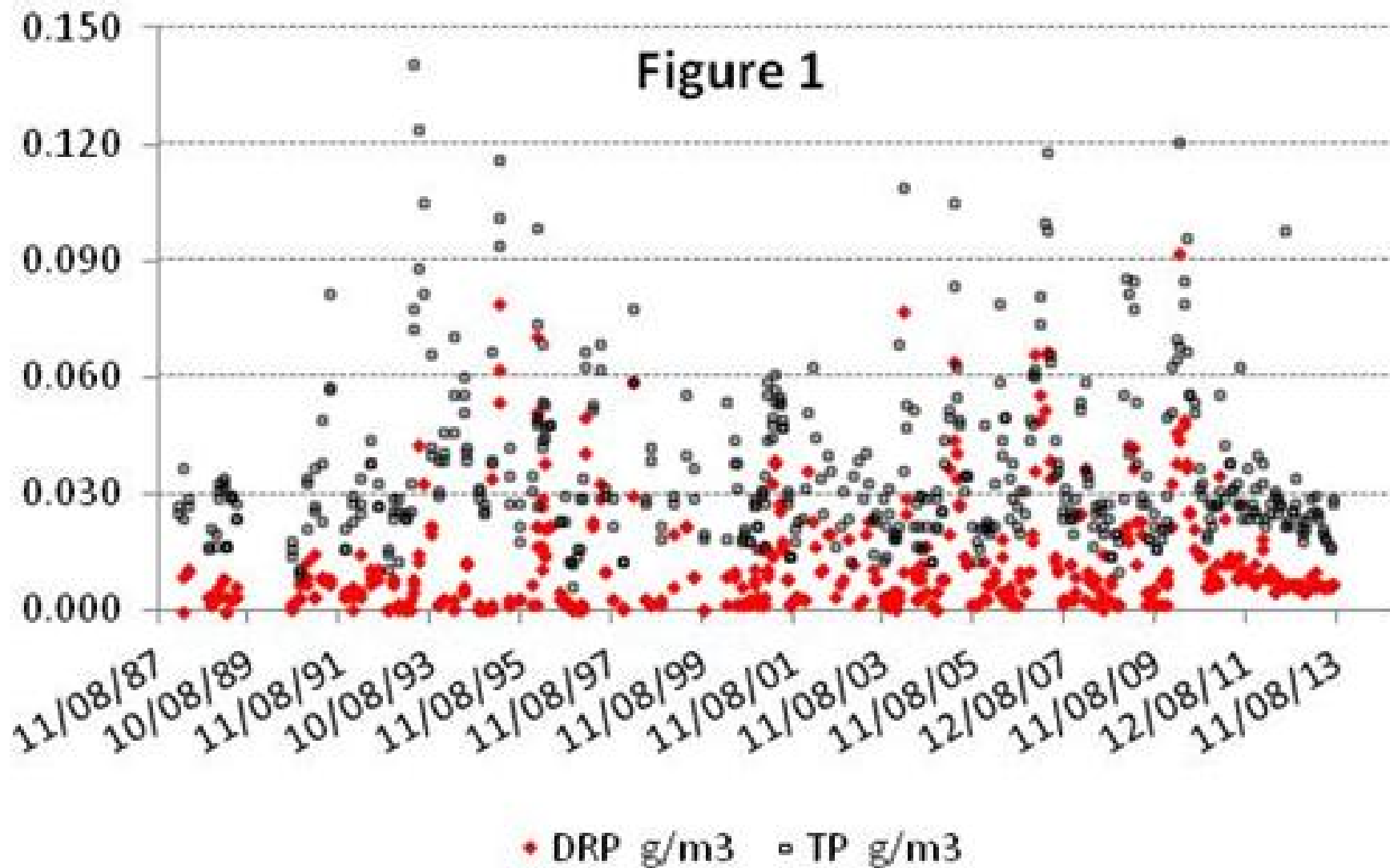


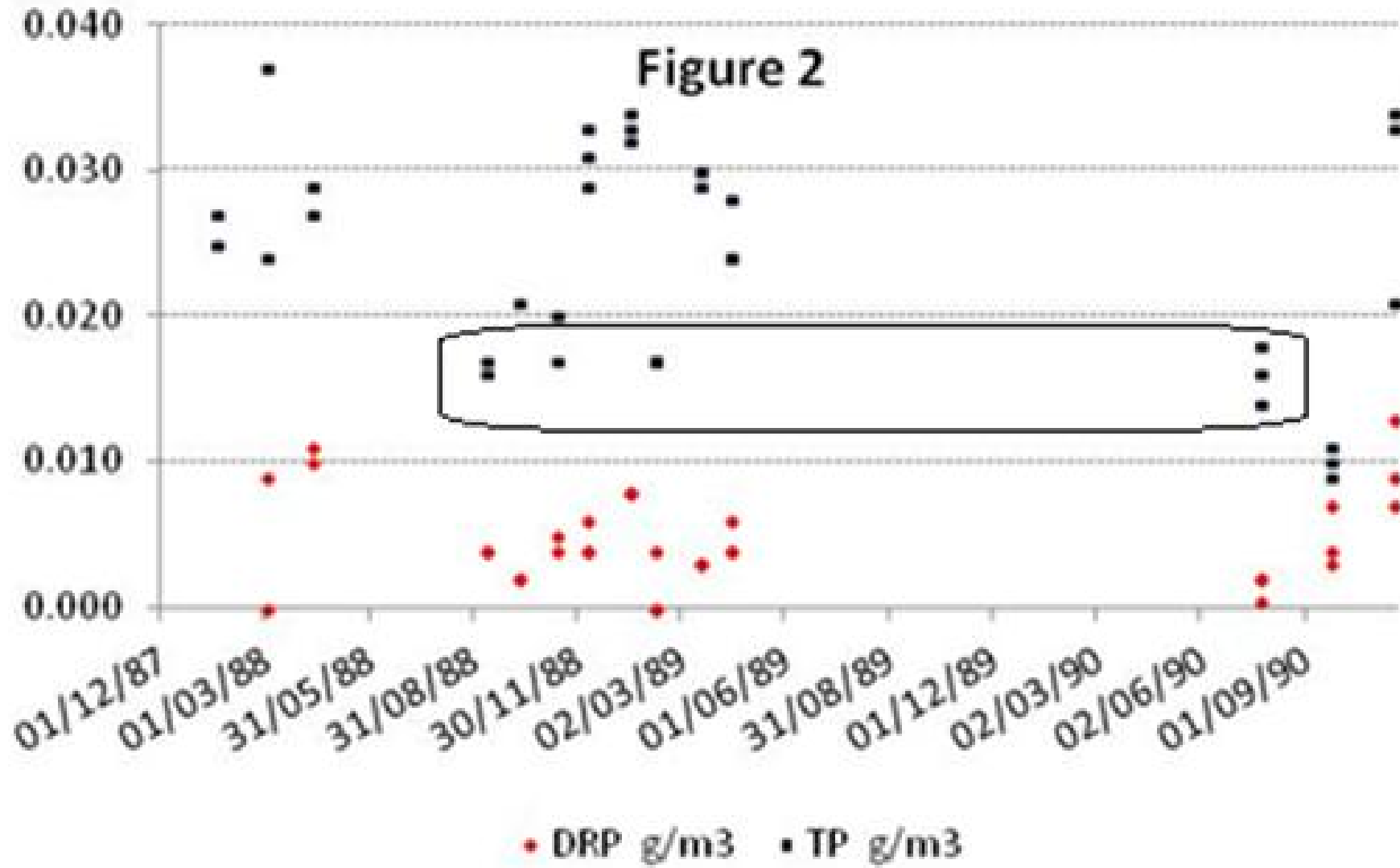
Action	Conversion factors to estimate nutrient load reduction			Recommended method		
Alum (liquid alum - 4% Al)	Estimate Lake Rotorua (Al:P) (5:1)	Estimate Lake Okaro 2004 (Al:P) 7:1, estimate Lake Okaro 2013 Al:P 3:1	R McDowell - 5873 mgP/kg liquid alum (approx 7:1 Al:P)	M Gibbs - 45 gP/kg (max) (Al:P 1:1)	Al:P - 5:1	
Melter slag	R McDowell (Rerewhakaaitu slag socks absorbed 2600 mgP/kg.	Theoretical maximum (R McDowell) - 3523 mgP/kg		2600 mg P/kg melter slag		
Aqual P	M Gibbs - 23 gP/kg (max) & fine grain material 12 gP/kg	Estimate (McIntosh) - 2.3 gP/kg			12 gP/kg Aqual P	
De-nitrification (wood chip)	Landcare - Rotoehu trial - removed 2g NO _x /m ³ /d	Warneke & Schipper - pine wood chip - 1.3 g NO _x /m ³ /d			2 g NO _x / kg wood chip	
