

## Snowy River flow response monitoring and modelling – water bugs

Following construction of the Snowy Mountains Scheme between 1955 and 1967, flows in the Snowy River have been severely altered. To improve river health, water was released to the Snowy River via the Mowamba River as a result of the de-commissioning of the Mowamba River aqueduct. The Snowy River Flow Response Monitoring and Modelling program was established to assess the changes in river conditions that could be attributed to the new environmental water releases. This summary assesses the first stage Environmental Flow Regime (EFR) to the Snowy River from August 2002.

### Water Bugs

Aquatic macroinvertebrates (water bugs) respond to changes in river flows. Water bugs were sampled pre and post the EFR (Figure 1).



Figure 1 (left): Sampling water bugs in the Snowy River.

The water bugs of the upper Snowy River did not change after the EFR and the types and number of water bugs remained very different to nearby reference and control rivers (Figures 2 and 3). Reference rivers are waterways that are not affected by dams and contain types of water bugs that were likely to be found in the Snowy River prior to the construction of Snowy Mountains Scheme. The control river is a system that will not receive an EFR and reflects bugs that can cope with a highly altered flow regime.

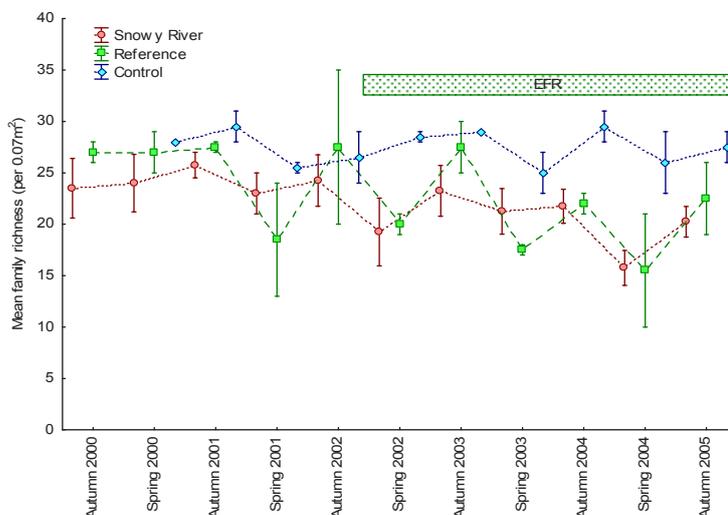


Figure 2 (left): Mean macroinvertebrate family richness in riffles from upland Snowy River, control and reference sites, before and with EFR (error bars  $\pm$  S.E.). Source: Brooks et al. (2007).



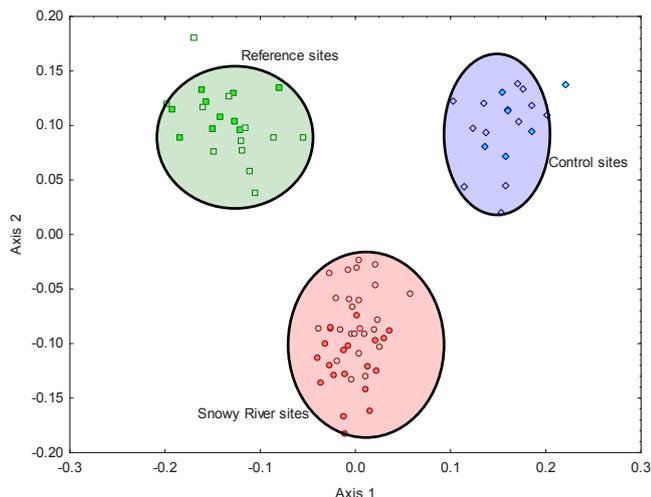


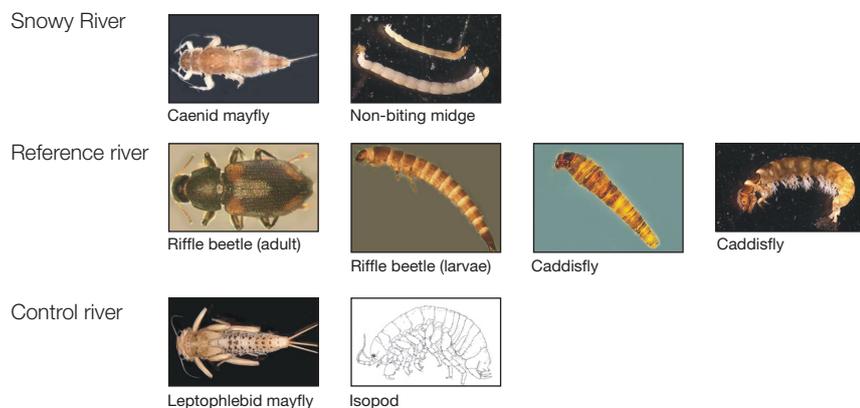
Figure 3 (left). Canonical analysis of principal components (cap) ordination on water bugs in running water from the upland Snowy River, control and reference sites, and before (closed symbols) and with (open symbols) EFR. Source: Brooks et al. (2007).

The closer the large circles the more similar the water bugs, the further apart the less similar the water bugs.

The running water bugs that distinguished the groups for the Snowy River, reference and control rivers are shown in Figure 4. In general:

- the Snowy River sites typically had higher densities of caenid mayflies and non-biting midges
- the reference sites contained higher densities of caddisflies (Conoesucidae and Hydropsychidae) and Elmidae (larvae and adult)
- the control sites contained higher densities of leptophlebiid mayflies and isopods (Phreatoicidae).

Figure 4. Types of river bugs found in the Snowy River, reference and control rivers



Images from the Murray-Darling Freshwater Research Centre. Line drawing of Isopod by Buz Wilson, Australian Museum

The reason for the lack of changes to water bugs within the Snowy River was because the very small changes to the flow regime after decommissioning Mowamba River aqueduct were not sufficient to increase habitat diversity. Total wetted area and running water area increased by approximately 50 per cent with the environmental flows in the upper Snowy River.

It is possible that while water bug composition was not altered greatly by the first stage of the environmental flow regime, total invertebrate abundance in running water habitats may have increased in relation to increased habitat area. There is unlikely to be a change in the upper Snowy River water bug assemblage composition until base flows are increased and high flow events are an integral part of the environmental flow regime.

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