BEFORE HEARING COMMISSIONERS at CHRISTCHURCH

IN THE MATTER	of the Resource Management Act 1991
AND	
IN THE MATTER	of the proposed Variation 5 to the Proposed Canterbury Land and Water Regional Plan – Nutrient Management and Waitaki
BETWEEN	DairyNZ Limited
AND	Canterbury Regional Council

STATEMENT OF REBUTTAL EVIDENCE OF JUSTIN ALLAN KITTO

FOR DAIRYNZ LIMITED

5th August 2016

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1. Introduction

1.1 My full name is Justin Allan Kitto. I previously provided evidence relating to Plan Change 5B (Waitaki) to the Canterbury Land and Water Plan on 22 July 2016.

1.2 My qualifications and experience are set out in my Evidence in Chief.

1.3 I reconfirm that I agree to comply with the Expert Witness Code of Conduct set out in the Environment Court's Consolidated Practice Note 2014, as set out in my primary evidence.

2. Executive Summary

2.1 LWRMS have presented evidence on proposed nutrient limit ranges using the multiple lines of evidence approach. This approach has merit, but can be limited by the choice of data and scientific rigour of the analysis.

2.2 Some of the evidence presented is not entirely appropriate as depending on the river system, the limits are currently and likely to be achieved in the future, or there are stressors other than nutrients that if managed will allow environmental outcomes to be achieved. Other lines of evidence are either inappropriate as limits, or have low levels of confidence around them due to the compounding of modelling errors.

3. Scope of Evidence

3.1 In this rebuttal evidence, I provide additional comments on matters raised by Mr Canning for Lower Waitaki River Management Society (LWRMS). I note that LWRMS has not sought to be heard on their evidence.

3.2 I specifically reply to matters that have been raised by Mr Canning that relate to the Hakataramea River and the Northern Fan Freshwater Management Rivers of the Waikakahi Stream and Whitneys Creek.

4. Technical comments

4.1 Mr Canning has used a 'multiple lines of evidence' approach to recommend limit ranges for dissolved inorganic nitrogen (DIN) and dissolved reactive phosphorus (DRP) for both upland and lowland rivers. This approach does have merit in that it considers numerous outcomes from a number of contexts as opposed to relying on one single study that is often context specific. However, the reliability of this approach is limited by the appropriateness and scientific rigour of the evidence that is included.

4.2 Mr Canning has used five pieces of evidence to make his recommended nutrient limit ranges. Of these five pieces of evidence, I have concern with three of them which I will explain in turn below.

4.3 Matheson et al. 2016 has recommended a DIN limit of less than 1.1 mg/l to allow for the national bottom line for periphyton being achieved. This value is on the high side, given current and future state is considerably lower than this. Further, in my primary evidence I state in paragraphs 4.7 and 4.9 that flow conditions in this catchment exert an important influence of periphyton growth and if all things remain the same, increases in the amount of nitrogen may stimulate more periphyton growth. Therefore, the limit of 1.1 mg/l is likely to be too high as an average. In the context of the Northern Fan rivers, I wish to reinforce paragraphs 5.7-5.12 of my primary evidence where I have argued that to improve the ecosystem health in these rivers, the focus should be on minimising sediment inputs and reintroducing shade as opposed to focusing on nitrogen management.

4.4 In paragraph 46 of the primary evidence by Mr Canning, he refers to the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC 2000) (I referred to them as the 'ANZECC guidelines') and the recommended limits for both DIN and DRP. While Mr Canning refers to these numbers as "limits", these numbers are actually considered to be trigger values whereby an effect may or may not occur if they are exceeded. These numbers were designed to act as a trigger for managers to then conduct site specific investigations to determine if adverse effects were occurring and if so, what was the stress and at what level was unacceptable stress occurring. Consequently, I do not believe these numbers are directly applicable to either the Hakataramea or the Northern Fan rivers.

4.5 In paragraph 49 of Mr Canning's primary evidence, Mr Canning has regressed results of two separate, national scale modelling studies to determine appropriate DIN and DRP limits. I have a number of concerns with this approach. First, the study by Clapcott et al. (2013) modelled macroinvertebrate community index (MCI) scores. MCI is based on presence/ absence of macroinvertebrate taxa. However, Mr Canning has taken these results and converted them to approximate quantitative macroinvertebrate community index (QMCI) scores. The QMCI scores are based on the abundance of the different macroinvertebrate taxa present. Consequently, converting MCI scores to approximate QMCI scores is inappropriate and is likely to introduce significant error.

4.6 The second issue with this approach is that Mr Canning has assumed that there is a direct cause and effect relationship between DIN and macroinvertebrate scores. This is not correct. As noted in my primary evidence (para 5.9), Moore (2014) found limited or no relationship with DIN in a study of Canterbury spring-fed streams. Young and Clapcott (2015) also stated that DIN does not have a direct relationship with macroinvertebrate scores.

