

**Cataract Gorge – Relationship between environmental flow releases  
and habitat for the Beddomeid snail, *Beddomeia launcestonensis*.**

**Report to Hydro Tasmania**

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# Cataract Gorge – Relationship between environmental Flow releases and habitat for the Beddomeid snail, *Beddomeia launcestonensis*.

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## Background

A survey was required to assess the potential for proposed environmental flow releases from Trevallyn Dam to connect with or enhance habitat for the aquatic snail *Beddomeia launcestonensis*, a species endemic to Cataract Gorge.

Habitats occupied by *B. launcestonensis* within Cataract Gorge are described by Davies and Cook (2002) and Spiers (2003). *B. launcestonensis* is known to occupy a restricted range of habitats within Cataract Gorge. The two principle habitat types occupied by the species are:

- Boulder fields within the First Basin – particularly at shallow to intermediate depths along the north-eastern shore of the main Basin pool. This restricted range is believed to be a result of the location of higher flow velocities within the First Basin during flood events, combined with the distribution of fine sediment deposits which accumulate during prolonged periods of flow;
- Scour holes within the Gorge, particularly between Deadman’s Hollow and the Second Basin. These holes are formed by local erosive action of cobbles on the main bedrock within the Gorge channel. *B. launcestonensis* occupies scour holes occurring within a limited range of elevations above the centreline (thalweg) of the Gorge channel. This restricted range of occupied locations is believed to be due to the interacting effects of flood frequency and the magnitude of shear stress during flood.

The magnitude of minimum environmental flows in the Gorge is being evaluated by Hydro Tasmania, as releases form Trevallyn Dam. These flows are aimed at providing a range of environmental services. This report describes a visual assessment of the degree to which releases of various magnitude may interact with known scour hole habitats for *B. launcestonensis*. A flows of 3.0 cumec was scheduled for release from the Dam on 27 April 2010. Field observations were required of the relationship between water levels associated with these releases, and water levels associated with known habitat locations within the Gorge.

## Methods

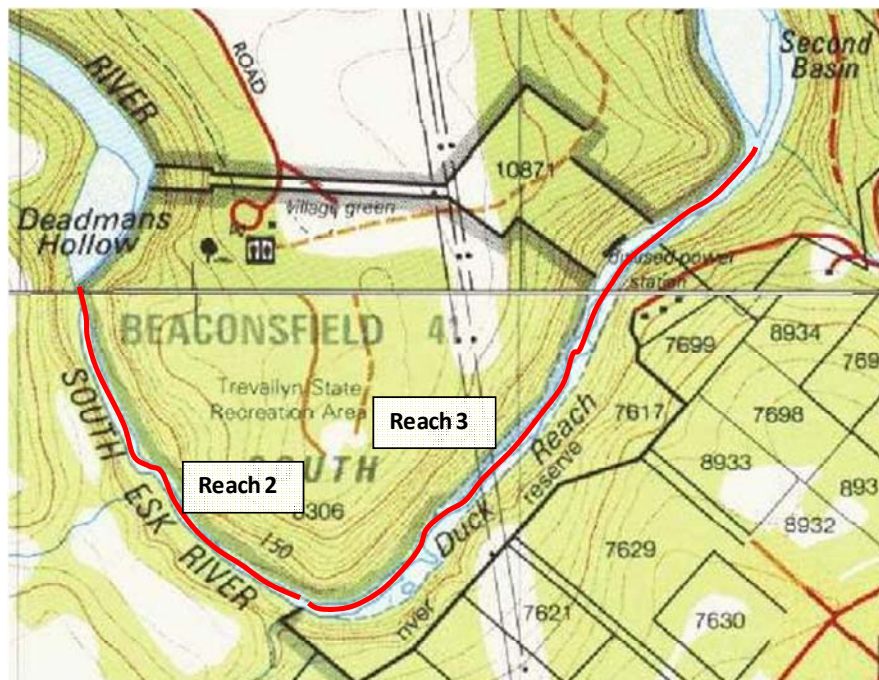
Twenty-nine known scour hole habitat locations from 11 locations within the Gorge within Hydro’s study Reaches 2 and 3 (Figure 1) were visited between 26 and 27 April 2010. Scour holes and adjacent water levels were observed over several hours when water levels within the Gorge were stable during the highest trial flow release (3.0 cumec).

