

**IN THE MATTER** of the Resource Management Act 1991  
**AND**  
**IN THE MATTER** of the hearing of submissions on  
Proposed Plan Change 3 to the Land and  
Water Regional Plan

**BY** **OTAIO WATER USERS GROUP**  
**Submitters**

**TO** **CANTERBURY REGIONAL COUNCIL**  
**Local Authority**

---

**REBUTTAL EVIDENCE OF GREGORY IAN RYDER**  
Dated: 21 October 2015

---

---

**GALLAWAY COOK ALLAN  
LAWYERS  
DUNEDIN**

Solicitor on record: B Irving  
Solicitor to contact: B Irving  
P O Box 143, Dunedin 9054  
Ph: (03) 477 7312  
Fax: (03) 477 5564  
Email: [bridget.irving@gallawaycookallan.co.nz](mailto:bridget.irving@gallawaycookallan.co.nz)

## **Introduction**

1. My full name is Gregory Ian Ryder.
2. I provided a statement of evidence dated 25 September 2015 in connection with submissions by Otaio Water Users Group on Variation 3 to the proposed Canterbury Land & Water Regional Plan (pL&WRP).
3. I have read the evidence of the following witnesses and wish to provide rebuttal evidence on aspects of their material:
  - (a) Ms Angela Christensen on behalf of Central South Island Fish & Game Council;
  - (b) Dr Michael Joy on behalf of Lower Waitaki River Management Society;
  - (c) Mr Justin Kitto on behalf of Fonterra Group and DairyNZ.

My rebuttal evidence is largely in relation to comments and recommendations relating to tables 15(a) and 15(c).

4. I confirm that this rebuttal evidence is also prepared in accordance with the Code of Conduct for Expert Witnesses contained in the Environment Court Practice Note 2014.

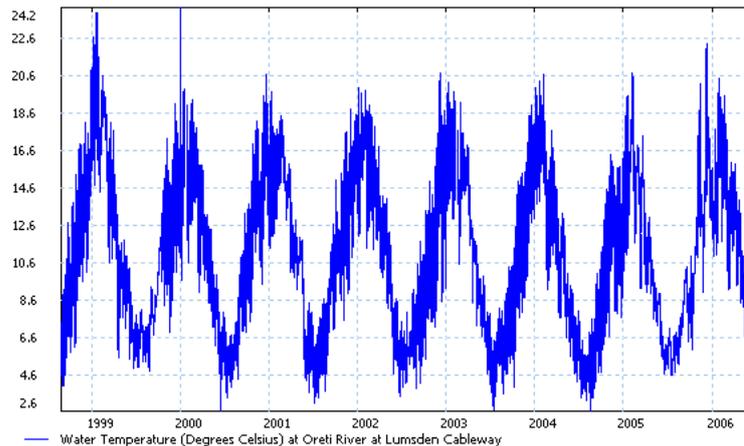
## **Angela Christensen (Central South Island Fish & Game)**

5. Ms Christensen at paragraph 88 of her evidence in chief notes that Fish and Game supports the freshwater outcomes submitted in Table 15(a) to safeguard life supporting capacity and ecosystem health. She then goes on to provide support for changes, including several additions, to Table 15(a).
6. One change sought is a maximum temperature of 19°C (currently set at 20°C under Variation 3). The basis for this change is, as I understand it, to protect brown trout feeding, stonefly populations and ecological health of a number of species and their habitat preferences. Fish & Game sought a similar change at the Variation 2 hearing and I commented on that proposed change as well.
7. Not all fish species are sensitive to the temperature thresholds recommended in Table 15(a) and I consider that Ms Christensen has ignored that fact that many large South Island rivers exhibit peak summer temperatures much greater than 19°C, yet continue to support healthy macroinvertebrate

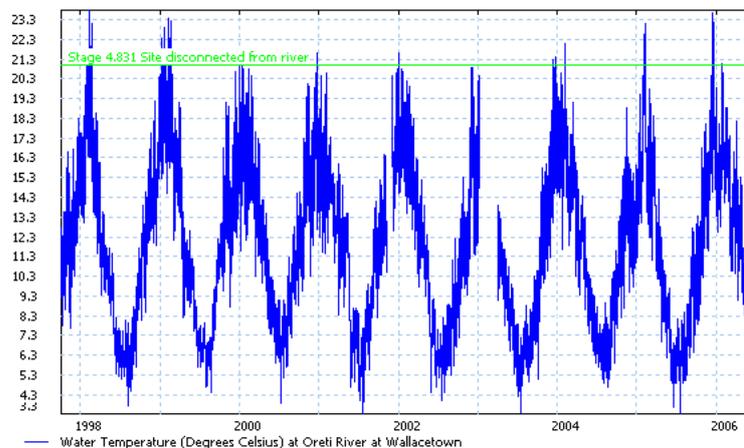
populations and trout fisheries that are highly regarded. I have presented some continuous temperature data for two Southland rivers I am familiar with (Mataura and Oreti), as gathered through regional council monitoring (Figures 1 and 2). These are large rivers and have summer temperatures which consistently peak above 19°C and regularly exceed 20-21°C. They both have well recognised trout fisheries, the Mataura having an international reputation, and both have water conservation orders in recognition of their brown trout fisheries.

