Water Quality Technical Advisory Group Meeting

28 July 2021,

GHA Building Rotorua.

Meeting Notes.

1. Welcome and apologies:

In Attendance: James Dare, Ian Kusabs (on-line), Paul Scholes, Grant Tempero, Chris McBride, Justine Randall, Andy Bruere, Piet Verburg, Max Gibbs, Keith Hamill, Paul White, Dean Meason.

Apologies: Mariana Te Rangi, Joe Butterworth, Craig Dupree, Kit Rutherford, Helen Creagh, Alison Lowe.

2. Actions from last meeting:
    a. Models: Ōkaro model to be discussed in agenda item below,
    b. Tarawera GW report circulated https://www.rotorualakes.co.nz/vdb/document/1812
    c. Lake load report, completed. Continue with Status quo, statement included to acknowledge the GW boundary work, but assessment of catchment impacts undertaken by Paul Scholes. https://www.rotorualakes.co.nz/vdb/document/1814

       Paul: geo-spatial issues need to be resolved at a national level for REC data.
    d. Rotoehu/Rotorua multi-variate analysis. Some misunderstanding in notes re: Paul's intention with the work. Looking into cause and effect on Rotorua WQ. Agreed to discuss with key TAG members at morning tea and bring back solution in Other Items, later.
    e. Review of TLI data has been on hold. Complete annual TLI first. Need some support to complete review work. Questions re purpose of the review. Suggest: Science review of TLI data and targets set 20 years ago, with limited data.

       ACTION: Andy to summarise objectives of the review and circulate for comment. Also, circulate Michelle Lee memo on the setting of the TLI targets.

       JD: Community desired outcomes will be available end of August. Need load reduction targets by year end.

       ACTION: Identify someone to undertake the review assessment.

       Discussion: Target TLI is not = target N and P reduction. Extend project brief on internal lake loads with PV to include target load reductions. Need to assess each TLI component first step.

       ACTION: 3 Step review
            i. Review TLI and components, (Andy and James to discuss),

            ii. Assess internal lake loads (Piet, in contract),

            iii. Load reduction targets for NPS work (Piet & Chris).

Discussion: effect of climate change? Need to consider inter-annual load variability, how important? Prof Hamilton has additional climate change proposal to go to BOPRC planners Zoom meeting.

ACTION: Andy to invite Piet, Grant and Dean to the Zoom. Final brief will come back to TAG.

James indicated that NPS FM has a short time frame for data, end of the year, so there is urgency to getting work started and completed.

3. Update on nano-bubble research: Andy and Max updated the group on the nano-bubble workshop and report from Cawthron. Main points:
    - Small scale applications,
    - 3 components to the technique but not clear of individual efficacy work,
    - Mixed local soils(MLS) seems very large loads needed, unsure of practicality,
    - Uncertainty of components in MLS,
    - Cost of scale up to lakes not clear,
    - Still in research phase and not suitable for full scale lake application.

    ACTION: Andy to circulate key points and get comments from members.

4. Lake Ōkaro Model

Chris presented some key parts of the work. Surprised at the improved lake water clarity in secchi disc results. Catchment changes have not achieved the TLI.

Discussion: Expect SD inverse proportional to Chl-a, however, not clear in data. So what is driving clarity? Possible run-off of fine sediment from land use. Possibly SD is better than expected TLI for most lakes?

Project couples an ensemble of three hydro-dynamic models. What next? Funding needed to scale up nationally. Also need to undertake same modelling for PC 10 Review.

Report to be reviewed in next 2 weeks.

5. Phytoplankton limitation study.

Presentation from Grant T. This is the second round of seasonal studies. Comment that this type of work is limited by the specific species that are present in the lake at the time of sampling. Long period of N limitation.

During trial a storm was encountered that resulted in no nutrient limitation following sampling. By the end of May day length too short- not much response. Lake co-limited and then N-limited during sample timing.

