

**BEFORE THE INDEPENDENT COMMISSIONERS**

**IN THE MATTER** of the Resource Management Act  
1991

**AND**

**IN THE MATTER** of the Proposed Variation 1 to the  
Proposed Canterbury Land and  
Water Regional Plan

---

**SUPPLEMENTARY EVIDENCE OF JIM COOKE ON BEHALF OF NORTH  
CANTERBURY FISH AND GAME COUNCIL AND THE ROYAL FOREST  
AND BIRD PROTECTION SOCIETY**  
September 2014

---

---

**North Canterbury Fish and Game Council**

Environmental Advisor – Scott Pearson

PO Box 50,  
Woodend 7641  
North Canterbury  
027 5252 650

## **QUALIFICATIONS AND EXPERIENCE**

1. My name is James Grainger Cooke. My qualifications and evidence are set out in my Evidence in Chief, dated 29 August 2014.
2. This supplementary evidence addresses specific points raised by Shirley Hayward and Greg Ryder in their evidence-in-chief.
3. I have again prepared this evidence in compliance with the Code of Conduct for Expert Witnesses contained in the Environment Court Practice Note 2011.

## **DUAL NUTRIENT CONTROL**

4. Dr Ryder states (#40 EIC) “regardless of whether or not the technical assessments associated with Variation 1 accurately predict nutrient concentrations in streams and rivers of the Selwyn Waihora catchment, CPW is not expected to provide a significantly greater contribution of P to surface waters”. My review (EIC #40-49) of a paper currently in press by NZ’s leading expert on P transport for pastoral soils (Dr Richard McDowell, AgResearch) provides credible evidence that P transport through groundwater is likely under recent stony soils in Canterbury, and I therefore doubt that ECan’s assumptions used in the P scenarios (Appendix 7 of Robson, 2014) are correct.
5. Further the modelling by Kelly (2014) referred to by Dr Ryder (#36) assumes dual nutrient limitation (N & P) based on studies done outside of Canterbury. There have been no studies done (or least none referenced by Kelly (2014) that confirm P, N or N+P limitation and under what circumstances. P limitation could explain the lack of increasing P concentrations in lowland spring-fed streams (other than the Halswell River) as could longer than expected lag times.
6. Regardless of which nutrient limits periphyton growth in these spring-fed lowland streams, there appears to be general agreement that both N and P loads from the Selwyn-Waihora catchment need to be reduced if the state of Te Waihora is to be improved. Indeed Shirley Hayward (#14) states “I support the need to carefully manage nitrogen and phosphorus loads to Te Waihora/Lake Ellesmere in order that the broader objectives of Variation 1 and the Zone Committee may be successfully achieved in the long term”.

## **UNCERTAINTIES IN CATCHMENT MODELLING AND THE NEED FOR MONITORING**

7. Both Hayward (#44-45) and Ryder (#37) comment on the uncertainty of the modelling. I agree with them as do ECan experts who have openly stated their assumptions and the limitations of the modelling. I have seen no evidence that improves on the catchment load predictions, which are the product of modelled farm outputs, groundwater modelling (including lag times), point source inputs, surface water modelling and attenuation. The major uncertainty in all these (in terms of the 'ultimate' catchment load is farm output. I therefore endorse the statements of Dr Alison Dewes in her EIC and rebuttal evidence on the current inaccuracies of this key component, and the methods she proposes whereby reliability would be drastically improved.
  
8. It is imperative, in my view, that robust monitoring of all significant spring-fed lowland streams feeding into Te Waihora be put in place to, as accurately as possible, estimate the load of P and N entering Te Waihora in order to 'verify' modelled predictions regularly. This requirement supports the position of Fish and Game that with improved current state monitoring and accurate validation of modelled N and P farm outputs, the Regional Council will be far better equipped to adaptively manage nutrient allocations. Shirley Hayward agrees with this principle stating in her conclusion (#69) "A commitment to continual improvements in catchment information (e.g., land use), monitoring of outcomes sought, and refinement of water quality predictions will help address concerns with current areas of uncertainty."

**DATED** this        8th        day of September                    2014

Dr James G Cooke

### **REFERENCES**

Kelly, D. (2014) Technical report to support water quality and water quantity limit setting process in Selwyn-Waihora catchment. Predicting consequences of future scenarios: surface water quality and ecology in lowland streams. ECan Report R14/13.

McDowall, R.W., N. Cox, C.J Daughney, D Wheeler and M Moreau (in press). A national assessment of the potential linkage between soil, and surface and groundwater concentrations of phosphorus. Journal of the American Water Resources Association

Robson, M. (2014) Technical report to support water quality and quantity limit setting in Selwyn Waihora catchment - Predicting consequences of future scenarios: Overview Report. ECan Report R14/15 ISBN 978-1-927284-89-6