Floating wetlands	Mesocosm trial: 638-762 mgN/m ² /d, 54 mgP/m ² /d	Tank trial : 157-239 mgN/m ² /d, 2.3-5.4	Opus: 714 kgN/ha and 13 kgP/ha	714 kgN/ha and 13 kgP/ha		
Constructed wetlands	NIWA - 146 - 597 kgN/yr, 30 - 302 kgP/yr		Opus: 368 kgN/ha and 11 kgP/ha	368 kgN/ha and 11 kgP/ha		
Hornwort harvesting	4% wet wt - dry matter; 3% dw Nitrogen, 0.4% dw Phosphorus.				4% dry matter; 3% dw Nitrogen, 0.4% dw	
Diversion wall	Action Plan: 180 tN/yr, 15 tP/yr				180 tN/yr, 15 tP/yr	
Riparian protection	Overseer				Overseer	
Detainment bunds	Current research					
Land use change	Overseer				Overseer	
Septic tank diversion (reticulation) of	BOPRC: 10 gN/p/d, N:P - 10:1 (3.65 kgN/ p/yr) (HEU 2.8 persons)	S Park: 9.56 kg N/HEU (household)			3.65 kgN/p/yr, N:P - 10:1 (HEU for Rotorua)	
Zeolite	5 - 15 g NH₄-N/kg (max). NIWA report 2 g NH₄-N/m³					
Phoslock						

