



25 November 2012

Dr Tim Davie
Surface Water Resources & Ecosystems Section Manager
Environment Canterbury
PO Box 345
Christchurch 8140

Dear Tim,

REVIEW OF REPORT ON ECOLOGICAL VALUES AND FLOW REQUIREMENTS OF COOPER CREEK

This report summarises the ecological values of Coopers Creek and considers an appropriate minimum flow and assessment point to maintain the ecological values found in the Creek.

Modelling of habitat/flow relationships can be difficult and/or meaningless in spring-fed streams where there is often no relationship between water level and flow, because macrophyte abundance is often the main factor controlling water levels in these systems. The author experienced this difficulty in Coopers Creek and was unable to say whether the current minimum flow in Cooper Creek could be raised or lowered while still protecting the ecological values.

In these situations it may be more appropriate to define a minimum flow using hydrological records (e.g. 90% of the natural MALF). However, in many cases, including Cooper Creek, hydrological records are not available or insufficient to provide an accurate estimate of key flow statistics like the natural MALF.

In some situations the main factor associated with low flows that may be affecting ecological values is dissolved oxygen (DO). Daily fluctuations in dissolved oxygen are often large in spring-fed streams because of the abundant macrophyte growths, and since groundwater entering spring-fed streams often has low DO. Reductions in flow are expected to exacerbate daily DO fluctuations, although some recent work that I have conducted doesn't support this expectation in spring-fed streams. Therefore, I don't advocate that extra effort should be put into DO modelling in this case.

Another approach to minimum flow setting in spring-fed streams is to base the minimum flow on maintaining permanent flow in a particular length of stream (e.g. minimum flow will provide 90% of the stream length that would have had permanent flow at the natural MALF). Obviously the lack of key flow statistics will also affect this approach, but minimum flows could be based on observed flows (e.g. minimum flow will provide permanent flow in the reach from the spring head to at least 200 m downstream of SH72). The report author could consider if sufficient information on flows and creek drying is available to set a minimum flow using this approach.

Since there is a poor relationship between flows in Coopers Creek and the Orari River gorge, I support the report's conclusion that water abstraction from Coopers Creek should not be controlled by flows at the Orari gorge, and instead flows in the Orari upstream of Ohapi Creek, or within Coopers Creek itself, are used to manage water abstraction from Coopers Creek.

Specific comments

Page 6, Table 2: close bracket required after DO%

Page 6, Section 3.4, Line 4: macrophytes spelt wrongly

Page 7, Second line: replace 'where' with 'were'

Page 8, Line 3: Check spelling of *Anguilla*

Figure 7 – Wow!!

Page 12, Section 5.0, 2nd paragraph: It should be remembered that the minimum flow will control irrigation takes, but doesn't guarantee that flows will not drop below the minimum flow. Even if the minimum flow was set at the natural MALF, flows would naturally be lower than this every couple of years.

Yours sincerely,

A handwritten signature in blue ink that reads "Roger S. Young". The signature is fluid and cursive, with the first name "Roger" and last name "Young" clearly legible.

Roger Young, PhD
Freshwater Ecologist