

Commentary on the “Review of information on Lake Rotorua catchment phosphorus losses and reductions” by Park (2017)

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Purpose:

To review material supplied by Park (2017) on “Lake Rotorua catchment phosphorus losses and reductions”, with a view to answering the question supplied by A MacCormick (BOPRC): “Is a decrease in anthropogenic load of 10-15 t P/yr achievable?”

Assumption:

That the report of Tempero et al. (2015) outlining the natural load is accurate, and that the range required of anthropogenic load decrease has no uncertainty associate with it.

Commentary:

Prior work (McDowell 2014) has identified that across 14 catchments nationally, the focus of mitigations in critical source areas (CSAs) decreased P losses by about 40% costing < 2% farm EBIT compared to “blanket” approaches that did not target CSAs and reduced P losses by 48%, but cost 12% of farm EBIT.

Additional work (McDowell et al. 2017) compared the application of mitigations focused on N or P applied on the basis of cost-effectiveness only and showed that substantial reduction in P losses were unlikely if mitigation only focused on N.

However, a second approach considered cost-effectiveness and the ease of implementation when applying mitigations. This “pragmatic” approach advocated for more P-effective mitigations earlier in the schema and resulted in N and P loss mitigation that was quick and cheap.

There are over 22 different strategies available to mitigate P losses. Many of these can be captured by manipulating an Overseer file for a farm block, but not all. More importantly, as Overseer is not spatially explicit, it will not naturally capture P losses associated with CSAs. Overseer files can be set-up to capture CSAs by more CSA-specific blocking, but this is seldom done as blocks typically focus on N-relevant (and somewhat P-irrelevant) management issues such as different stocking rates.

A list of P mitigation strategies was supplied in 2010 and has been updated in various publications; e.g. as published on the Ministry for the Environment's website (McDowell et al. 2013). These mitigations have been applied in numerous publications, nationally and on a regional basis. Using recently developed spatially-explicit software that uses management data from Overseer, (McDowell et al. 2015) showed 20-80% of the anthropogenic load was mitigated; one of the modelled farms was in the Rotorua area. This concurs with the mitigation potential estimated by Park (2017).

However, it should be noted that catchment-wide this will only be achieved with competent and full implementation of the mitigations (viz. good management plans) listed. I note that this requires an assessment of CSAs of a farm, the selection of mitigations suitable for those CSAs and follow-up to ensure that the mitigations have been put in place. This falls within the proposed PC10 provisions for a Nutrient Management Plan and not a Nitrogen Management Plan.

Recommendations:

I recommend the council:

- Develop a set of standards for an acceptable NMP that contains a spatially-explicit farm map, and plan that identifies and deals with CSAs, and that the mitigations are logged, checked and revised on a 5-yearly basis.
- Do not use the mitigations listed by Beef and Lamb NZ (B&LNZ) without in-depth review. Many of the B&LNZ practices listed in Appendix II of Park (2017) of "high water quality benefit" for P may not be so. The data appears to be qualitative and not quantitative. I dispute the categorical effectiveness for P mitigation listed. They are intended to be "rules of thumb". Such an emphasis on anecdotal evidence could result in ineffective strategies being promoted over those that are more suited for a farm. For example, if a drystock enterprise had soils only slightly above the agronomic optimum, they would be credited with > 50% P mitigation, whereas only a few percentage decreases would likely be achieved.
- Examine the catchment yield of P from production forestry. Note that I can send the Council calculated loads for all water quality sites currently measured by Regional Authorities and NIWA. If the 95% confidence interval of P losses for the central North Island under forestry fits within the 0.12 kg P/ha.yr listed by Park (2017) I would trust the assumption that the estimated decrease in P losses associated with a landuse change from pasture to forestry would result in the P decrease estimated (in the long-term).

References:

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