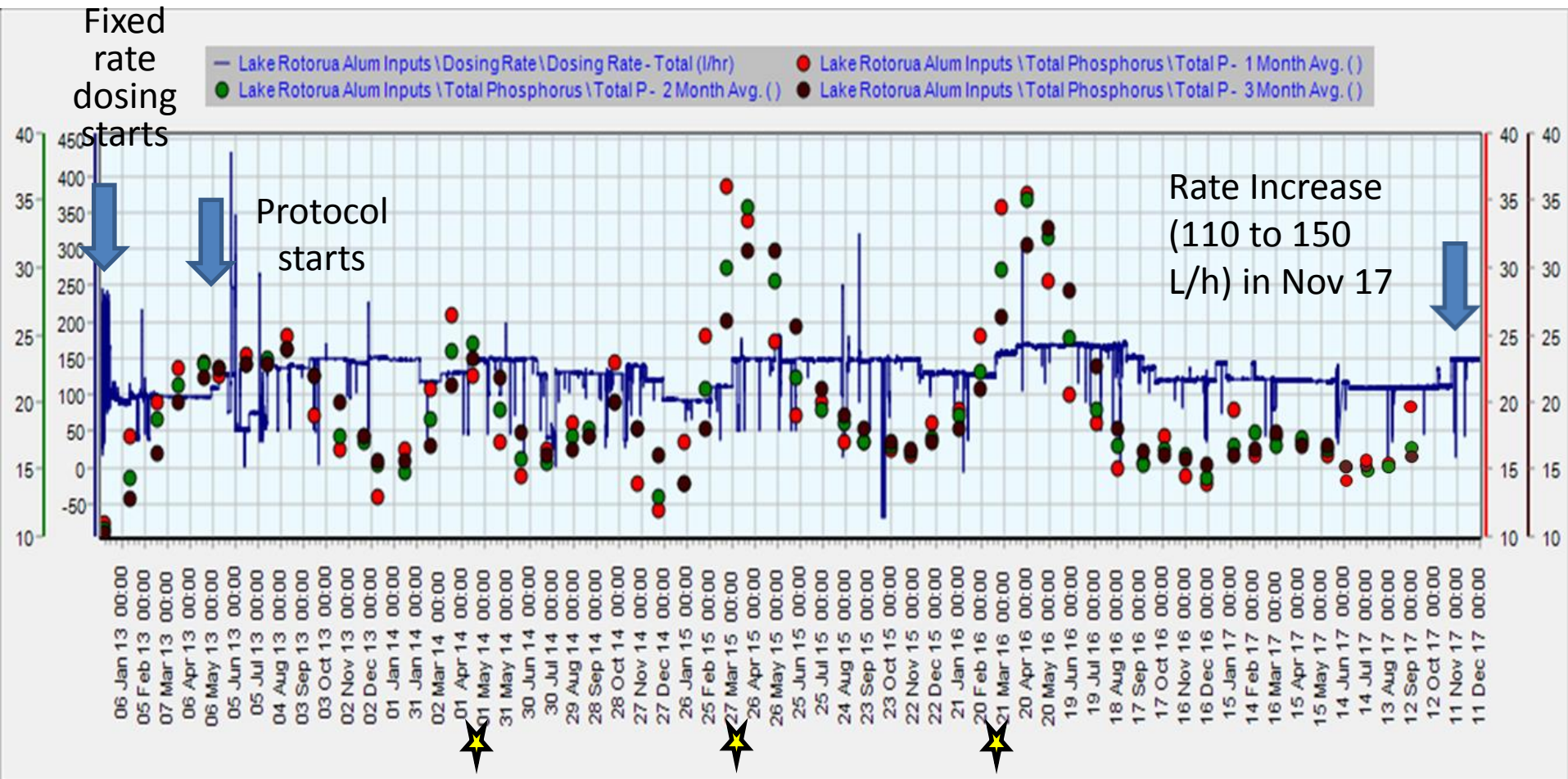


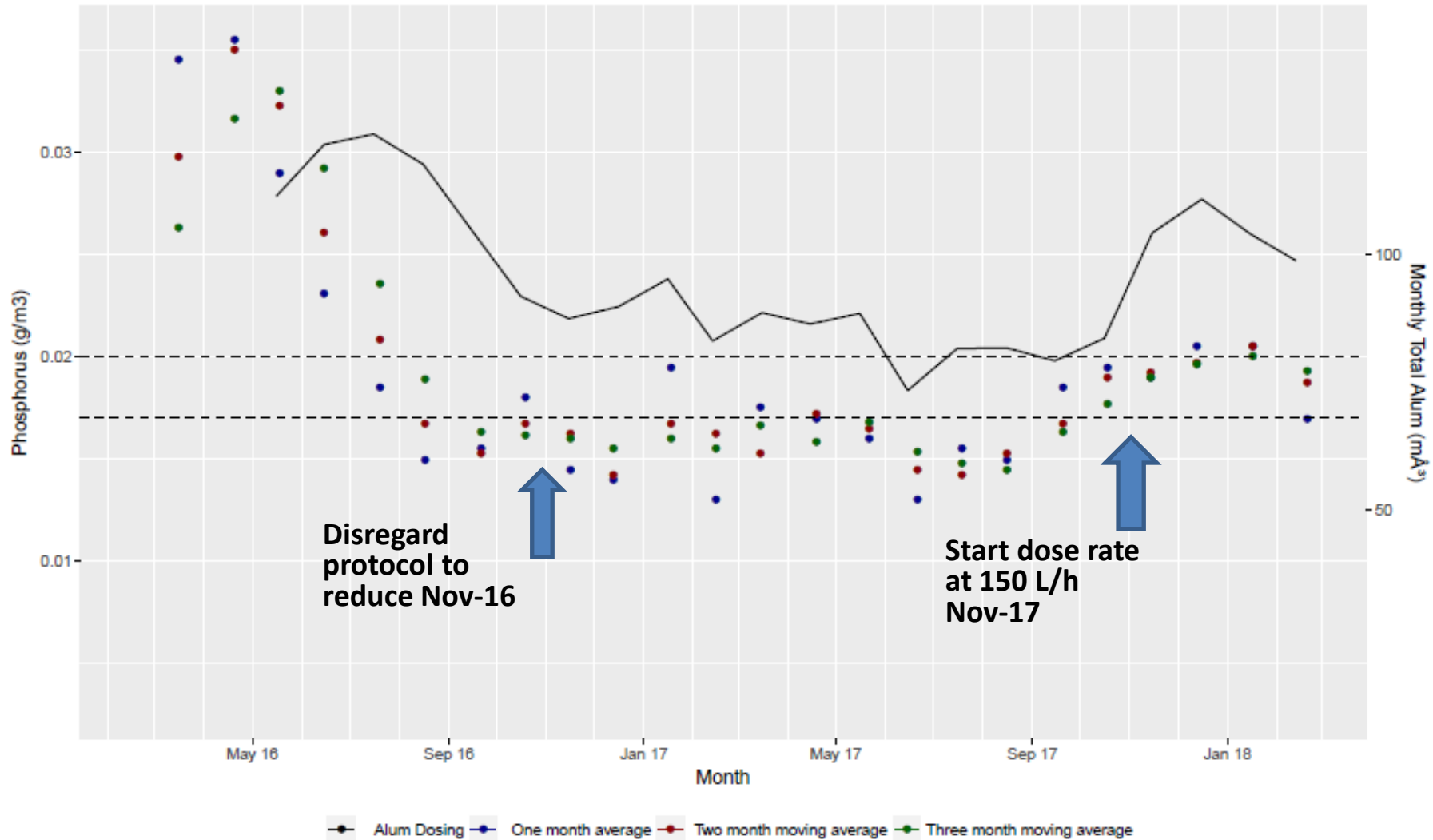