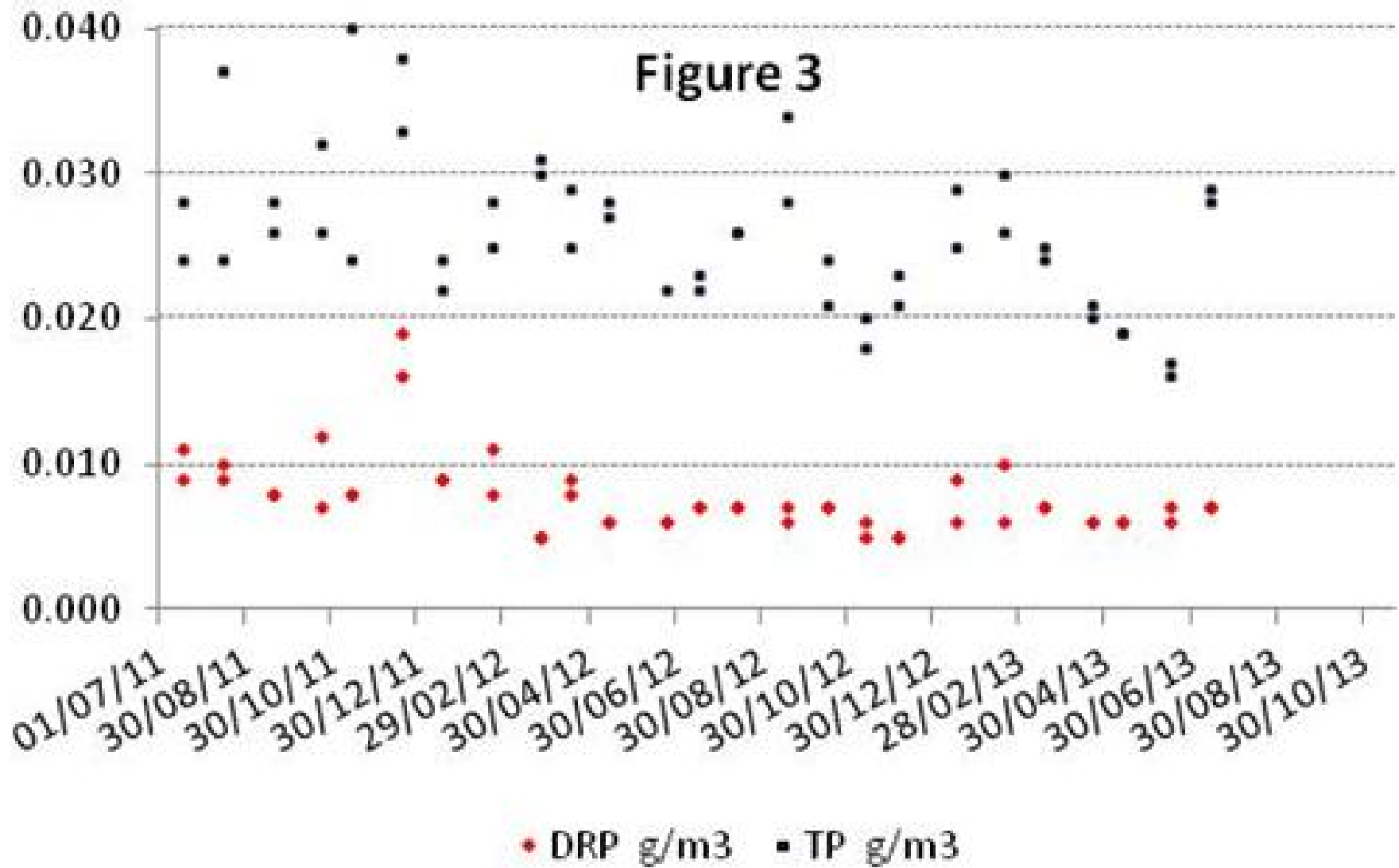
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Hornwort harvesting	4% wet wt - dry matter; 3% dw Nitrogen, 0.4% dw Phosphorus.				4% dry matter; 3% dw Nitrogen, 0.4% dw	
Diversion wall	Action Plan: 180 tN/yr, 15 tP/yr				180 tN/yr, 15 tP/yr	
Riparian protection	Overseer				Overseer	
Detainment bunds	Current research					
Land use change	Overseer				Overseer	
Septic tank diversion (reticulation) of	BOPRC: 10 gN/p/d, N:P - 10:1 (3.65 kgN/ p/yr) (HEU 2.8 persons)	S Park: 9.56 kg N/HEU (household)			3.65 kgN/p/yr, N:P - 10:1 (HEU for Rotorua)	
Zeolite	5 - 15 g NH₄-N/kg (max). NIWA report 2 g NH₄-N/m³					
Phoslock	11 gP/kg Phoslock (Company website)					