8. While lower water temperatures are generally desirable in New Zealand rivers, I do not consider occasional peaks into the low 20s are critical to safeguarding life-supporting capacity.

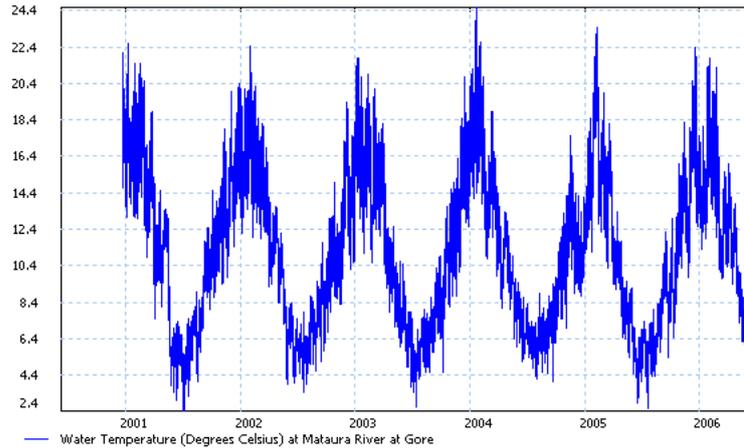
*Oreti River At Lumsden – upper catchment*



*Oreti River at Wallacetown– lower catchment*



**Figure 1** Continuous temperature data for the Oreti River at Lumsden (top) and at Wallacetown (bottom) (data source: Environment Southland).

*Mataura at Gore*

**Figure 2** Continuous temperature data for the Mataura River at Gore (data source: Environment Southland).

9. Central South Island Fish & Game Council have also sought the addition of bioavailable nutrient concentration limits to Table 15(a) in the form of dissolved inorganic nitrogen (DIN) and dissolved reactive phosphorus (DRP). These are set out in Appendix One of Ms Christensen's evidence in chief (page 82 of the PDF of her evidence).
10. Firstly, I consider this to be doubling up on the water quality limits for these nutrients in Table 15(c) of Variation 3 (Water Quality Limits for Rivers). Although Table 15(c) nutrient concentrations are regarded as 'water quality limits', and the existing and proposed Fish & Game values in Table 15(a) are regarded as 'freshwater outcomes', it is possible they will be treated as the same, leading to confusion. Further, the concentrations proposed in Table 15(a) for hill-fed upland, hill-fed lowland and spring-fed plains differ from the river and stream-specific concentrations listed in Table 15(c).
11. For example, Fish & Game recommends that the following DIN and DRP concentration limits be added to Table 15(a):

Management Unit	DIN (mg/L)	DRP (mg/L)
Hill-fed upland	0.21	0.006
Hill-fed lowland	0.47	0.006
Spring-fed plains	0.80	0.016

12. Table 15(c) has the following DIN and DRP concentration limits as drafted under Variation 3 and amended by Fish & Game:

River Type	DIN river range (mg/L)	DRP river range (mg/L)
Hill-fed upland	0.06 – 0.39	0.012 – 0.021
Hill-fed lowland	0.04 – 0.74	0.002 – 0.055
Spring-fed plains	0.39 – 0.60	0.010 – 0.460

13. Table 15(c) figures are annual median concentrations. Also included in this table, but not presented above, are annual 95<sup>th</sup> percentile concentrations for DIN. In my opinion, these concentration limits for tables 15(a) and 15(c) are not consistent and the inclusion of concentrations in both tables would be confusing. I note here that I have already stated in my evidence in chief (paragraph 40) that I find the purpose of Table 15(c), as drafted in Variation 3, unclear.
14. Secondly, the DIN and DRP concentration limits recommended for inclusion in Table 15(a) by Fish & Game appear to be inconsistent with the periphyton indicators for chlorophyll *a* in that table. The New Zealand periphyton guidelines (Biggs 2000<sup>1</sup>) indicate that, to maintain a periphyton biomass less than 120 mg/m<sup>2</sup> (as sought by Fish & Game for hill-fed lowland and spring-fed plains surface waters), DIN would need to be less than about 0.034 mg/L and DRP less than about 0.003 mg/L (mean monthly concentrations) for streams with a 40 day accrual period (basically the number of days between flood events of sufficient size to remove periphyton build-up). Concentrations would have to be even lower for rivers like the Otaio which have longer accrual periods<sup>2</sup>.
15. Thirdly, it is my understanding from previous pL&WRP hearings that the purpose of Table 1a of the pL&WRP and that of Table 15(a) of Variation 3 is more about ideal outcomes rather than the imposition of limits. The technical memorandum<sup>3</sup> prepared by Environment Canterbury's Principal Water Quality Scientist, Dr Adrian Meredith, that was attached to the Section 42A Report for the pL&WRP, noted that the tables identify 'outcomes' for Canterbury rivers and lakes, "*which at times may be aspirational*". Dr Meredith went on to state in the memorandum that they are not intended as water quality guidelines or

<sup>1</sup> Biggs, B.J.F. 2000. New Zealand periphyton guideline: detecting, monitoring and managing enrichment of streams. Ministry for the Environment, Wellington, New Zealand.

