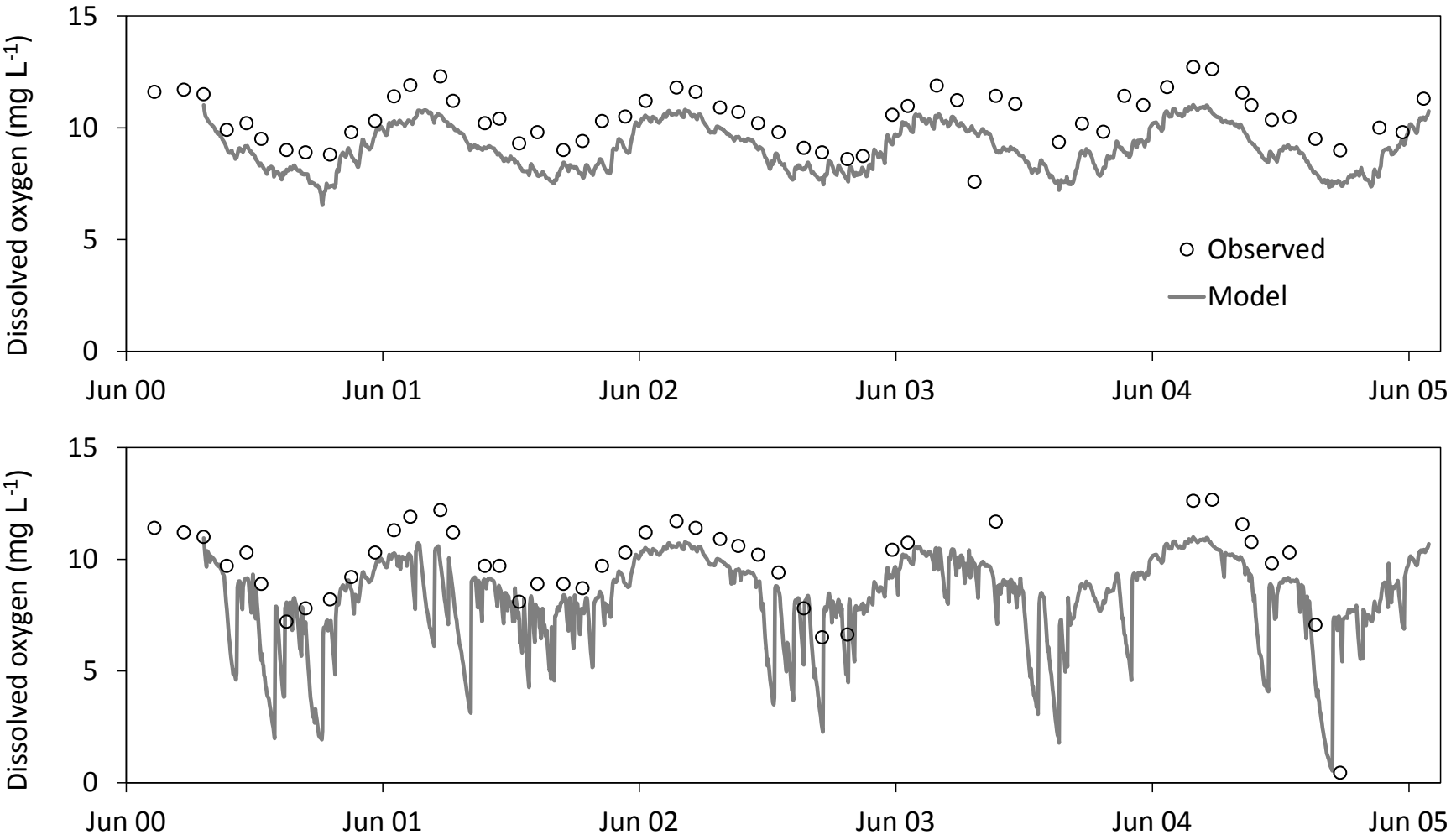
Calibration of water column temperature



Calibration of dissolved oxygen concentration



Validation of dissolved oxygen concentration



Where to from here

- Model calibration needs a little bit more work (i.e. nutrients and chlorophyll *a*).
- Phosphate concentration in Lake Rerewhakaaitu are usually below the analytical detection limit making calibration challenging
- Scenario modelling can commence shortly after calibration/validation is finished.
- Community involvement important for scenario development.