Alum Plant Update

May 2018

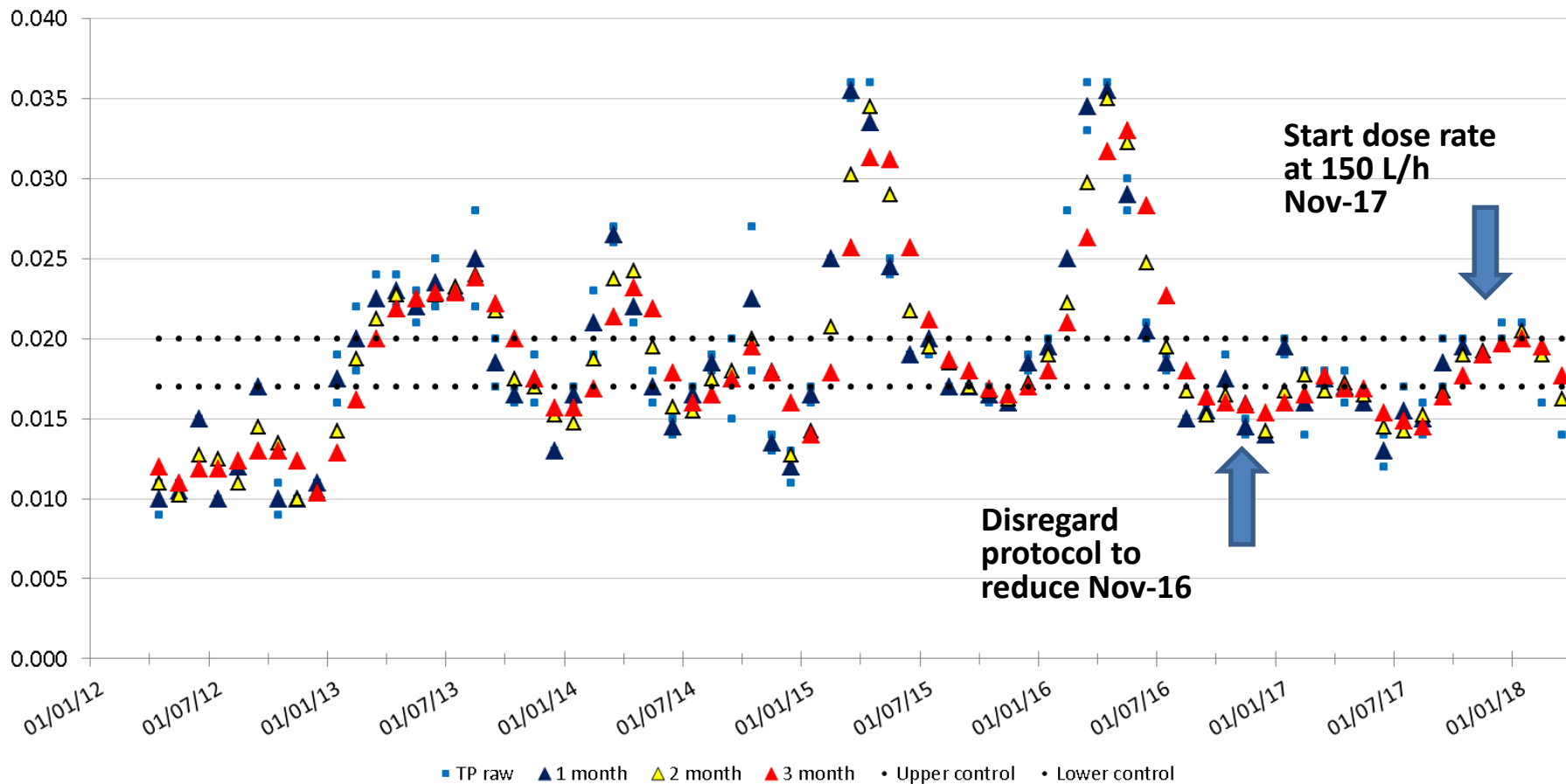
Historic up to Dec 17 – dosing rate and TP concentrations Lake Rotorua