<sup>2</sup> Pattle Delmore Partners Ltd. 2015. Effects on Ecological Values of the Otaio River from changes to the B-block allocation. Prepared for Blue Cliffs Station.

<sup>3</sup> Appendix 1. Submission on Table 1(A, B) pLWRP. From Adrian Meredith to Matthew McCallum-Clark, Peter Constantine. 7 January 2013.

standards that set numerical limits at specific points as for consent compliance purposes.

16. Dr Meredith went on to make the point that the indicators in Tables 1a and 1b of the pL&WRP are composed of parameters of direct relevance to maintaining 'life supporting capacity' and do not include 'detailed' parameters such as chemical water quality parameters. In other words, the tables set higher level outcomes and hence should be regarded more as aspirational targets than limits.

**Dr Michael Joy (Lower Waitaki River Management Society)**

17. Dr Joy recommends that fish be monitored and that the IBI index (Index of Biotic Integrity), which he has modified for New Zealand freshwater fish communities (Joy and Death 2004<sup>4</sup>), be used. He recommends that a minimum fish IBI score be added to Table 15(a), but does not state what that score should be (paragraph 31 and point e of his recommendations in his evidence in chief).
18. The evidence of Mr Adam Canning, presented at the Variation 2 hearing (Hinds/Hekeao area), and appended to the evidence of Ms Christensen in her Variation 3 evidence discussed above, has a recommended IBI score of 40 for the Hinds catchment, but no information was presented as to what expected IBI scores in the Canterbury region are.
19. Work by Joy (2010<sup>5</sup>) in the Southland region demonstrated the importance of developing IBI scores based on regional rather than national data. In their paper about the development of the IBI, Joy and Death (2004) also noted that further knowledge was needed about the accuracy of the IBI in comparison to other river assessment systems. I am not aware of this information having been collected, and therefore I suggest caution be exercised over the application of the IBI in this or any other regional plan document without further assessment and testing.

---

<sup>4</sup> Joy, M. K. and Death, R. G. 2004. Application of the Index of Biotic Integrity Methodology to New Zealand Freshwater Fish Communities. - Environmental management 34: 415-428.

<sup>5</sup> Joy, M. 2010. Freshwater fish in the Southland region: Spatial distribution in relation to landcover and temporal trends. A report for the Southland Regional Council. Wairesearch Limited.

20. Dr Joy also recommends continuous oxygen saturation and continuous temperature be included in Table 15(a) and that limits be set for minimum and maximum levels. While I agree with him that continuous monitoring of these water quality parameters can produce useful information, and that one-off readings have limited usefulness, in my experience monitoring to obtain continuous readings has a number of practical difficulties that would limit its use for plan purposes, in particular for use in water quality limit setting.
21. **Mr Justin Kitto (Fonterra and DairyNZ)**
22. Mr Kitto provides some useful comments regarding the interpretation of Table 15(a) and that it should be regarded as an 'outcomes' rather than 'stressors' table with respect to environmental, cultural and recreational conditions. In particular, I agree with his comment at paragraph 14 of his evidence in chief where he states; "*it is the outcome that is important in Table 15(a), not how you get there*". For that reason, he recommends that DIN and nitrate toxicity limits not be added to it, but rather be placed in a separate table. This recommendation is partly at odds with my recommendation that nitrate toxicity to be included in Table 15(a), although I did suggest that, alternatively, it could be added in a separate table. However, Table 15(a) is not perfect in its composition, as drafted, in that it contains both 'outcome' and 'stressor' indicators. For example, dissolved oxygen, temperature and arguably *E. coli* levels are, in my opinion, stressors and not outcomes. The first two parameters are included in Table 1(a) of the pL&WRP (freshwater outcomes for Canterbury rivers).
23. In my mind, I see little difference between Table 15(a) having an outcome for temperature in the form of a maximum level, minimum levels of dissolved oxygen saturation and maximum concentration levels for nitrate toxicity. All three are there to protect freshwater ecosystems. I consider it is more important how emphasis is placed on them and on whether they are to be regarded as outcomes rather than hard and fast limits.
24. Mr Kitto notes that Fish & Game has recommended adding a periphyton outcome for spring-fed rivers in Table 15(a). He considers this inappropriate as the predominant plant growth in this type of river is macrophytes (e.g., rooted plants) and a macrophyte outcome is already provided for and so

ecosystem health in these river systems can be appropriately measured. I agree with Mr Kitto's comments on this matter.

Name: Greg Ryder

Date: 21<sup>st</sup> October 2015