

Notes from the water quality TAG meeting 9 November 06

- to add to the meeting minutes/other notes/useful info

Present:

Paul Dell, John McIntosh, Andrew Wharton, David Hamilton, Kit, Max Gibbs, Peter Dine, Paul White.

1 Review previous Minutes/Action Sheet

- David Rowe presented fish work to Environment Bay of Plenty Council – great work.
- Pete – Hamurana mudcrete samples to go to Auckland - to form a bund.
- David – The Rotorua lakebed is mostly silica, very fine and very porous. This could affect any flocculation
- Max – lake temperature and fishery work is more complex than expected – still to do.
- The selling point for the Hamurana wall (if it's done) will be environmental enhancement.
- John McIntosh – cow numbers through time can be tracked in consent database. But new consents can't show dairy conversions.
- Penny – Number of properties falling within the nutrient benchmark area = 1800 valuation references. About 800 individual farms from those valuation references.
- Only 15 Questionnaire One surveys are still to be returned. The Q1 information is needed for Q2. Q1 contains 3 maps, 1 page Q to confirm: property area, boundary, land use, share farm/lease?, slope, land use conversions.
- Only 1 refusal for Q1.
- Biggest issue – getting software and models right. NPLAS/OVERSEER negotiations to join software together will take place over the next few months.
- Farmers can send in ovp file plus mitigation, or Q2 data. This may be less forthcoming than Q1. Privacy concerns need to be addressed and internal structure to keep data private.
- Greater farmer concern regarding future sustainability policies and how the information will be used for new Rule 11 rules.
- 80/20 rule – only chase up those > 4 ha as those under 4 ha may be covered under a separate rule.

2 Review nutrient budgets

- Stream attenuation of nutrients? Environment Bay of Plenty uses off-farm, versus Waikato using into-lake. Attenuation will be brought in by

Kit's catchment model. Perhaps less attenuation around Rotorua than Taupo because most water flows through groundwater not streams. 50 kg/ha/yr is still low, allows for a loss of '10' in attenuation for dairy farms. Environment Waikato are using figures as low as 12 to 60. Need to allow for lag time. Framework for this is needed.

- David – need to make clear to farmers: you may only have 10 kg-N going in now, but 50 kg-N eventually – delayed by old age groundwater.
- Paul White - Label it 'the ultimate load', 'nutrient sources (not budget) to Lake Rotorua'. Budget is wrong word – inputs only – kg/ha.
- Warwick – prefer 'land use yields'.
- Paul – prefer 'long term nutrient inputs'.
- John – '... from the catchment'.
- Paul W – groundwater project to be complete end of November. Two reports – technical one will include future N load for water inputs, and a summary report.
- Paul D – will use your (Paul White's) work to look at rules, communications.
- Warwick – lake behaviour responding to internal cycling – address in statement discussion later on.
- David H – Why is dairy P lower than sheep/beef P? – because of topography mostly.

3 Nitrogen use by algae

Warwick went through report. Algal input is the right order of magnitude. There is N cycling at micro and macro level. Productivity – much larger input from sediments than input from catchment.

- As algae dies, releases N during death, fall to bed and decomposition.
- "Nutrient inputs prime an internal pump" – now dominating the available nutrients in lake.
- Harvesting algae = mop up huge amounts of N! But very difficult.
- Rotoiti algal productivity is massive - 600 m³/sec – like the Rangitaiki in a major flood - because of the rapid rate of phytoplankton growth.
- Warwick – 1.3 million wet tonnes of biomass produced in lake p.a. Sediment release (net?) to lake is 3x from catchment. 'Roughly' – 1/10 of N is P.
- David – aligns with models. 40 from catchment, 20 settles out, 400 drops out by algae death, 380 released to the water column, 20 leaves via Ohau Channel. Most P is uptaken, not available in water column.
- P can be released into water. Oxygenation can reduce this.
- 24 TP and 308 TN from 2 release events – huge build-up, enormous inertia – not much change in N and P cycling now.
- David – Balance between N/P limitation is delicate. Can vary either, but mostly in balance.

- N: 3,600 to P: 380, total internal cycling in lake!
- Max – new report of N in rainfall on website.
- Paul W (measurements at Kaharoa) – one month's worth of rainfall data collected now, to be analysed.
- Paul – nutrient 'budget' to be revised, taking out internal sediment cycling, to base of table. Explained further in TAG position statement.
- Max – if lake 'turns over' 4x per year, an annual turnover ('800 T/yr, recycled 4x') is misleading, more like 390 in/out per turnover..
- Warwick – p.a., load is 3,600 TN – 360 TN could be recycled up to 10x per year approximately.
- "Amount of nutrient made available from the sediments in the lake to drive lake process is 360 TN and 36 TP".
- David – I need to get the model to confirm these figures.
- Max – means 2.5x of the load is coming from catchment – gives us hope!
- .

4 Dredging Report – Review

David – dredging would need to go to solid depth to get through loose detritus – gas issue.

