

## **Press release: The New Zealand Freshwater Sciences Society (NZFSS) refutes agribusiness professor's comments about the condition of the Waikato River**

**Background:** Recently, Jacqueline Rowarth (professor of agribusiness at the University of Waikato and newly appointed Chief Scientist for the Environmental Protection Authority) declared that the Waikato River is one of the 5 cleanest rivers in the world in terms of its concentration of nitrate and that the river's nitrate concentrations have improved due to changing farming practices[1]. This statement contradicts Environment Waikato's data showing the river's climbing nitrate concentration, which concerns many freshwater scientists including Environment Waikato's Bill Vant[2]. Recently, NIWA's Bryce Cooper[3], and others freshwater scientists have spoken out to the media and criticised Rowarth's statements. Dr. Doug Edmeades (a soil scientist) subsequently wrote in the NZ Farmer [4] in support of Rowarth's analysis and questioned the integrity of the freshwater scientists who presented data contradicting Rowarth. Subsequently, Rowarth wrote a letter to the NZ Farmer [5] stating that faecal bacteria (*E. coli*) levels in the Waikato River would pass the European Union's standards for swimming.

**NZFSS rebuttal:** Rowarth's and Edmeades' statements contain factual errors, use outdated data and misrepresent the current state of the Waikato. The New Zealand Freshwater Sciences Society (comprising over 400 freshwater scientists and professionals) would like to set the record straight concerning the condition of the Waikato River and the comparisons made by Rowarth to OECD river nitrate levels and the European Union's (EU) microbiological standards for swimmability.

### **1. "The Waikato River doesn't even make the top 30 cleanest waterways in New Zealand":**

Regarding Rowarth's statement that the Waikato River is one of the 5 cleanest rivers in the world [1], comparisons with a small selection of the world's rivers for which data were provided to the OECD does not provide any basis for her statement that the Waikato River is the one of the 5 cleanest rivers in the world. As Dr. Bryce Cooper pointed out [3], "the Waikato River doesn't even make the top 30 cleanest waterways in New Zealand". Here, Rowarth has committed a basic statistical error in equating the Waikato River's ranking among a small sub-sample of world rivers for its ranking among all the world's rivers.

### **2. OECD data used were from 2002-2004. New data show a rapid deterioration in nitrate**

**concentrations:** Rowarth's analysis concerning nitrate concentrations was based on OECD river nitrate data from the years 2002-2004 (these data are now 12 to 15 years out of date)[6]. We have looked at these data, as well as the OECD's most up-to-date river nitrate data (for around 100 rivers up to 2011)[7]. The data in the OECD world river database show that Waikato River nitrate levels have deteriorated rapidly relative to the OECD sample of world rivers, dropping from its 5% ranking in 2002-2004 to a 24% ranking in 2011 (Fig. 1). This large drop in the Waikato River's ranking occurred over a period of only 10 years. If this trend continues, by the year 2025, the Waikato River will be no cleaner than the average river in the OECD world river database. This information contrasts starkly with Rowarth's and Edmeades' messages, that the Waikato River is one of the cleanest rivers in the world [1,4] and that farming practices are contributing to improvements in water quality in the river[1].