Long Term Phosphorus record Lake Rotoehu

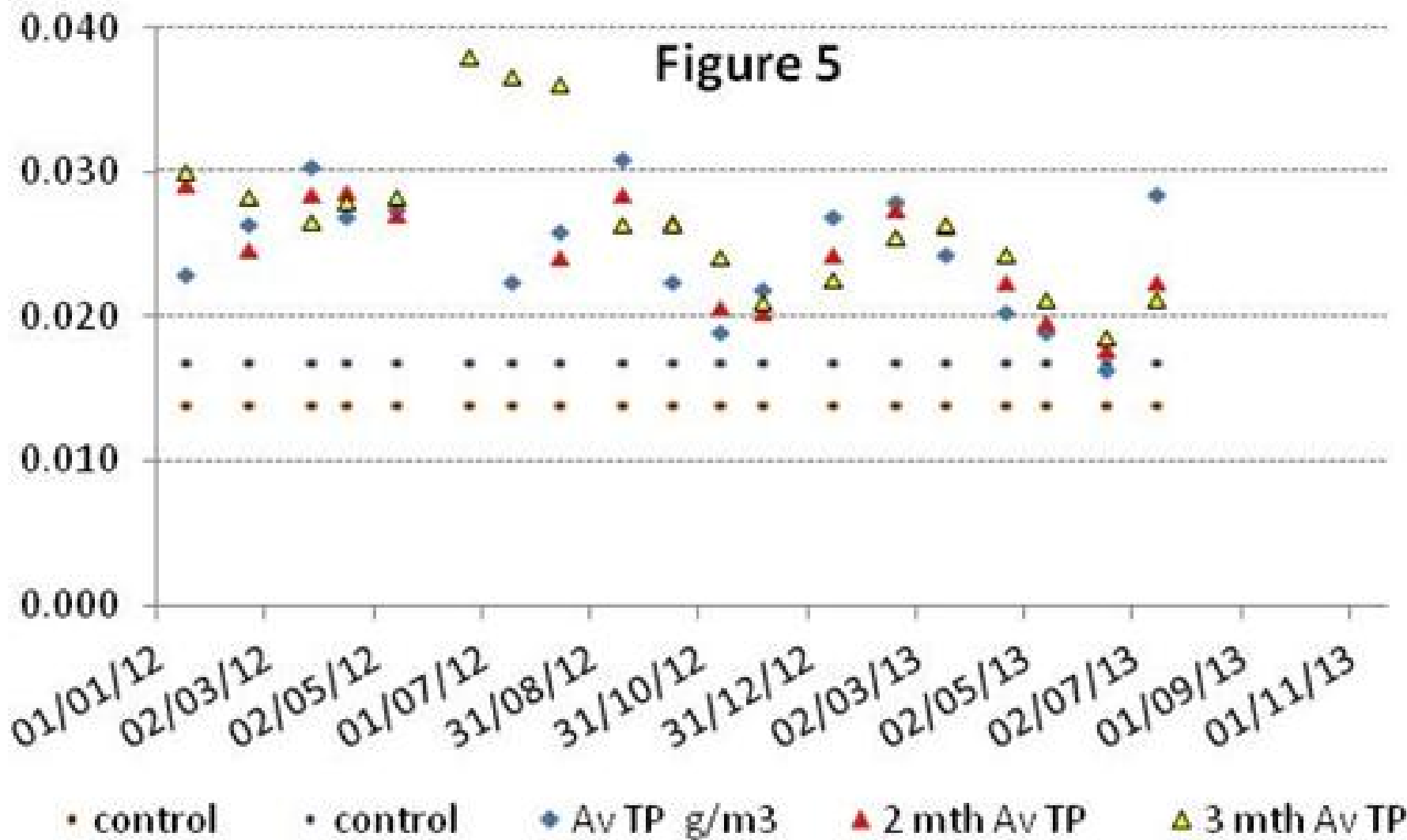


Phosphorus concentration – Lake Rotoehu