Observations were made of the number of scour holes connected to the main channel water levels during the trial flow release period.

Each scour hole was inspected for the presence of snails by actively examining the inner walls of the scour hole and the surfaces, including the undersides of any boulders or large rocks within them.

All snails were identified (to family level for non-target taxa, to species for *B. launcestonensis*). The abundance of each snail taxon was estimated within each scour hole, and recorded in rank categories as follows: 0 -10 individuals, 10 – 25, 25 – 50, 50 – 100, 100 – 250, 250 – 500, > 500.

Scour hole dimensions, temperature, conductivity and dissolved oxygen were also recorded.



**Figure 1. Reaches in Cataract Gorge in which scour holes were surveyed for *B. launcestonensis*.**

**Table 1. Location of surveyed scour holes.**

Hydro Study Reach	Group	Easting	Northing	Scour holes
<b>Reach 2</b> Upstream Dalrymple Ck	1	508560	5409627	7 (A – G)
	2	508396	5409773	2 (A, B)
	3	508247	5410178	1 (A)
	4	508265	5410102	4 (A – D)
<b>Reach 3</b> Downstream Dalrymple Ck	1	509289	5410169	2 (A – B)
	2	509429	5410339	3 (A – C)
	3	509747	5411452	1 (A)
	4	509718	5411417	1 (A)
	5	509224	5410056	4 (A – D)
	6	508883	5409613	1 (A)
	7	508848	5409558	3 (A – C)

## Results and Discussion

Survey conditions were good, and all scour holes designated for survey were successfully located and assessed prior to and during the 3 cumec release. 27 of the 29 scour holes were occupied by aquatic snails (primarily snails of the family Planorbidae), with 8 being occupied by *Beddomeia launcestonensis* (Table 2). Of these, three had high densities (250 – 500 animals per hole).

Water levels in the Gorge in the reaches adjacent to the scour holes stabilised at only 15 – 20 cm above the current long-term environmental flow level (1.5 cumec) during the period of trial release of 3.0 cumec at Trevallyn Dam.

Only two of the 29 scour holes had entrance elevations within 0.5 m elevation of the 3 cumec release, with the remainder being between 1 and 3.8 m above the water level (based on scour hole elevations reported by Davies et al 2009). Neither of these lowest elevation scour holes were occupied by *Beddomeia launcestonensis* in April 2010, and had also not been occupied by the species in April 2009 (Davies et al. 2009).

The 3.0 cumec release did not result in any water connection to any of the 29 previously surveyed scour holes or to any other scour holes closer to the water level. The increase in water level to 3.0 cumec from the normal release level was primarily contained within the main channel with little or no lateral spread.

In surveying habitat for *B. launcestonensis*, Davies and Cook (2001, 2002) concluded that scour holes and clefts/undersides of boulders were the dominant habitats, but only where:

- River flows did not lead to high turbulence;
- Periods between high flows did not lead to sedimentation and/or excessive competition by other snail species.

Targeted research around the issue of flow tolerances (Spiers 2003) further supported these conclusions with improved understanding of *B. launcestonensis*' low tolerance to near-bed shear stress.

**Photos 1. Typical scour holes occupied by *B. launcestonensis* in April 2010. Scour hole A, Group 1, Reach 2 (approx. 3 m above 3 cumec water level).**

Thus it appears that the species habitat is restricted by two factors:

- Levels of turbulence during high flow events;
- Levels of fine sediment deposition and space/food competition by other snails between high flow events.

This effectively restricts the species to :

- Scour holes high in the channel profile to maintain wetted habitat between high flow periods but protected from excessive turbulence during floods (mid-Gorge scour holes at medium elevation above the channel centreline);
- Crevices between and under large boulders in sheltered pool areas which do not become excessively silty between high flow periods (part of the 1<sup>st</sup> Basin).

The species occupies scour hole and boulder crevice habitats in areas which experience intense flow during floods.

Occupation of these micro-habitats therefore promotes fine sediment scouring as well as exclusion of competition, while protecting *B. launcestonensis* from excessive shear stress during flood event peaks.