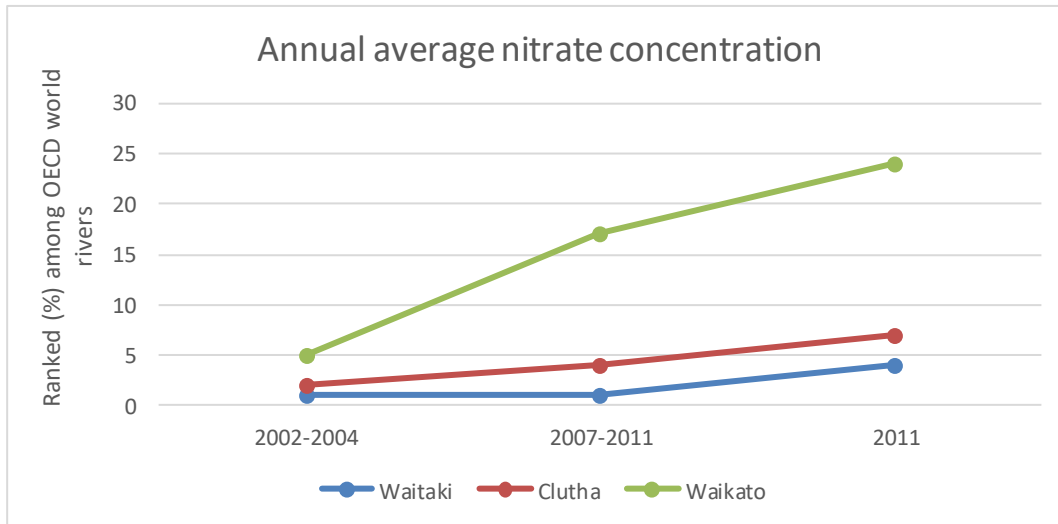


Figure 1. The percentile position of three New Zealand rivers in relation to rivers in the OECD database, based on annual average nitrate concentration. Data from OECD [6,7]. Number of rivers in 2002-2004 = 88; in 2007-2011 = 73; in 2011 = 100.

**3. Misunderstanding of statistics regarding *E. coli* concentrations:** Rowarth's statement that the Waikato River's faecal pollution indicator (*E. coli*) levels would pass the European Union's standards for swimmability is in error because she erroneously equates two different statistics of *E. coli* concentration (the median and the 95th percentile). The **median** concentration is similar to the **average** concentration whereas the **95th percentile** is closer to the **maximum** concentration. So she erroneously compared the median concentration of *E. coli* in the Waikato River, which she mistakenly interpreted as the maximum concentration, with the 95th percentile in the EU standards (1000 cfu/ 100 mL) for swimmability. Comparing apples and oranges like this is nonsensical. Analysis of Environment Waikato data for 2009-14 shows that *E. coli* levels in the Waikato River at Huntly [8] failed bathing standards as defined by both the EU and by our National Policy Statement for Freshwater Management [9].

**4. The Waikato is a long river, showing a large range in water quality from the headwaters to the estuary:** Rowarth and Edmeades commented on the nitrate concentration of the Waikato River without reference to any specific sites in the river. Discussing the condition of the Waikato River as a whole is not informative because water quality in the river is very good at the outflow of Lake Taupo and decreases markedly as the river flows downstream [10]. The catchment of Lake Taupo has strict regulations on nitrogen fertiliser use and Lake Taupo acts as a nutrient sink, thereby supplying a large amount of high quality water to the upper Waikato River. Therefore, discussion of impact of land use on water quality in the river must consider the large upstream-downstream changes in land use impacts and water quality. Discussing the whole river as a single entity, without reference to specific sites (as Rowarth and Edmeades have done), can lead to false interpretations and claims about water quality in the river. For example, on its website, the Ministry for the Environment cautions: "Note that it is reasonable to compare only our most nutrient-enriched rivers with rivers reported by the Organisation for Economic Co-operation and Development (OECD). This is because, in general, OECD measurements are taken at the mouths of rivers flowing from large catchments." [11].

**5. Rowarth's and Edmeades' comments seem oblivious to the large, government/iwi/stakeholder/community Waikato River restoration project now underway:**

Rowarth's and Edmeades' misrepresentations of the condition of the Waikato River in relation to rivers in the OECD database and to EU microbiological standards distracts from the fact that the river has been identified by central government, regional council, a variety of stakeholders, iwi and local communities as being in need of restoration. Funds have already been allocated and collaborative processes are underway to try to improve water quality in the lower river to a swimmable standard again.

Rowarth's and Edmeades' comments concerning the condition of the Waikato River are not only false, but distract from the important work being done to improve water quality in New Zealand. They are not freshwater scientists, and this is reflected in the poor standard of data analysis and interpretation. The publication of such poor scholarship in media outlets does not foster robust debate; rather it can serve to confuse and distract the interested public and non-experts. **To help avoid such problems in the future, the New Zealand Freshwater Sciences Society encourages the media to consult its members whenever non-experts attempt to address freshwater issues publicly.**



Dr. Marc Schallenberg  
(President) on behalf of the New Zealand Freshwater Sciences Society  
Department of Zoology  
University of Otago  
[marc.schallenberg@otago.ac.nz](mailto:marc.schallenberg@otago.ac.nz),

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