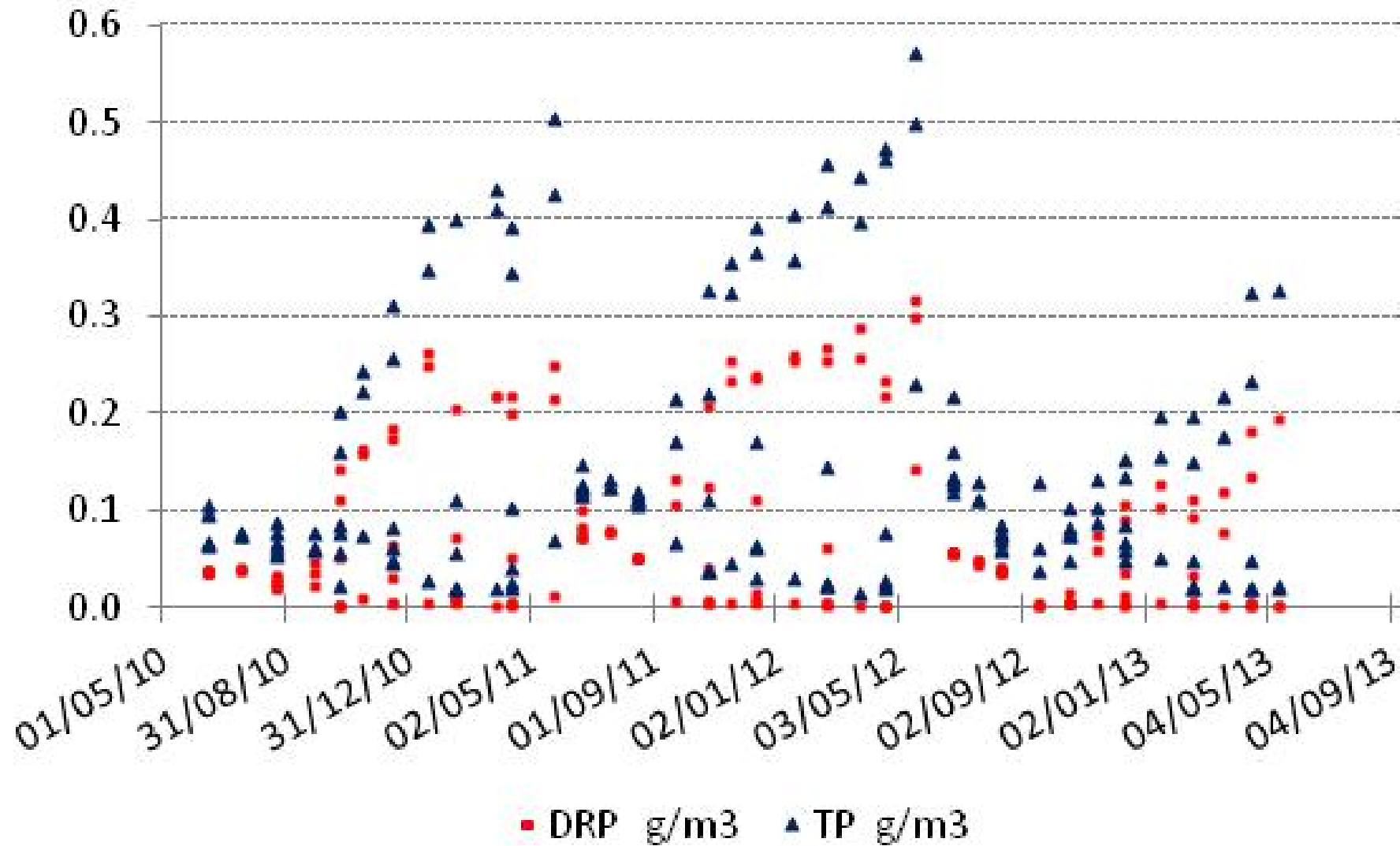




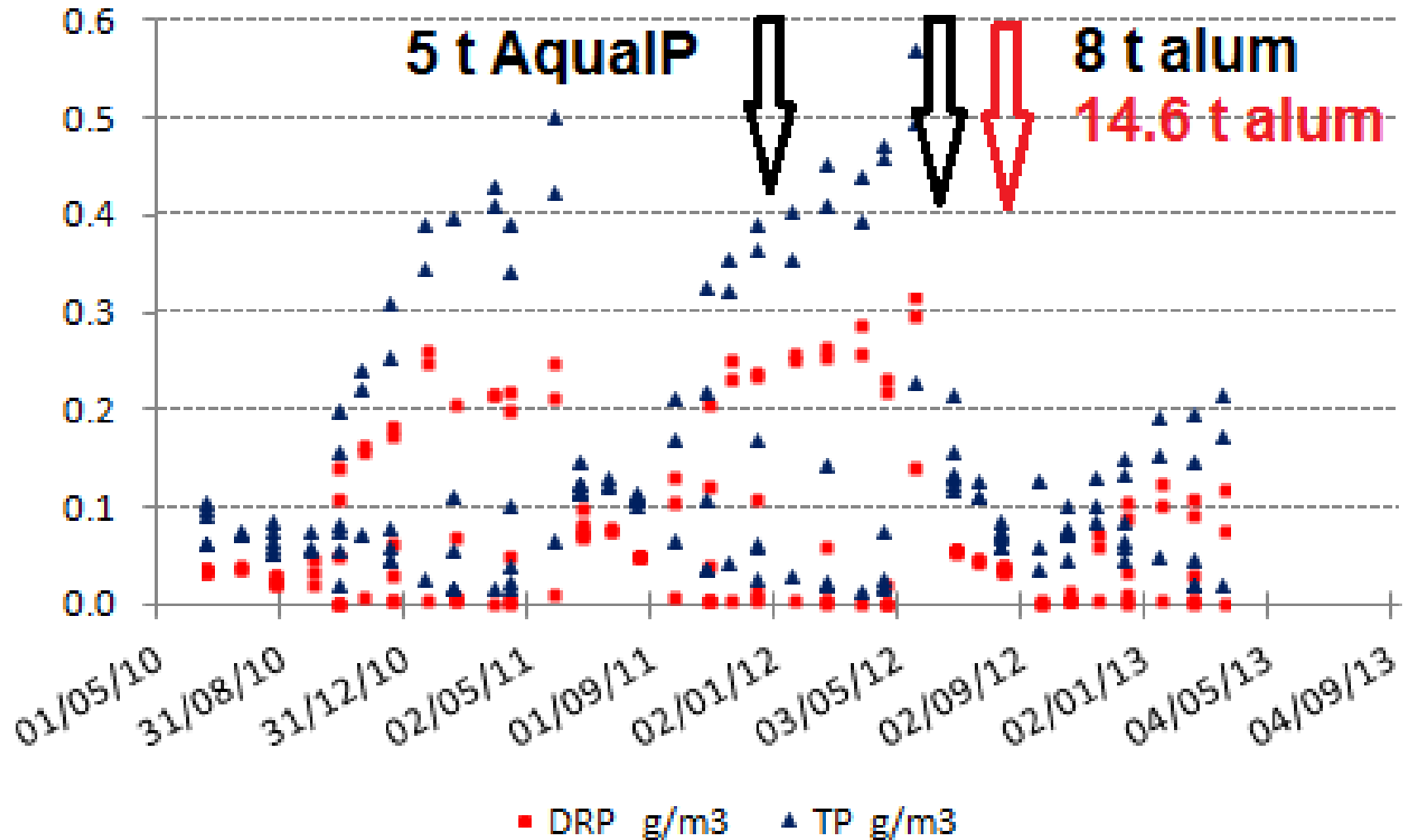
Control Chart with control zone 0.014 – 0.017 g/m³