**Table 2. Scour hole characteristics and numbers of snails in Reaches 2 (upstream of Dalrymple Creek) and 3 (downstream of Dalrymple Creek) in Cataract Gorge, April 2010. Snail numbers in categories as follows: 1 = 1-10, 2 = 10-25, 3 = 25-50, 4 = 50-100, 5 = 100-250, 6 = 250-500, 7 = > 500.**

Gorge Reach	Group	Scour hole	Depth mm	Width mm	Length mm	Temp Deg C	Conductivity microS/cm	Oxygen mg/l	B. launcestonensis	Austropyrgus Species 1	Austropyrgus Species 2	Planorbidae	Physidae	
Reach 2 Upstream Dalrymple Ck	1	A	360	320	320	12.6	37.6	10.4	3	4		5		
		B	380	420	1420	12.3	22.9	11.6				6		
		C	390	450	450	13.2	25.3	13.24				5		
		D	140	120	370	13.5	16.3	13.8						
		E	525	810	1140	14.3	39	4.09				2		
		F	380	1090	1180	14.2	15.9	13.8				4		
		G	540	810	810	13.2	12.8	12.18				5		
	2	A	650	630	2610	13.2	9.3	11.43	2			4	1	
		B	410	250	250	13.5	25.7	13.33				3		
	3	A	330	650	650	13.7	60.4	9.79	6	1		6		
		4	A	690	470	910	14.6	18				9.91		6
			B	370	410	590	13.7	20.8				10.64		2
			C	490	490	570	14.5	15.2				10.57		3
	D	200	670	670	13.7	12.9	11.17	4						
Reach 3 Downstream Dalrymple Ck	1	A	120	690	690	14.6	126.9	8.86	2	5	4	4		
		B	150	750	750	14.5	122.8	9.37				2		
	2	A	560	560	370	15	12.3	6.89	1			6	5	
		B	840	520	820	14.8	78.4	7.28				6		
		C	640	360	360	14.6	18.7	7.9				6		
	3	A	310	650	650	14.5	113.6	11.94	6			1	2	
		4	A	660	640	1280	14.5	31				10.76		5
	5	A	260	760	760	14.3	27.3	9.14	1			2	2	
		B	360	870	1600	14	37.5	9.63				4		
		C	870	810	810	14.8	22.3	7.73				4		
		D	570	470	470	12.8	35.7	11.09				2		
	6	A	230	570	570	13.7	106	5.8	6	2	4	4	4	
		7	A	220	1150	1150	14.4	89.8				11.6		6
		B	370	880	880	13.7	15.9	17.7	2			5	5	
		C	380	1050	1050	15	87.9	11.07				6		
												7		6

Despite intensive survey, no scour holes immediately adjacent to the main channel in the Gorge have been found to contain *B. launcestonensis*. Thus, flows of 3 cumec are unlikely to provide substantive improvement in scour hole habitat, as the species' distribution in scour holes is believed to be determined by conditions during high flows (and subsequent competitive exclusion and/or poor water quality during intervening low flow periods). Any baseflow level at or below 3 cumec would have no influence on scour hole habitats currently occupied by *B. launcestonensis*.

Flows in the range 0 to 5 cumec are also unlikely to cause any change to the species' habitat availability or quality in the 1st Basin boulder field, as flows in this area are not strongly driven by such low river flows. Hydraulic conditions at low flows in this area tend to be driven by wind, with fine sediment scour occurring during high flow events (Davies and Cook, field observations).

It is concluded that a release of up to 3 cumecs has no connection with, and no effect on, scour hole habitat for *B. launcestonensis* in Cataract Gorge, and is unlikely to cause any significant change in habitat for the species above existing release levels. This is consistent with observations made previously by Davies and Cook (2001, 2002) and Spiers (2003).

## References

- Davies PE and Cook LSJ 2001. Cataract Gorge: Environmental Flow Assessment. Report to Hydro Tasmania. December 2001. 38 pp.
- Davies PE and Cook LSJ 2002. The Cataract Snail - *B. launcestonensis* - status, management and critical habitats. Report to Hydro Tasmania. March 2002. 26 pp.
- Davies PE, Cook LSJ and Smith B 2009. Status of *Beddomeia launcestonensis* in Cataract Gorge. Monitoring report to Hydro Tasmania. April 2009. Freshwater Systems, Hobart. 10 pp.
- Spiers D 2003. Factors affecting the distribution of the endemic hydrobiid gastropod, *Beddomeia launcestonensis*, in Cataract Gorge, Launceston, Tasmania. Honours Thesis, School of Zoology, University of Tasmania, Hobart.