

## Sediment Advisory Group meeting notes

13 August 2015, @University of Waikato

**In attendance:** Paul Scholes, Prof David Hamilton, Dr Max Gibbs, Chris McBride, Niroy Sumeran, John McIntosh, Andy Bruere.

### 1. Notes from last meeting:

- a. Discussion of weed decay rate information for Okawa Bay. Paul stated information from Clive and his work was presented at the March LWQS symposium.

**ACTION 1:** pass information from paper to David for use in modelling weed spray impact on Okawa bay in Rotoiti model. Moritz to carry out modelling in the bay and main body of lake separately. Paul/ David.

- b. Discussion that *Elodea* increases pH significantly, Niroy presented Rotoehu pH from monthly grab samples. pH >9 over Feb/March and dosing will not be locking P at this pH. John suggested increasing weed harvest and to alternate with alum dosing to get more P, and perhaps reduce alum dosing overall. David noted cyanos efficient at utilizing carbon at pH 9+. Advantage over other algae.

Process advised: reduce weed by increased harvest, maybe 2 occasions per year then alum dose directly after harvest.

**ACTION 2:** Change to control weed on 2 occasions per year and reduce overall alum dosing. Alum dosing should resume after the weed harvest is completed. Niroy/Andy.

**ACTION 3:** Add monitoring site at location 6 to get real time pH. Investigate feedback to alum dosing to stop dose if pH rises above 8.5. Niroy.

- c. Discussion on the potential ecological impact of the Rotoehu alum dosing on the receiving area. Suggest it is taken back to WQTAG for advice.

**ACTION 4:** David to get Grant to outline a monitoring program to discuss at TAG. Group suggested goldfish and zooplankton work, noting that goldfish monitoring is being undertaken.

2. Sediment testing for Rotorua and Rotoehu. This is a continuation of the work for Lake Rotorua to support the research around alum dosing. WQTAG has advised continue 3 yearly sampling that has been initiated in Lake Rotorua. No program for Rotoehu has been initiated, so it was advised that it should come into the same program as Rotorua.

**ACTION 5:** Commence the 3 yearly sampling regime for Rotorua and include Rotoehu sampling in the program. David to get a proposal written by Grant Tempero, and present to BOPRC.

**ACTION 6:** Sample locations proposed for Rotoehu to be taken to WQTAG for advice.

3. Sediment Al and P sampling.

John discussed that we are looking for marginal increases in total Al and that we should run sediment tests using a range of analytical techniques to test if they provide any better insights into environmentally relevant changes in Al from dosing. There was a discussion that we could sample the “accumulation” zones.

**ACTION 7:** David to discuss with Adam Hartland / Grant Tempero to see if some samples can be tested using different techniques and what that might reveal regarding the source of alum.

4. Lake Ōkaro.

Lake Ōkaro has been at its target TLI for the last two seasons, at 4.5. Paul presented information that indicated a change in pH and possibly due to lower cyano numbers. Clarity is recently getting to as much as 7 m.

**ACTION 8:** Niroy to collate all alum and Aqual-P dosing dates and loads.

It was discussed that we should dose after large rainfall events to target the P from land sources. Consider setting trigger based on analysis of large events from past 10 years. Discussion around whether we need to target sediment P vs catchment P.

**ACTION 9:** Surface application of Al during September at 5 t dose. Niroy to plan. The agreed aim was to dose before pH rises due to cyano activity and lower chances of cyano dominance by reducing in-lake P levels. Agreed this strategy has worked and will lead to re-setting the lake so annual algae carbon loads deposited on lake bed are reducing → positive feedback loop on sediment P releases. Idea is to target P in thin surface mixed layer immediately after onset of stratification.

5. Aeration Reports for Rotoehu

Two reports under review. Outcome is that the 14/15 aeration was more effective. The natural drivers of lake mixing and stratification are more dominant than we could influence with the trial machinery.

Comment that this is similar to the machine used in Lake Tutira in the 1970s. Report should be available on that work (author Laurel Tierney, possibly through HBRC). Comment that energy requirements / costs may have been too high to continue.

Main issue in Rotoehu is the shallow nature of the lake, difficult to get cold water returning to the machine location to provide on-going and effective mixing. This is less challenging in a reservoir with morphometry more like a deep cone.

David made comment that surface mixing can be used to get control on cyanos.

6. Sediment anoxia in Lake Rotorua.

Max discussed proposal to undertake sediment anoxia work in Lake Rotorua. This was requested at WQTAG to identify the impact of alum on lake sediments, in effect have we had any influence on P releases with alum?

Discussion on lake circulation and the fate of alum from Puarenga, David showed the modelled distribution from Puarenga location (used to demonstrate possible sewage discharge from that location).

Proposed to repeat David Burger in-situ benthic chamber trials, to measure the rate of release of P, oxygen consumption, effect of adding dithionate, determine P efflux values, and compare with 2002 and Burger 2007 results. Testing would help to determine if alum could affect efflux rates.

Max suggested using lab cores and benthic chambers. Location of testing in areas of alum deposition, eg, in the southern weed beds and prior to the Ōhau Channel discharge area.

Suggested that Max checks out the TOC info from Dennis Trolle's sediment cores.

**ACTION 10:** Max to bring proposal back to WQTAG at next meeting for support.

#### 7. Ca effect for P control and weed control.

This proposal was brought to the sediment group at last meeting.

Suggested that a trial should be undertaken to test effect on weed control. David suggested a student project focussing on Lake Oranga and/or Okawa Bay.

Info on products:

- Slaked Lime can cause pH shift in sediment ( $\text{Ca}(\text{OH})_2$ )
- Precipitated Lime  $\text{CaCO}_3$  is less effective in sediments.

Was also suggested that lime may prevent germination of seeds (*Potamogeton* turions) in the sediments. Good control for invasives, but could have native plant issues.

**ACTION 11:** David to initiate trial work with a student. Possible mesocosms or quadrant areas in Oranga and /or Okawa Bay.

Max raised possible use of polyacrylamide for P locking. Has been discussing with John Paterson the use of polyacrylamide for critical P sources on farm.

**ACTION 12:** Max to circulate info on polyacrylamide to the group.

#### 8. Nanobubble and local soils work

David following up with Gang to get final report. Need to look into the costs of product and application to see if commercially viable. BOPRC interested in collaboration and would like to make sure Waikato is linking with our work. Andy has already made approaches to Canterbury and they are interested in a proposal.

David reported that John Quinn is reporting to the Waikato shallow Lakes group on 19<sup>th</sup> August and aiming for some trial work on nanobubble modified local soils in the Waikato.

BOPRC would like to continue to have an involvement in this project and have already initiated discussions with Canterbury.

Note: After meeting, Andy has spoken to John Quinn and indicated that BOPRC would like to remain involved in any collaboration around nanobubbles, and that BOPRC actually funded the trial work by Gang done at the UoW.

**ACTION 13:** David to follow up final report from Gang to BOPRC.

Note: Action 7 was requesting info on dosing of Lake Ōkaro. The following is what was dosed until Jan 2014.

- |                   |                       |                  |
|-------------------|-----------------------|------------------|
| 1: 10 tonne alum, | 2: 112 tonne Aqual P, | 3: 44 t Aqual P, |
| 4: 5 t Aqual P,   | 5: 22.6 t alum,       | 6: 10 t alum     |