Total Monthly alum dosed (m³) vs TP concentrations Lake Rotorua



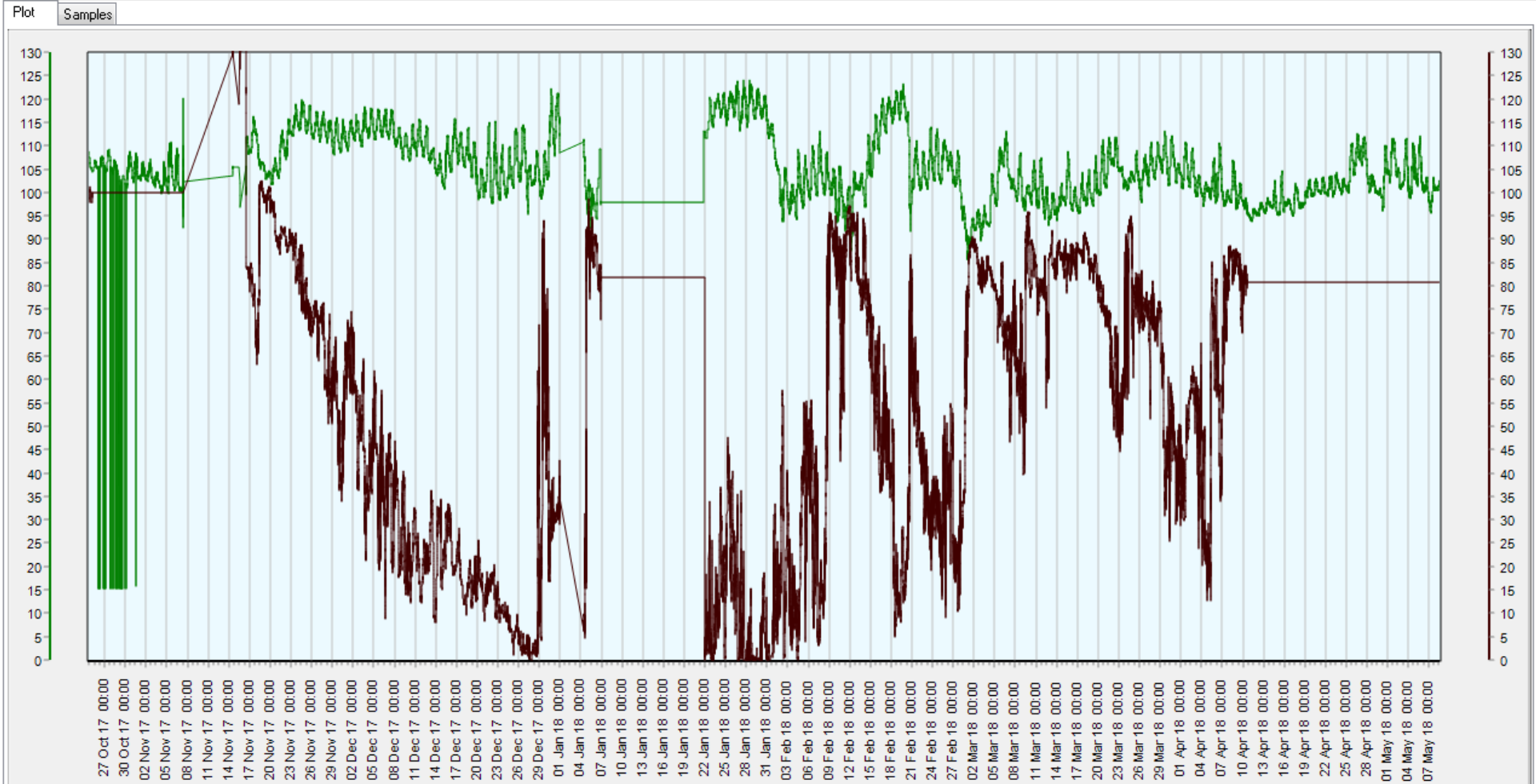
April 12 to current- Rotorua P concentrations vs control target



✓ Lake Rotorua Buoy \ DO Sat (0.5m) Raw Plot Period 8/05/2018 12:10:00 p 102.45 %

✓ Lake Rotorua Buoy \ DO Sat (20m) Raw Plot Period 8/05/2018 12:10:00 p 80.89 %

24/10/201 12:10:00 p.m. Fetch Data 8/05/201 12:10:00 p.m.



