NSW GOVERNMENT Office of Water

SNOWY FLOW RESPONSE MONITORING AND MODELLING

The potential drift-barrier effect of Mowamba Weir

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BACKGROUND

Impoundments and diversions throughout the Snowy River Catchment have severed flow connections between the Snowy River below Jindabyne Dam and its headwaters[1]. 99% of mean annual flows from the upper catchment are diverted to the Murrumbidgee and Murray Rivers, disrupting the natural flow regime to downstream reaches and impacting on aquatic communities. Between August 2002 and January 2006 environmental flows were released from the Mowamba River, a tributary below the Jindabyne Dam (Fig 1), to improve the ecological condition of the Snowy River. Although invertebrate communities were expected to recover via drift, the apparent lack of recovery[2] has raised concern over the role of a weir on the Mowamba River acting as a barrier to the downstream migration of invertebrate fauna during environmental flows.

Figure 1. Jindabyne Dam and surrounding area. Circles represent approximate sample locations for the study.

OBJECTIVES

1. Determine if Mowamba Weir is a barrier to invertebrate drift and particulate organic matter transport.
2. Evaluate options for managing Mowamba Weir to assist the recovery of macroinvertebrate communities in the Snowy River.

STUDY AREA

The Mowamba River is an upper snowmelt tributary of the Snowy River, joining the Snowy River approximately 2km below Jindabyne Dam (Plate 1). The Mowamba River is regulated by a weir (Plate 2) located 4.25km upstream of the confluence with the Snowy River. Flows up to 523ML day-[1] to the weir are diverted to Jindabyne Dam via the Mowamba Aqueduct[3].

EXPERIMENTAL DESIGN AND METHODS

We predict the potential barrier-effect of Mowamba Weir depends upon the size of the weir relative to that of large natural pools (i.e. potential natural barriers).

We will test this by:

- Comparing drift through the weirpool with drift through multiple (12 to 16) reference pools.
- Sampling Drift with 25x25cm drift nets (250µm mesh) placed randomly across a transect of known cross-sectional area (Plates 3 and 4).
- Sampling for 3 hours after sunset, coinciding with peak drift densities[4] (see Pilot Studies). The proportion of surface area sampled will be used to estimate total drift abundance (genus).
- Sampling across three different discharges during environmental flow releases when flows overtop the weir.

Pilot studies are being conducted to resolve experimental design issues including: the number and array of nets, the optimal time of day to sample, the amount of time to sample for, the practicality of placing large numbers of nets efficiently.

EXPECTED OUTCOMES

We anticipate that the weir is a partial barrier under normal baseflow, reflecting the mobility of taxa and their capacity to survive slow-flow habitats.

Management options: modify or decommissioning the weir, partially decommissioning the weir during key seasons/times of day, or when flows permit passive transport through the weir.

Plate 1. Jindabyne Dam.

PILOT STUDIES

Thredbo River (August 2010)

Samples collected at 1 hr intervals before and after sunset.

Peak Drift

Occurred between 1 and two hours after sunset (Figure 2).

Taxonomic composition - larval

Plecoptera (stonefly) 36%, Ephemeroptera (mayfly) 20% and Chironomidae (midge) 13% (Figure 3).

Plate 2. Mowamba Weir during an environmental flow release. Photo: R. Bevitt

Plate 3. 25x25cm nets with 1.5m tails and 250um mesh arrayed along a transect in the Thredbo River to sample drifting invertebrates and transported CPOM. Nets are fixed to star pickets using 6mm steel roundbar[5]. Photo: D. Coleman

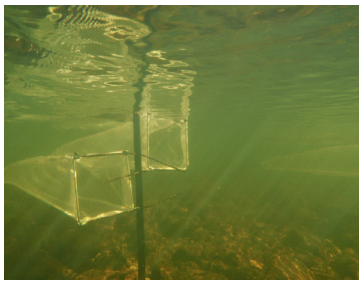

Plate 4. An image of drift nets taken from underwater. Nets are placed at varying depths. Photo: D. Coleman

Plate 5. An image of a stonefly larvae from the Snowy River Catchment (Plecoptera Gripopterygidae). Photo: D. Coleman

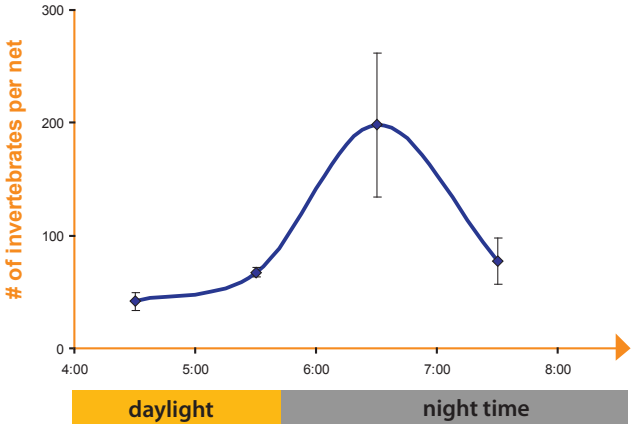

Figure 2. Mean drift densities across four sample times (n=2)

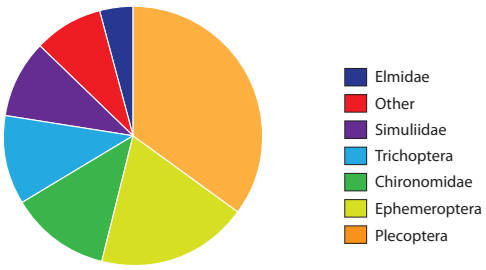

Figure 3. % taxonomic composition (% of total sample; n=8)

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