

24 November 2012

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Dear Tim,

## **REVIEW OF REPORT ON ECOLOGICAL VALUES AND FLOW REQUIREMENTS OF THE ORARI RIVER CATCHMENT**

This report provides a thorough summary of the ecological values of the Orari River catchment and uses flow habitat modelling to predict the effect of different flow scenarios on these values. It appears that current rates of abstraction from surface and groundwater in the catchment are having a substantial effect on the flow regime and habitat availability for at least some key species. Linking all consents with a minimum flow measurement point in the lower catchment seems like sound advice.

In the description of the flow habitat modelling the author indicates that at sites other than the Orari River itself, velocities were modelled and not measured at each cross section (Page 16). The author provides no information on how the velocities were modelled. Perhaps using the WAIORA approach where channel cross-section, and discharge are known – providing an estimate of average velocity???? However, if this is the case then there is no information available on the distribution of velocities across the cross section. I would like to see more information on what was done.

The habitat modelling appears to have focussed on ‘representative’ reaches at each site. The effects of low flow on fish passage is a concern, especially for large bodied species like adult salmon, which are known to migrate up the Orari River and spawn in Ohapi Creek. I expected to see measurements, or predictions, of the effects of flow on water depth in the shallowest riffles, which will potentially act as a bottleneck for migrating fish. Maximum cross-section depths of at least 0.24 m (with a velocity less than 2 m/s) are generally considered to be required to allow adult salmon passage through the shallowest riffles (Everest et al. 1985). This report provides no information on what flows are required to allow adult salmon passage (or passage of other species) up the lower Orari River and into Ohapi Creek.

In general there was considerable repetition in the report, with modelling results for the same set of species and life stages at the same sites presented at least three separate times –e.g. comparing natural MALF’s with current MALF’s (Figure 6), natural MALF’s, current MALF’s and three other flow scenarios (Fig 18), and natural MALF and two other flow scenarios (Figure 9 in Appendix D). This repetition made the report rather cumbersome and difficult to read.

The analysis of the effect of different flow/storage scenarios on periphyton accrual period focussed on the MAXIMUM number of days between flood events and found little difference among the different scenarios (Figure 27), which seemed surprising to me. However, I am not convinced that the MAXIMUM is the appropriate statistic to use for assessing if there are any differences among scenarios. I would like to see a comparison of the median, 75<sup>th</sup> percentile, 90<sup>th</sup> percentile, and 95<sup>th</sup>

percentile of the number of days between floods to adequately assess differences among the scenarios.

### ***Specific comments***

Summary, 4<sup>th</sup> paragraph, 1<sup>st</sup> line: poor grammar – “....it will be required to.....” please reword this section.

Summary, 4<sup>th</sup> paragraph, 3<sup>rd</sup> last line: “...at that time...” at what time?? Presumably this is still the current situation???

Summary, 2<sup>nd</sup> page, first line: would read better with something like “Storage of A block water resulted in a .....

Summary, last line “....impacts ON ecological values.”

Page 1, 1<sup>st</sup> paragraph, last sentence: To some extent I disagree with the idea that management of the water resource should involve balancing instream values with out of stream water use. In theory, instream values should be provided for by setting minimum flows and allocation limits. Once this is done, then allocation for out of stream use can be conducted. Of course this isn't what's always done and in over-allocated catchments some clawback and balancing is required.

Page 4, Section 3.1, 3<sup>rd</sup> paragraph: I think you mean continuous temperature or DO data, not 'daily' data. To me, daily suggests one measurement per day.

Page 9, Section 4.3, 1<sup>st</sup> line: The survey was in Feb 2010. So was done a while ago...

Page 10, Section 4.4: data only available up to 2009. What about data from 2010, 2011 and 2012??

Page 10, Section 4.4, paragraph 2, last line: Oligochaete spelt wrongly. Also need a full stop after snails on the third line.

Page 11: missing close bracket after *Anguilla australis*)

Page 15, Line 4: correct spelling of reference is Lamouroux

Page 15, Section 5.2.1, third paragraph: I'm not sure what point the author is trying to make regarding the relationship between flow and water clarity. The key point is that low flows and higher flushing flows are both important.