As a summary for Lake Rotorua:

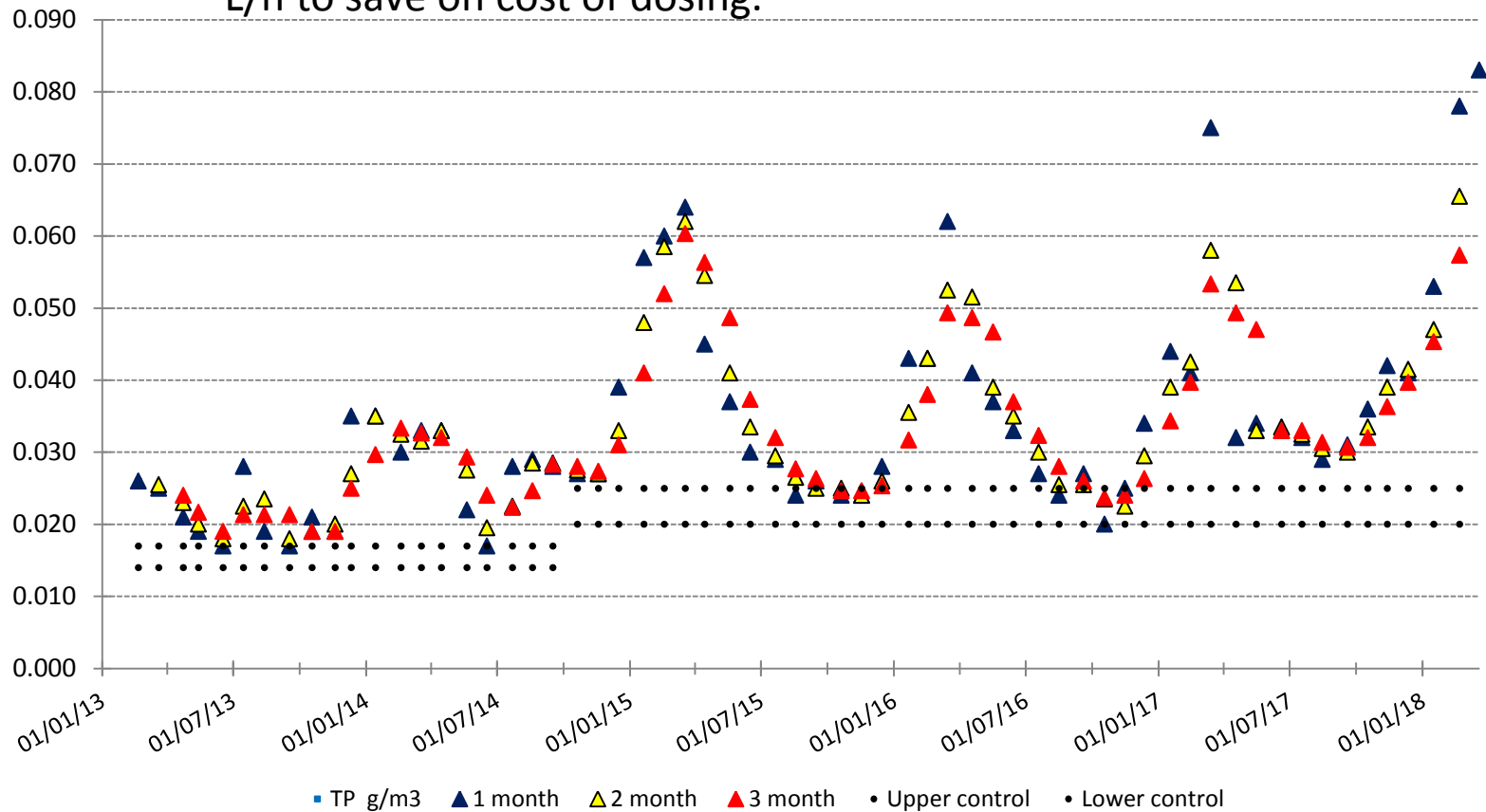
- December results would have increased dosing rate by 10 L/h to 160 L/h,
- Same for January results so dosing rate would have gone up to 170 L/h,
- February would have maintained the dosing rate at 170 L/h,
- March TP levels for 1 monthly and 2 monthly fell below < 0.017 mg/L so dose rate would have decreased to 150 L/h,
- Dose rate reduced to 130 L/h on the 4-5-18