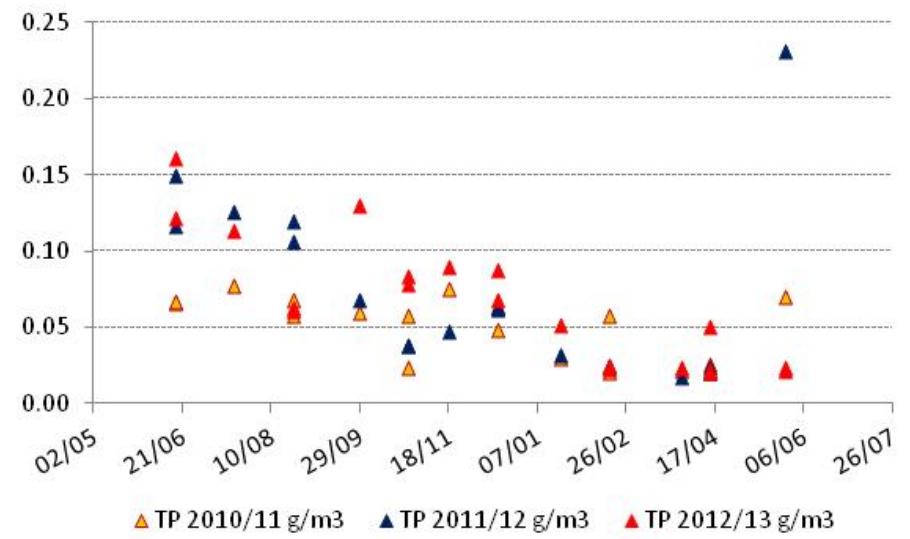
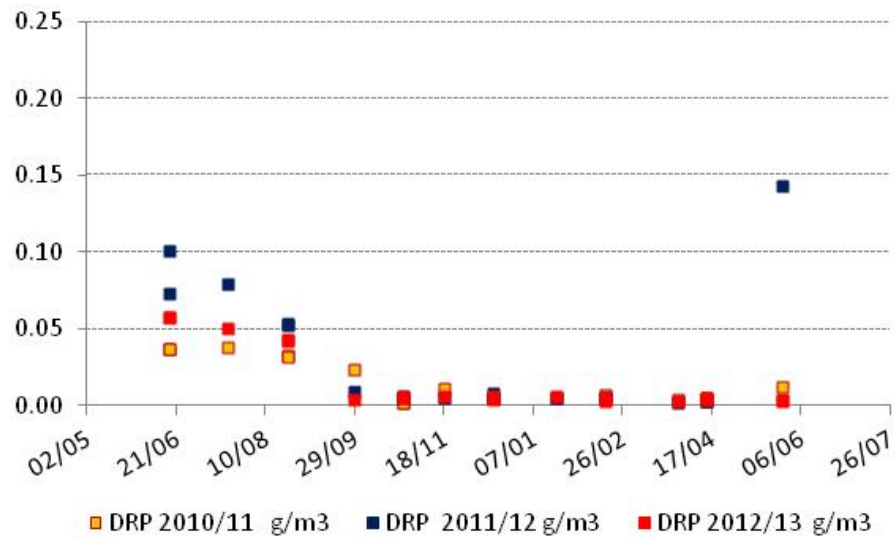
DRP & TP in the epilimnion and hypolimnion of Lake Okaro