Page 16, Table 5: Why are there multiple minimum flows for the Orari River at lower gorge?

Page 17: There appears to be some confusion about what statistic habitat availability at low flows should be compared with. In small-medium sized rivers, habitat availability for flow demanding species/life stage is generally predicted to increase with flow above and beyond the natural MALF, with maximum habitat availability potentially at much higher (and unattainable) flows. Therefore, the appropriate comparison is to compare the % of habitat availability provided at a particular minimum flow with that available at the natural MALF. The only exception to this is in the unusual circumstances where maximum habitat availability may occur below the natural MALF, and therefore it is appropriate to compare the % habitat availability at the proposed minimum flow with the maximum habitat availability. The author seems to mix and match comparisons in the report, but particularly on this page. On page 18, (last line) the author quotes Wilding et al (2004) who also apparently focussed on comparison with maximum WUA, rather than WUA available at the natural MALF.

Page 19, line 4: Should be naturalised 7d MALF

Page 19, 3<sup>rd</sup> paragraph: text doesn't match the figure. Maximum habitat for juvenile brown trout does not occur at 60 L/s. Figure 7 suggests maximum is at about 250 L/s.

Page 20, last paragraph: While removal of macrophytes may have some benefits, there may be a drop in water level (and associated habitat loss) if macrophytes are removed.

Page 22, 1<sup>st</sup> paragraph, last sentence: How were impacts on temperature and DO considered?

Page 22: I am somewhat sceptical about the value of 'expert' panel derived minimum flows. What was the justification for a minimum flow of 46% of MALF??

Page 24, Section 5.5, Paragraph 2: There seems to be some internal repetition in this paragraph. The second sentence says it all. I'm not sure what the following sentences add (apart from some confusion)

Page 28, 2<sup>nd</sup> paragraph: The dual minimum flow regime sounds pretty clumsy. Maybe there are benefits??

Page 28, last paragraph, 3<sup>rd</sup> line: Do the flow regimes really provide "Optimal" flows for recreational sport fishing?? I'm not convinced about this. Has modelling been done using flow preference curves for trout and salmon anglers??

Page 33, Section 7.3.1, 2<sup>nd</sup> paragraph, Line 6: flows closer to AND ABOVE the natural 7d MALF.

Page 41, last line: replace were with where.

Page 42, 2<sup>nd</sup> paragraph, 2<sup>nd</sup> line: replace that with than

Page 42, last paragraph, line 3: For the three flow scenarios you're not increasing the 'natural' 7d MALF. All these scenarios involve abstraction. Plus in the last line the author needs to specify that the second mention of black fronted terns relates to the Rangitata curves.

Page 43, Figure 25: Rangitata is spelt wrongly.

Page 43, 1<sup>st</sup> paragraph: I don't think you can say that higher flows would MAXIMISE food production. A better statement would be that higher flows will provide more habitat for food production.

Page 45, 1<sup>st</sup> paragraph, line 4: replace that with than

Page 45, 3<sup>rd</sup> paragraph: A block TAKES can be....

Page 46, 3<sup>rd</sup> paragraph: replace where with were

Page 1/9, 4<sup>th</sup> bullet point: remove of

Page 7/14, 2<sup>nd</sup> paragraph, 4<sup>th</sup> line: remove is

Appendix F, Page 4, Section 1.1: Doesn't make sense. Perhaps something like "the model predicts no effect???"

Appendix F, Page 5: I struggled to read what this figure was. It may be important stuff??

**Reference**

Everest FH, Sedell JR, Armantrout NB, Nickerson TE, Keller SM, Johnson JM, Parante WD, Haugen GN 1985. Salmonids. In Brown ER (ed.) Management of Wildlife and Fish Habitats in forests of Western Oregon and Washington – Part 1. USDA Forest Service. Pp 199-230.

Yours sincerely

A handwritten signature in blue ink, reading "Roger S. Young". The signature is fluid and cursive, with the first name "Roger" and last name "Young" clearly legible, and "S." as a middle initial.

Roger Young, PhD  
Freshwater Ecologist