Lake Rotorua P-locking Control Protocol

	Control Chart	Alum Dose Rate	Cumulative Alum Dose Rate	Explanation
Increase	Monthly average TP > 0.020 g/m ³	plus 10L/hr	plus 10L/hr	Use control chart in next tab and look at 1 month data
	Two monthly average TP > 0.020 g/m ³	plus 10L/hr	plus 20L/hr	Use control chart in next tab and look at 2 month data
	Three monthly average TP > 0.020 g/m ³	plus 10L/hr	plus 30L/hr	Use control chart in next tab and look at 3 month data
	TP trending upwards or static and the 3 statistics above TP > 0.020 g/m ³	plus 10L/hr	plus 40L/hr	This should only be considered if the month after all 3 monthly averages have past the upper control. This means the second consecutive month with all 3 monthly averages above and trending upward would constitute for the additional 10L/h.
Decrease	Monthly average TP < 0.017 g/m ³	reduce by 10L/hr	reduce by 10L/hr	Use control chart in next tab and look at 1 month data
	Two monthly average TP < 0.017 g/m ³	reduce by 10L/hr	reduce by 20L/hr	Use control chart in next tab and look at 2 month data
	Three monthly average TP < 0.017 g/m ³	reduce by 10L/hr	reduce by 30L/hr	Use control chart in next tab and look at 3 month data
	TP trending downward and the 3 statistics below TP < 0.017 g/m ³	reduce by 10L/hr	reduce by 40L/hr	This should only be considered if the month after all 3 monthly averages have fallen below the lower control. This means the second consecutive month with all 3 monthly averages below and trending downward would constitute for the additional 10L/h reduction.
Summer Protocol	Changes to protocol Start at 150L/hr (combined dose)	Occurs when? 1st November		Protocol further solidified at WQTAG on 11 Dec-2017 where it was agreed dosing will start at 150L/hr on 1st Nov.
	Ignore protocols call to reduce dose rate	1st November - 1st April		It was discussed at WQTAG (2016-10-07) that due to the lag time as we approach summer the protocol may call for a reduction in dose rate in Nov-Jan and doesn't call for a dose rate increase until Feb-March. Because of this we may miss opportunities to control phosphorus or be more efficient with the product. It was agreed that if the protocol calls for a reduction in dose rate after Nov we would ignore until April.