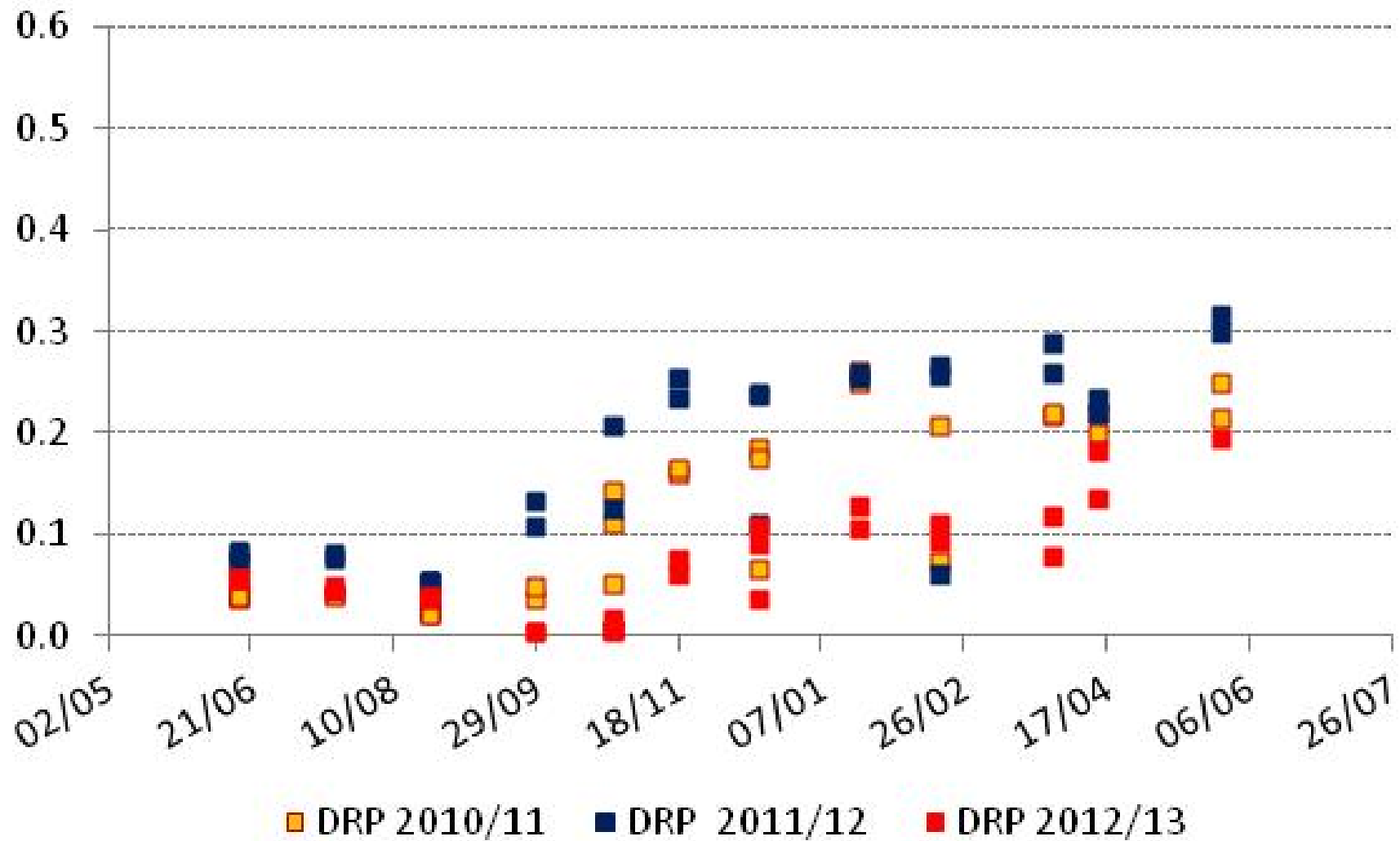
Lake Okaro treatments



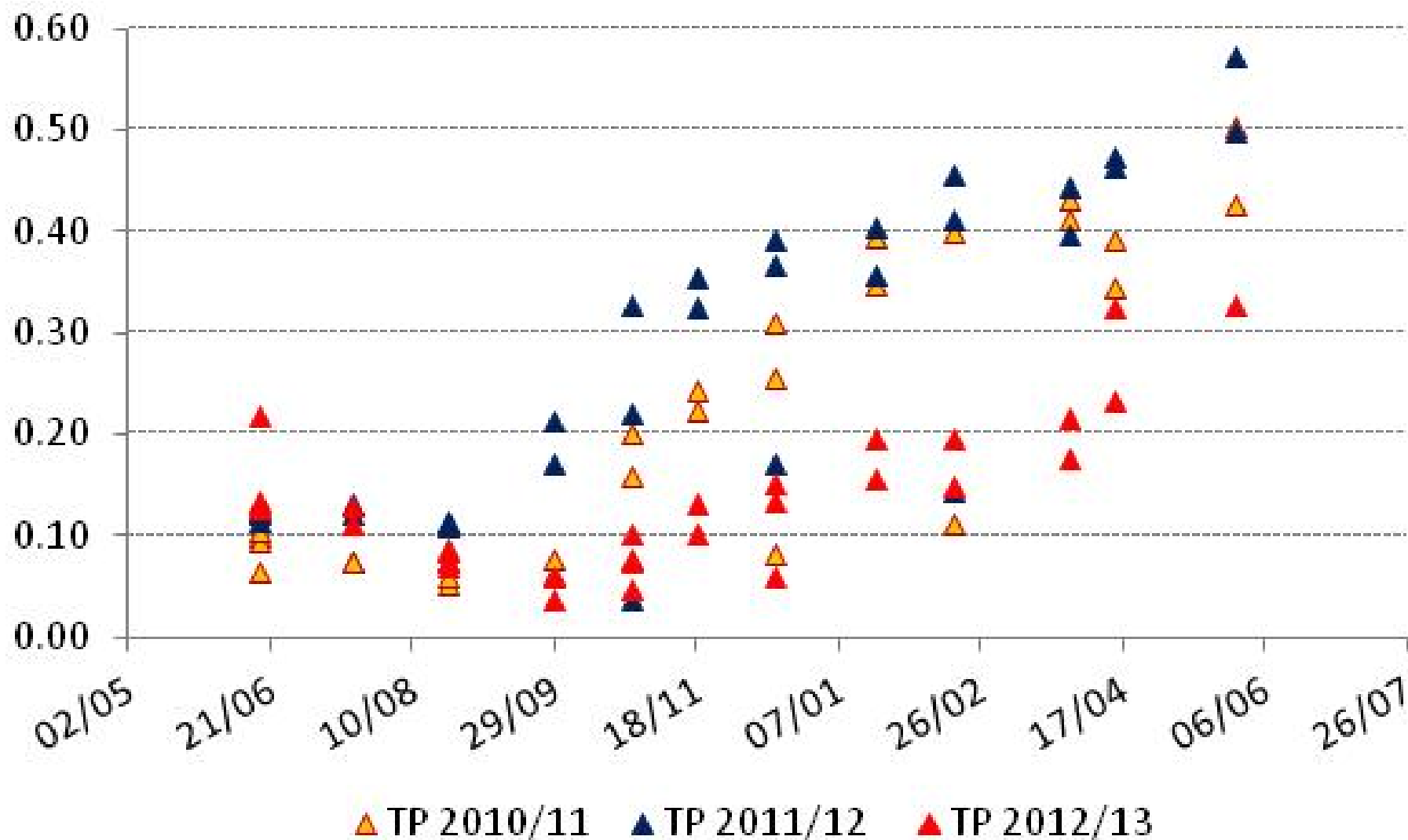
Lake Okaro epilimnion

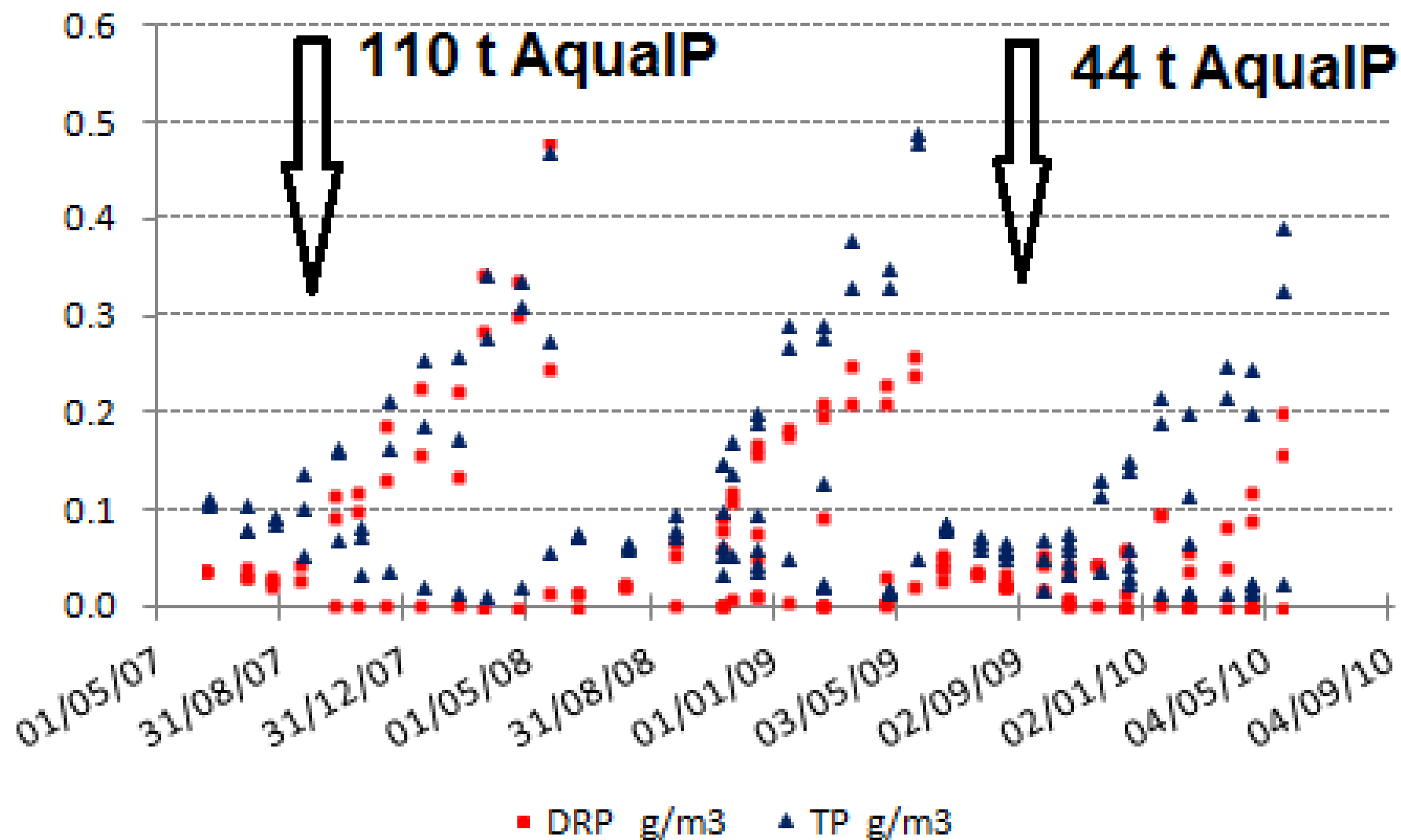


DRP g/m³ in the hypolimnion of Lake Okaro



TP g/m³ in the hypolimnion of Lake Okaro





Okaro Alum Treatment 2013

- 15 tonne alum over spring 2013
- Added in 3 doses
- Targeting post-rainfall
- Cease once pH > 8.5
- Phosphorus in the stream appears to be the principal source controlling algal abundance in summer
- Additional source epilimnion sediment release at high pH.
- Examine, continuous trickle release of alum into the lake at the stream mouth (under current consent).