- Suggested disposal (will be critical) options scary (turn acidic, sulphur in profile).
- Sheer practicality to dredge 30 km² an issue also.
- Paul – unless economically viable and can deal with disposal, it's not a goer.
- Report needs tidying up – recommendations to change. Perhaps a Waikato University student could do this?
- David – Need to be very careful that dredging doesn't expose extra P further down from Tarawera eruption. Could take 10, 20, 50 cm of sediment cores and expose to water, measure releases or take it out, let air-dry = leachage out/test. – to find out where the high P concentrations are.
- Also need to work out depth to go to, to be effective
- Okechobee – dredging work put back 20 years because of the hurricane.
- Paul W – report's pre-conditions are good, show a 10 year timeframe. Take out 'are underway'. Dredging option to sit there, with the other options.
- Paul D – put report inside the sediment think – tank. More evaluation needed before any field trials happen. Where to put sediment from Te Weta Bay? Perhaps behind a bund.
- David – 1km x 1km, 22m deep – scary!
- Paul W – but sill possible for other lakes?

- **Action – TAG members to send report changer to Paul D for tidy up.**
- Paul W – be realistic about timeframes for this. If a private citizen can further this, good luck! Be clear about stepping stone trials – e.g. Chris Hendy trials, student theses, masters study.
- Paul D – we're not doing any Rotoiti sediment coring. Okechobee spent a lot of money, but achieved little. There is a USA political slant in report quotes and comments. Incorporate this into the three year programme.

5 Mussels Report Review

- Paul D – trials in Omapere not in report.
- David – genetic work from Victoria University not in report. Rerewhakaaitu work not in report – needs to be mentioned.
- **Action – Other changes/comments from David to send to Paul D.**
- David – want to simulate effects of mussel biomass into DYRESM/CAEDYM.
- Paul D – is table 2 realistic?
- Recommendations covered in part by Omapere work and Vic research, check with Ngaire's report.
- David – at Rotokakahi, below 16m, mussels disappear. Okaro has none, in Ohau Channel they are abundant – suggests kakahi (mussels?) are dependent on oxygen. Not in anoxic zones.
- Max – could you rejuvenate population by translocating to new location? Part of bio-remediation experiment.
- Max/David – also as eutrophication happens, benthic algae grow and smother mussels.
- John Mc – shells at Ohau Channel and Lake Rotorua are very brittle. Need Calcium too e.g. they're not in Tikitapu.
- Paul W – the report needs a better conclusion, and separate recommendations from it.

6 Weed Harvesting

David – risk that if take out weed beds, algae will grow. Trim 1 metre only, leave it out for fast growth conditions. Use CTD, don't want to cut beneath 10% of TAL. Because Lake Rotoehu is relative shallow lake, makes more sense. Need to make sure it doesn't trigger algal blooms.

- Paul – there will be pressure to spray 60ha of hornwort in the lake = nutrient recycling and blooms? Nutrient loading costs.
- Paul W – should look at reducing water from hornwort to save money. Keep records a key issue to prove it's having an effect.
- Warwick – Percentage of N in lake – wetland?
- Paul – hornwort harvesting may have a synergy to the bigger lakes programme.
- Paul W – rule out weed spraying somehow! Not when lakes are sick.

- Max – if it can be bioreacted, don't have to worry about Arsenic
- Top up with weed from other lakes too? Maybe take to ethanol plant in Reporoa.

7 **Review of Position Statement**

- As sent around.
- Uwe's report on website – is there a more up to date version? (beyond June 06).
- Also query Puarenga b/c the effluent is around 40!
- John McIntosh to search out what we have (metohelp – check).
- Include Rotoiti targets in the position statement and check wording etc. Send changes to TAG members, get their approval.

8 **Oxygenation**, see PowerPoint.

- Stainless Steel - \$150-200,000 for Okaro, plastic is cheaper.
- \$1 million requested from government.
- For Rotoiti and large lakes, how effective are they, costs? How many?
- Use solar panels for electricity?
- Warwick – need scientific data from the 30 etc plants in Germany.
- Paul – how can we model this? Beca's cost - \$45 million – questionable! How is this different?
- If we can do this in Okaro, it's difficult because the lake isn't that deep. Deeper lakes more efficient.
- Max – Point source aerator near draw off tower in Auckland. That can mix and aerate the reservoir lake to > 6 ppm.
- Max – once establish current, there is phenomenal momentum that can distribute the water.
- Paul – how much time in lake needed? Three month – improvement noticed, 8 month, lake came better. After 2.5 years – stopped it, catchment inflow kept come in, stop for 1.5 year, now restart. So once water stops, lake reverts back to former condition.
- David – have three problem lakes, though Rotorua special case. Too shallow too.
- Max – if you keep water levels around 2 ppm, N would still denitrify, while P remains bound.
- Paul D – but would have a low P: N ratio once it was turned off!
- Paul D – what would partnership cost us?

9 **Tikitere Update**

Greg will have report on Tikitere by February. End February, know what it will do to the infrastructure. Six to seven years of use, depending on development of trunk main.

- Pete – Zeolite trials – filtering Tikitere and landfill, add with compost (by Craig Moet) – paper to next Council meeting.
- Advantage to Rotorua District Council if works. Bad on sewage plant too, as ammonium from leachate strips.
- Greg – if treatment at site, may be longer-term option (with pre treatment) to remove contaminants like sediment.
- Pete – Zeolite trial time – will measure leaching of nutrient out of zeolite. Released at rate plant uses it.

10 **Z2 Update**

John McIntosh and Paul met Scion. Scion producing significant amounts of Z2. By March next year could do major trial. Plot trials in Rotorua too?

11 **Sediment Remediation Review**

- See David Hamilton's PowerPoint.
- Paul – three years to December 2009 before major Rotorua sediment work.

21 November Rotorua Lakes Strategy Group meeting. Clive and David H to talk to statement, and sediment treatment area.