

IN THE MATTER of the Resource Management
Act 1991

AND

IN THE MATTER of applications for resource
consent by the Central Plains
Water Trust and a notice of
requirement for the
designation of land by Central
Plains Water Limited
associated with the
construction and operation of
the Central Plains Water
Scheme

**THIRD SUPPLEMENTARY EVIDENCE OF JOHN HAYES ON BEHALF
OF THE NORTH CANTERBURY FISH AND GAME COUNCIL AND THE
DIRECTOR GENERAL OF CONSERVATION**

1. INTRODUCTION

1.1 My name is John William Hayes. My qualifications and experience, and the basis upon which I prepared this third statement of supplementary evidence, are set out in my evidence in chief prepared for this hearing (dated May 2008).

1.2 I have been asked by Fish and Game to comment on Mr Cliff Tipler's evidence of 7 September 2009 on the revised CPWES. My comments are confined to effects on salmon angling.

2. COMMENTS ON SUPPLEMENTARY EVIDENCE OF MR TIPLER

2.1 In paragraphs 40 to 49 of his evidence Mr Tipler refers to a figure from a report by Mr Duncan for ECan that shows the preferred flow ranges for salmon angling and birds in the Waimakariri River. He also presents modified tables (in Figures 5-8 in Tipler's evidence) from Mr Duncan's report comparing the effects of the revised CPWES flow regime with flow regimes analysed by Mr Duncan undertaken for evaluating options for Plan Change 1 in the WRRP. On the basis of these comparisons Mr Tipler concluded that the revised CPWES regime will provide more days of preferred salmon angling flows (70 – 100 m³/s) than provided by allocation allowed under the existing WRRP and provided by the original applications by CPWES.

2.2 Mr Tipler's analysis inflates the number of days flows are in the preferred salmon angling range after abstraction. The reason for the upper bound on preferred flows for salmon angling (i.e., 100 m³/s) is that higher flows are most often too dirty for angling – not because the flows per se are too high (Figure 1). The CPWES abstraction will draw flows above 100 m³/s into the preferred range but most of these flows will be too dirty for angling so will be of no use to salmon anglers. In fact since the preferred salmon angling

flow range extends up to flows which become too dirty for angling (about 100 m³/s), abstraction can not increase the number of days that flows are in the preferred range. Any analysis that indicates the contrary should be viewed with suspicion.

2.3 In paragraphs 50 – 53 Mr Tipler says he does not believe water clarity will increase with flow reduction (i.e., there will not be an adverse effect of increased water clarity on salmon angling). In support of his opinion he argues that water velocity does not increase with increasing flow and therefore fine sediment does not remobilise from the bed with increasing flow. This is incorrect. Figure 2, reproduced from Figure 4.1 in Jowett et al. (2008), present results from hydraulic modelling at Crossbank demonstrating that mean velocity increases with flow. Flow reduction is correlated with increased clarity with distance downstream in the Waimakariri River, as I demonstrated in my evidence in chief. Furthermore, I reported a similar relationship in the Waitaki River in evidence I presented on salmon angling at the North Branch Tunnel Concept Consents Hearing.

2.4 In paragraphs 8.41 – 8.42 and Figure 16 of my evidence in chief I report that I found a significant regression between water clarity and flow when clarity is in the range 1 – 2 m at the Gorge. When clarity is within this range the water gets dirtier downstream as flows increase above 40 m³/s. The corollary is that the water will get clearer with flow reduction above 40 m³/s.

2.5 In reference to paragraph 2.2 above, flows that are above 100 m³/s and which are drawn into the preferred flow range for angling by abstraction will remain too dirty for salmon angling downstream because these turbid flows are below the clarity range over which clarity changes with distance downstream (i.e., 1 – 2 m at Gorge).

2.6 In paragraph 56 of his evidence Mr Tipler says that reduction in fishable area will be less under the revised CPWES flow regime than under the original CPWES flow regime. I agree but in order to

adequately assess this effect of the revised scheme, fishable area would need to be estimated for monthly median flows (cf my analysis of salmon angling habitat in my evidence in chief).

John Hayes

2 October 2009

References

Jowett I, Duncan M, Hayes J 2008. Flow requirements for fish habitat and salmon angling in the Waimakariri River. NIWA Client Report: HAM2006-026. Prepared for North Canterbury Fish & Game Council.

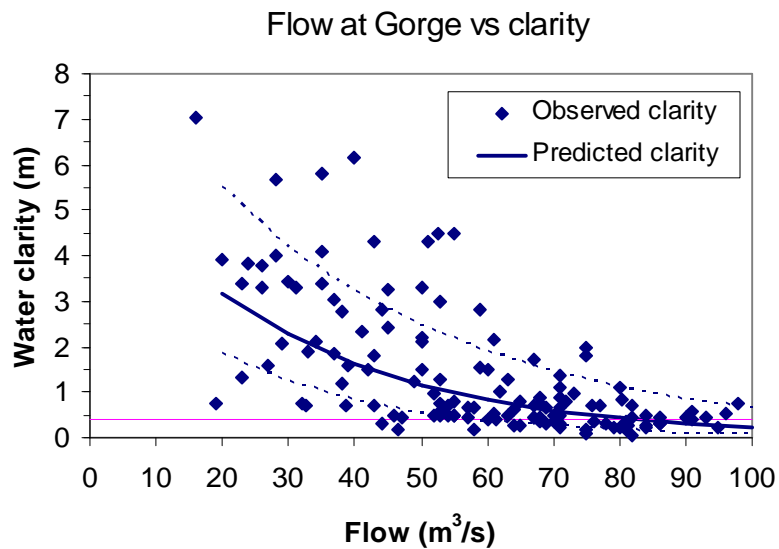


Figure 1 The relationship between flow and water clarity at the Waimakariri Gorge.

Significant regression statistics: $R^2 = 0.43$, Clarity = $EXP(1.8258-0.0336*Q)$, slope $P<0.000$. Dashed blue lines represent 95% confidence limits; **pink horizontal line marks the 0.4 m minimum clarity threshold for salmon angling.**

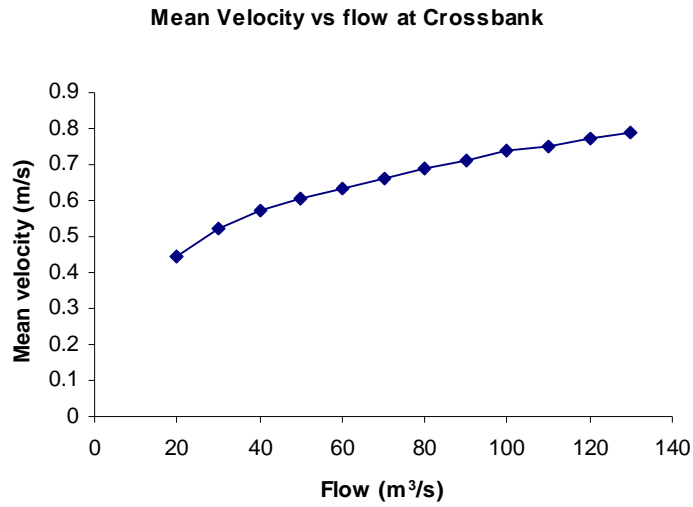


Figure 2. Mean water velocity versus flow predicted from hydraulic modelling at Crossbank (see Figure 4.1 in Jowett et al. 2008).