

Tabled at Hearing on 17 November 2015

## Proposed Plan Change 3 to the CLWRP Section 15

### Summary of evidence of Dr Mike Joy

1. The main waterways in SCC area clearly suffer already from agricultural impacts with water and habitat quality declining with reducing elevation and increasing cumulative impacts mainly from agriculture as outlined by Kelly (2015). Thus, with the anticipated increase in farming intensity, particularly with the Hunter Downs irrigation scheme, a worsening state of freshwaters is predicted in all scenarios except where the Zone Committee's "solution package" is both fully implemented and highly effective.
2. The current poor state of waterways in the SCC is confirmed by the data from Land and Water Aotearoa (LAWA) summarised in in my evidence this shows that the few monitored sites in the region at lowland end are in the worst 25% of sites of their type in New Zealand.
3. This is not only in Canterbury, the maps showing modelling of nutrient and macroinvertebrate index levels done by NIWA (as part of the NEMAR process included in original evidence) reveal the poor state of all New Zealand waterways in lowland intensively farmed areas of New Zealand.
4. The Department of Conservation note that there are 17 threatened native freshwater fish species in the Canterbury Region. Native fish are an important component as well as indicators of freshwater ecosystem health and their omission from the plan change and limits is concerning.
5. Native fish communities could be added to limits and management using the Index of Biotic Integrity (IBI) either using a regional or national model. The regional model is not available but could be made available if required.
6. Riparian buffer zones are an important management tool as they provide a range of benefits to freshwater communities including the reduction of in-stream nutrient concentrations; lowered fine suspended and deposited sediment, the exclusion of livestock, temperature control, flow variability control, maintaining natural habitat character, and providing a source of food for aquatic taxa, but of lesser value for shade on larger waterways.
7. However, riparian buffers do not significantly limit the movement of nitrogen from livestock to waterways as this happens via subsurface movement. The only way to effectively control nitrogen is to limit intensification or stock time on pasture.
8. Therefore, to achieve ecosystem health, instream habitat quality, water quantity, nutrients (particularly nitrogen and phosphorus), suspended and deposited sediment and riparian margins all need to be managed appropriately.
9. Thus, management should not be based on just nutrients; rather it must include a suite of

metrics. Furthermore, limits for each of the metrics need to be based on ecosystem health requirements as the starting point rather than working backwards from current land practices, which has no ecological basis whatsoever.

10. Limits and rules should be set to maintain ecosystem health, not nitrogen toxicity or/and to suit current land use. In other words to ensure ecosystem health and life supporting capacity means managing the whole ecosystem all attributes, not a select few parameters.
11. Nitrate toxicity is a “red herring” and should not have any bearing on decisions. This is because the toxicity levels were obtained under experimental conditions that have virtually no relation to reality. In real-life, stream biology is impacted by the secondary effects of excess nitrogen like oxygen depletion and habitat smothering at levels 10 times less than the levels where nitrogen becomes toxic. The only exception would be deep covered drains where light availability limits growth.
12. To achieve ecosystem health parameters needed to be added to assessment and goals they are continuous oxygen saturation and continuous temperature measurement.
13. Table 15(a) should have a nitrogen limit added for the three waterway management units, and they should be close to the ANZECC guideline limit for lowland waterways of 0.44mg/l nitrate nitrogen and 0.61 mg/l total nitrogen<sup>1</sup> or less than 0.8 mg/l DIN set in the Ruataniwha BOI decision.
14. I recommend that for all waterbodies that the maximum daily temperature during summer (October to April inclusive) be reduced from 20°C (Table 15a) to 19°C and during winter (May to September inclusive) be reduced to 11°C. The chlorophyll max biomass should reflect the Biggs (2000) periphyton guidelines of 50mg/m<sup>2</sup> for upland and 120 mg/m<sup>2</sup> for lowland and plains streams.
15. For the water quality limits table 15(c) the Annual median and 95<sup>th</sup> percentile should not exceed 0.8 (the Ruataniwha BOI limit).

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<sup>1</sup> Note there was a typo in my original evidence I had these numbers reversed