Notes from meeting on 435 t N target.

At Waikato University, 10 am 24 July 2014.

Those in attendance were: Prof Hamilton, Andy Bruere, John McIntosh, Chris McBride, Mike Scarsbrook and Clive Howard-Williams (on Skype). Kit Rutherford sent apologies.

The following notes are a brief summary of the meeting.

Andy introduced matters and circulated the two documents from John along with the earlier response from Chris and David.

The meeting was an opportunity to review the 435 t N/yr target for Lake Rotorua, and evaluate if that was still appropriate. Andy suggested that the outcome should be written up into a brief document along with the final modelling report for Lake Rotorua and subject to peer review. This was considered necessary as questions are likely to surface from the community, especially farmers, about how the target was derived, what science supported it and what the socio-economic implications of it were.

It was agreed that the document called “Sustainable Nitrogen Load Target for Lake Rotorua be discussed first and that the second document “Two issues highlighted with the lake model (J McIntosh 20/5/14)” be discussed second if necessary.

John explained Table 7 in the Sustainable Nitrogen Load Target and that the Action Plan had been structured around another table from Rutherford et al. (1989). He explained that some values in the table come from estimates and that with additional measured information available he believed the 1976/77 estimates would provide a closer match to the sustainable N target. He considered the 435 t N/yr as a precautionary estimate that would decrease TLI well below its objective.

In 76/77 the N load was estimated at 558 t N/yr (agreed about 550 T N), much higher than the target. At this point there was considerable discussion as to how the 435 t N/yr was assessed. Information presented by David also showed that the 76/77 TLI was closer to 4.5 and not the target of 4.2.

A point was raised that the data do not take into account time lags in lake processes. David suggested that the lag time may be 1.5 years (lake residence time) multiplied by 3 (time to 95% of equilibrium). Thus lag may be 5 to 7 years.

There was discussion around what is responsible for the TLI improvement in the 2006/7-2014 period. John suggesting the intervening 20 years since sewage was reticulated was a major component, as intimated in Rutherford work of 1989.

UoW presented data on the TLI parameters since 1960s. TLI values were unavailable for much of the 1960s. It was suggested that there is a need to check Fish report which has data from the late 1960s and early 1970s, to see if any more info on lake trophic state can be established.

There was considerable concern raised about the paucity of data from the early years (1960s and 1970s). There was uncertainty about how inputs from septic tanks had been accounted for in the 1976/77 (Hoare) results.

David commented in a review of the TLI data that it is difficult to see clearly how the TLI target of 4.2 has been established including what time period it pertains to.

In discussion it was noted that there appeared to be little point in going back to the community about 1960s water quality as few people in the community would be able to provide good objective evidence of the lake issues at that time. Additional discussion related to the fact that community aspirations are more complex than TLI, i.e., it is possible to meet the long term TLI value but still have algal blooms at various times of the year. The community generally is looking for good clarity and lack of algal blooms.

John raised a point that the Water and Land Plan specifies a TLI standard as well as lack of algal blooms.

Note: added later from John McIntosh: objective 11, TLI, objective 12, absence of algal blooms. They are set up so that long term reviews can assess if the two objectives coincide sufficiently well to meet community expectations

There was discussion around TP levels in the last year. It was suggested that some variations may have been related to sediment releases. However discussion led to agreement that without a review of the top and bottom water column P levels it was not possible to comment on the reasons.

David suggested an approach to Al vs P levels in top and bottom waters. Suggests the Al:P ratio can vary better or worse than the 7:1 that we have accepted (as an average).

There was discussion about the lake P target of 0.02 mg/L. Was it possible that the level in 1960s was closer to 0.03 mg/L?

There was a suggestion that P has decreased since 1991. This trend could be investigated further as it is in a period prior to 2006 when alum dosing started.

John challenged some of the basis for the model, outlined in his paper. Clive and David put that the model is the best tool available to assess the TLI result and to create different scenarios (e.g. to simulate no alum dosing).

It was agreed that the 435 t N/yr is not an absolute N level that will be required to meet the TLI. Some analysis of the error in this value should be carried out.

In finding a resolution to this discussion the following actions were proposed:

1. Investigate what data can be unearthed for the 1960s (e.g. Fish report)(Chris M);
2. Complete the Rotorua model report, covering off a range of different N and P loads (relating to concentrations) to see range to meet TLI; (David)
3. Formulate some questions around the use of the model (Clive)
4. Work with Mike to align the DNZ statement with the outcomes of the discussion (Mike, all)
5. Undertake some error analysis around the modelling work to show what effect that has on the 435 t N (David).

~~5.~~6. *Note added after meeting: Kit R: I am happy to help Chris McBride dig out data from the 1960s – there is a lot of historic data in the NIWA archives. I am also happy to write up the*

derivation of the 435 t target – I was closely involved in setting that number back in the dark ages.

Andy Bruere

25 July 2014

Additional comments received from Clive: Relate the DNZ summary document: The data I am looking at shows that if anything, the TLI increased between 2003 and 2007. Actually there was probably no statistical change but the trend looks upwards. Chris McBride has the full TLI data set plotted out.

Again – the problem with letting N increase is that if you can't control P you are then in real trouble so this becomes a risk evaluation exercise.

You have 'almost' covered this in your point #11 but I think it is prudent to remind people of the increasing risk as N increases and you try to contain P. This was an issue in the Ruataniwha hearings especially as phosphorus control was not mandatory on the Draft plan variation.

Thus your Critical Knowledge Gap of "Will the phytoplankton remain P-limited?" is a key one.