4.7 To demonstrate this, I have presented in Figure 1 the annual QMCI score against the average nitrate-nitrite-nitrogen (NNN) concentration for 12 months leading up to the collection of the QMCI sample. I also the QMCI outcome and the proposed DIN limit by Mr Canning using the Clapcott et al. 2013 evidence. For the Hakataramea River, the QMCI outcome is being achieved already while the current state NNN is less than the DIN limit Mr Canning has proposed. The future median DIN concentration proposed in Table 15B(c) is likely to be double what Mr Canning recommends using this method. In contrast, the QMCI scores are currently passing the proposed QMCI objective while average NNN concentrations greatly exceed what Mr Canning recommends. But, Whitney's Creek fails the QMCI objective some years while current state NNN is exceeding the DIN limit proposed by Mr Canning. But it does pass the QMCI outcome some years while the NNN concentration is high. This evidence reinforces that DIN does not result in a direct cause and effect relationship on macroinvertebrates as well as highlighting that in the case of Whitney's Creek, other stressors are likely to be at play.

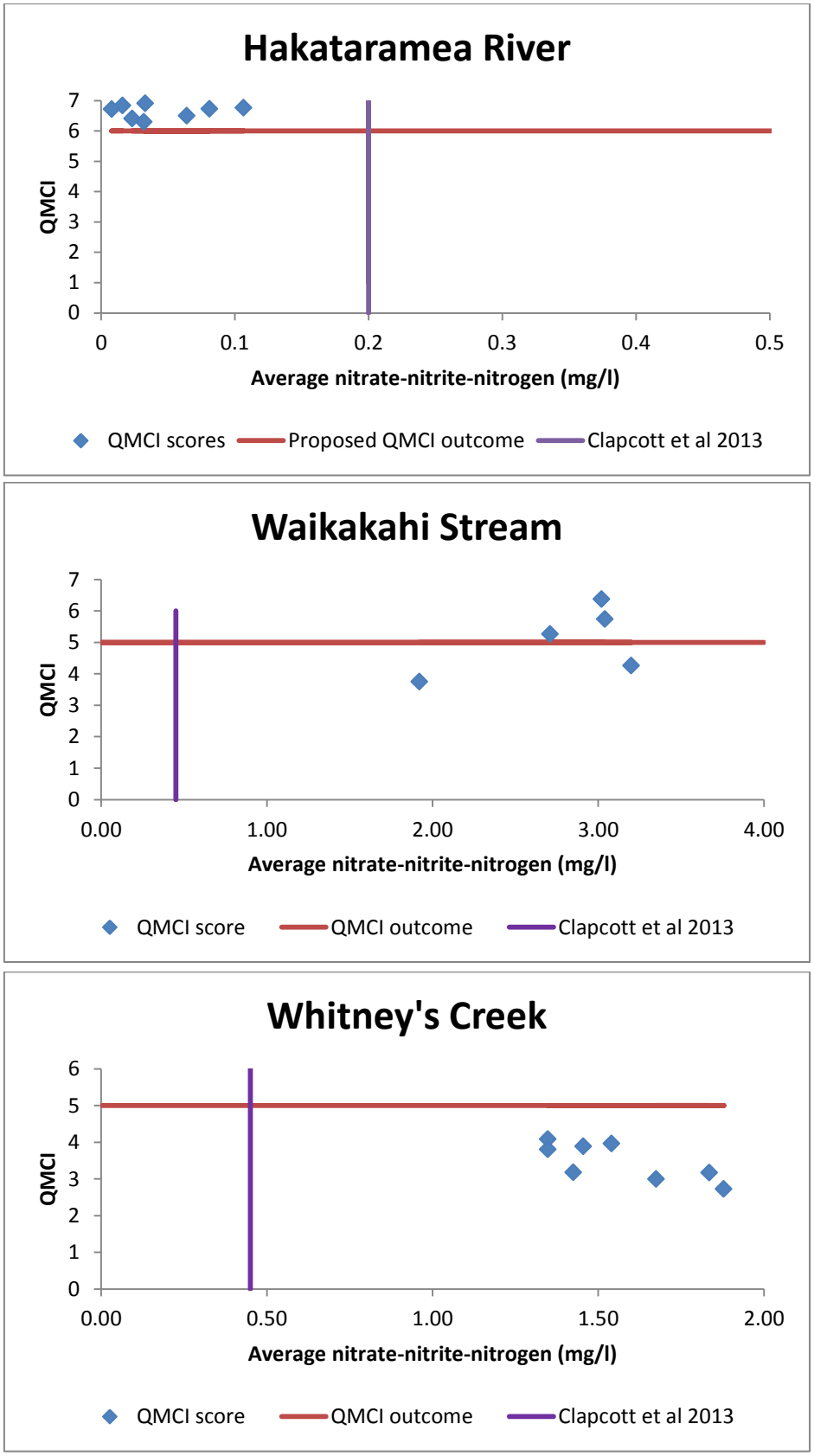

Figure 1: Annual QMCI scores (when available) plotted against the preceding 12 month average of nitrate-nitrite-nitrogen data.

4.8 To summarise, while the 'multiple lines of evidence' approach has merit, its strength is dependent on the evidence used. I am concerned that three pieces of evidence are not strong enough to support some of the limits proposed. This is because they are recommending a limit that could be too high (for the Hakataramea River), or were not designed to be used as limits, or they have inappropriately changed indices, thus introducing error to the analysis and assume a cause and effect relationship between nutrients and macroinvertebrates when other investigations have demonstrated that there is no direct causative link between the two.

Justin Kitto
5 August 2016

References

ANZECC (2000), Australian and New Zealand guidelines for fresh and marine water quality. Australian and New Zealand Environment and Conservation Council and Agriculture and Research Management of Australia and New Zealand.

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