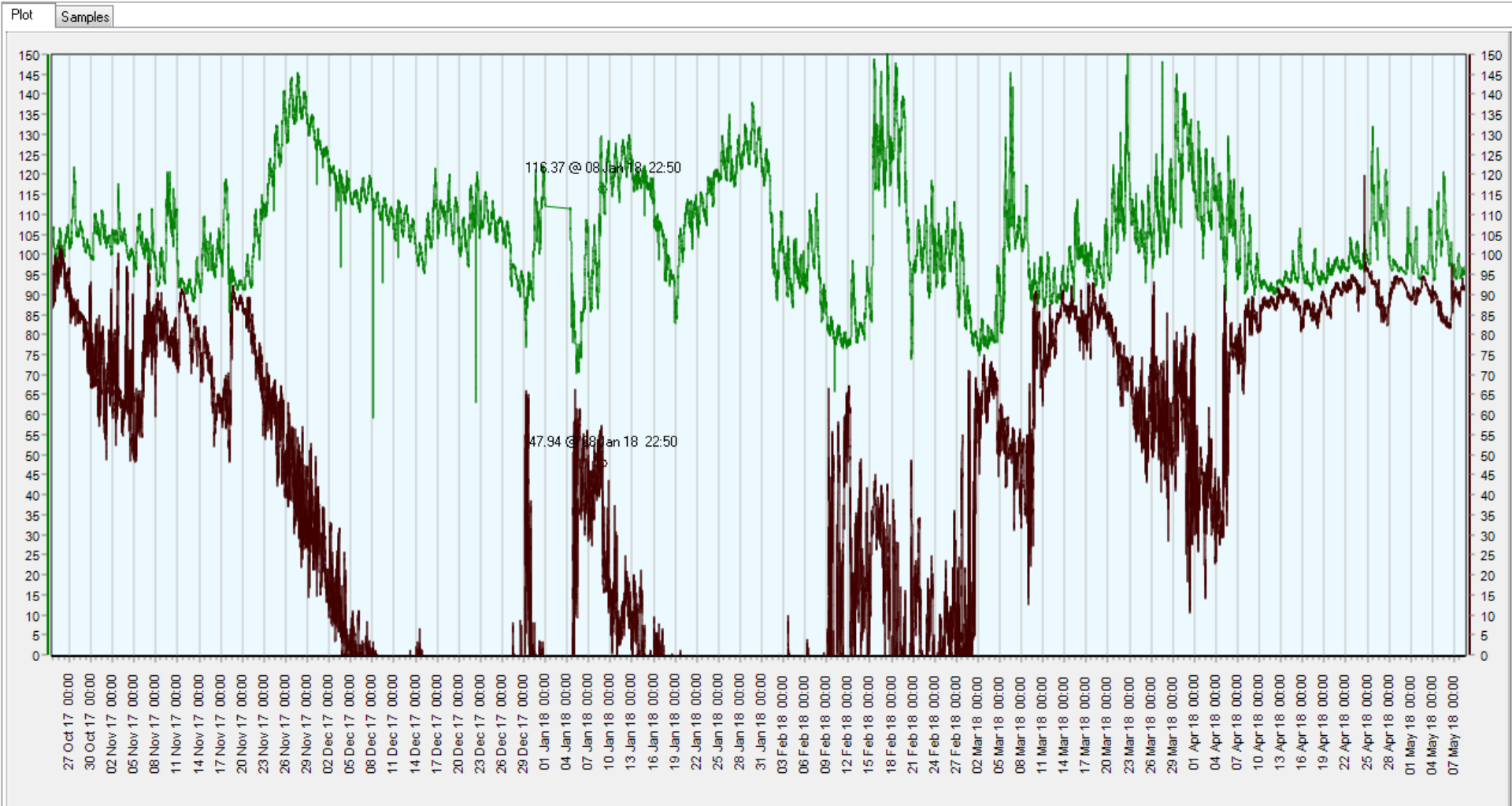
Feb 13 to current- Rotoehu P concentrations vs control target

Dosing rate reduction on the 6th November from 45 L/h to 20 L/h to save on cost of dosing.



✓ Lake Rotoehu Buoy \ DO Sat (0.5m) Raw Plot Period 8/05/2018 1:00:00 p. 97.57 %
✓ Lake Rotoehu Buoy \ DO Sat (10m) Raw Plot Period 8/05/2018 1:00:00 p. 91.88 %

24/10/201 12:10:00 p.m. Fetch Data 8/05/2018 12:10:00 p.m.



As a summary for Lake Rotoehu:

- We decreased dose rates on the 6/11/17 to 20 L/h,
- Latest TP levels are 0.083 mg/L. Highest since 2013,
- TP levels have not been within control band since Nov-2016.