**BEFORE THE ENVIRONMENT COURT**

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| *In the matter of* | appeals under clause 14 of the First Schedule to the Resource Management Act 1991 concerning the proposed One Plan for the Manawatu-Wanganui Region. |
| *between* | **FEDERATED FARMERS OF NEW ZEALAND ENV-2010-WLG-000148** |
| *and* | **MINISTER OF CONSERVATION ENV-2010-WLG-000150** |
| *and* | **HORTICULTURE NEW ZEALAND ENV-2010-WLG-000155** |
| *and* | **WELLINGTON FISH & GAME COUNCIL ENV-2010-WLG-000157** |
| *and* | **DAY, MR ANDREW ENV-2010-WLG-000158** |
| | *Appellants* |
| *and* | **MANAWATU WANGANUI REGIONAL COUNCIL** |
| | *Respondent* |

# STATEMENT OF REBUTTAL EVIDENCE BY ASSOCIATE PROFESSOR RUSSELL DEATH ON THE TOPIC OF SURFACE WATER QUALITY AND NUTRIENT MANAGEMENT

**ON BEHALF OF WELLINGTON FISH & GAME COUNCIL**

Dated: 17 April 2012

## INTRODUCTION

1. My full name is Russell George Death. A full description of my qualifications and experience was provided in my evidence dated 17 February 2012, which was filed with the Court.

2. I attended expert conferencing on the March 20 and 29, 2012. A record of that conferencing has been provided to the Court in the form of a conferencing statement. I have included further discussion around areas of agreement and disagreement for clarification where I think it is required in this evidence.

## PURPOSE AND SCOPE OF EVIDENCE

3. I have read the statement of evidence of Dr Michael Robert Scarsbrook.

4. The purpose of this evidence is to respond to his evidence.

## EXPERT WITNESS CODE OF CONDUCT

5. I have been provided with the Code of Conduct for Expert Witnesses contained in the Environment Court's Consolidated Practice Note 2011. I have read and agree to comply with that Code. This evidence is within my area of expertise. I have not omitted to consider material facts known to me that might alter or detract from the opinions I express.

## ISSUES IN CONTENTION

6. Dr Scarsbrook in his evidence in chief provides analysis of trends in water quality (nitrogen and phosphorous) that indicate over the more recent time frame (10 years) that he has assessed, that aspects of water quality may be improving at some sites in the Horizons region. This contrasts with the conclusions presented by Horizons scientists of trends in water quality over alternate time frames (20 years) that show declining water quality. He uses the analysis to support the view that increasing agricultural land use intensification over the last 10 years is

causing less effect on water quality than previously implied by the trend analysis presented by Horizons scientists.

7. Although I have not conducted formal trend analysis it looks as if for the one site Dr Scarsbrook provides data for (Manawatu @ Teachers College) (Fig. 5 Scarsbrook EIC) that if an even shorter time frame were considered (e.g., 5 years) there would be no decreasing trend in nitrogen.

8. That trend analysis with alternative time frames yields differing conclusions on the cause and effect of changes in water quality indicates how problematic such analysis is for establishing such causal links. In conferencing we agreed it was important to look at the entire data record. As Dr Scarsbrook himself highlights '*the cause of these trends is difficult to determine'*. Shorter term changes in water quality could be a result of no effect from land use intensification, recent changes in land management practise, changes in other activities (e.g. removal of a number of point source discharges), multi-year climatic patterns (e.g., la nina, el nino), other unknown factors, or some combination of these. The observed pattern does not identify causation or refute potential casual links put forward by Horizon's experts as Dr Scarsbrook suggests. In conferencing we agreed the period for trend analysis depends on the question and had differing views, as highlighted above, on the appropriate time scale for consideration on the One Plan. However, we did all agree that state is what matters to the ecosystem and users, and that state is not currently sufficient to protect ecological health in a number of Horizons waterbodies.

9. The facts as detailed in my evidence (and Horizon's experts) in chief are still: 1) water quality is considerably lower in many waterbodies than is acceptable (including those where short term improvements have been found); 2) agriculture has been convincingly linked with declining water quality from a multitude of national and international studies; 3) Non-point source contamination from agriculture has been identified as a major source of degraded ecological condition 4) the most obvious mechanism for improving water quality in a

multitude of the regions waterbodies is to actively manage agriculture to reduce its potential and actual deleterious effects.

10. Dr Scarsbrook still supports the view that state and trend are both important for establishing the appropriate management regime for water quality, but that based on his trend analysis that nutrient management may not be the best vehicle for this management, postulating that sediment and faecal contaminant management should be of more importance. As water quality is a multivariate parameter (including chemical, biological and habitat characteristics) affected by multi-stressors management of nutrients, sediment and faecal contaminants are clearly all important to consider.

11. Dr Scarsbrook also raised concerns over the methodology for determination of some of the Schedule D numbers. Many of these concerns have been allayed by expert conferencing. In my evidence in chief I present data collected from one of my research projects in the region. This data although not collected for determining periphyton limits (which is Dr Scarsbrook's main concern) or Schedule D numbers does provide good, independent validation of the approach and values established by Horizons in the One Plan Schedule D (Table 1).

Table 1. Predicted MCI values from my model associated with SIN or DRP values in Schedule D.

| SIN limits | MCI produced from my independent model | DRP limits | MCI produced from my independent model |
|---|---|---|---|
| 0.07 | 122 | 0.006 | 122 |
| 0.11 | 118 | 0.01 | 117 |
| 0.167 | 114 | 0.015 | 113 |
| 0.44 | 105 | | |

12. In summary although there may be some disagreement amongst experts on the principal cause of the low water quality and ecological health of the regions waterbodies, everyone agrees many of the waterbodies have lower water quality and ecological health than they should do and that nutrients, sediment and faecal contamination from agriculture is the principal cause of that degradation. It seems to me therefore, that management of all 3 stressors (nutrients, sediment

and faecal contamination) is necessary to see any improvement in water quality and/or ecological health. Furthermore, my independently derived research data provides good support for the Schedule D standards as a way to achieve those outcomes.

Associate Professor Russell George Death