Comment that N reductions are still appropriate. Piet V has paper in draft looking at nutrient limitation on 7 lakes. More P than N limitation. Commented that there can be issues with growth experiments and questioned applicability.

ACTION: Piet to send paper for circulation to group.

6. Alum dosing

Justine provided update on each of the three lakes alum dosing programme.

Lake Rotorua, may have missed the peak over Covid lockdown (no P sampling, could look at buoy data for that period).

The dose protocol, suggest stick to it and then monitor, as we are unable to accurately predict stratification events and therefore the peak P release which may need to be addressed. Chris commented that alum dose rate does not seem to be the dominant driver.

Justine commented that we increased from monthly to weekly P monitoring in 2016, could have missed peaks previously.

Lake Rotoehu: ACTION keep dosing at 10L/hr to address stream P, and work with Max to develop in-lake dosing protocol.

Lake Inflow data: Rotoehu. James presented data for the monthly sampling. Sampling compromise between data needs and cost/resource use**.**

ACTION: Cut down monitoring of inflows to quarterly except keep Waitangi Soda stream at monthly, James to action.

ACTION: James to review stream flow and nutrient correlation.

James made comment that he would like to understand the need/purpose for continued monitoring.

Lake Okaro P-locking.

Justine presented data. Commented that algal bloom soon after dosing but had subsided. Current dosing plan seems to be effective.

7. Weed harvesting Lake Rotoehu.

Justine presented weed harvest initial calculations for 2021 harvest. Undertaken in April and May 2021. Calculation removed 700t weed, measured by each truck being weighed. Questioned previous calculations where 2,500 to 3,000 t being removed.

This equates to 188kg P and 1352 kg N removal.

Comment: 188 kg P is equivalent to about 150 to 200 Ha of land retirement, or about ½ Soda Springs DRP removal.

Justine to reconfirm removal and compare with historic removals on equivalent basis.

8. PC 10 Science review.

Science Review is required in 2022. Previous review made 48 recommendations which are in summary report. These have been prioritised down to 24 in the Rotorua Lakes Science Plan. Some priorities were set low as it was expected the work would be completed in the programme by 2022.

ACTION: set up zoom meeting for initial review group, discuss process and steps in next review at separate workshop.

9. Other items:

Keith, report on Puarenga alum dosing. Report circulated.

Highlighted:

- Fig 3.1 has d/s and u/s samples, can clearly see when dosing was turned off,
- Fig 3.2 DRP, with the recent alum dosing DRP has not returned to the previous low levels,
- Figs 3.7 concern that TP seems to be increasing at the u/s site. Possible P-loss from land disposal site.
- Can identify the alum dropping off in 2018 in line with dosing being turned off.

ACTION: Andy to refer to Alison Lowe to see if anything known on this from RLC WW disposal site.

Max commented that pH<4 in Sulphur Bay, but still binding P. Not releasing, seems to be stably bound. Stream pH is about 6 units. May need much lower pH to release P, maybe <2?

10. Tarawera ground water boundaries: Paul White.

Paul presented on the Tarawera groundwater boundaries from GNS 2018 report.

Started with outline of how the catchment boundary for Lake Rotorua has been set and the uncertainty calculations around that. He referred back to his 2005 GW work on Rerewhakaaitu identifying the lake has a perched water table.

Outlined how surface boundaries are identified and where these do not coincide with ground water boundaries. Assume 50% of rainfall is going to ground, and use rainfall map to get distribution.

Nicki Kaolin is using this data to develop a catchment water balance and nitrate interactive tool.

11. Additional other items: Paul White.

Paul had started looking at data for Lake Rotorua since last meeting re multi-variate analysis of data sets c.f. lake DO. events. Looking for any possible relationships/drivers. Agreed that it would be important to look at more regular data and would receive the lake buoy data from Chris. He would compare with site 2 data.

ACTION: Paul to look at available data for Lake Rotorua to see if any relationships emerge in relationship to DO events in the lake.