

Document type: Water advice report
Document ID: **WMA2017/01**
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Water Resources Group
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Date: November, 2017

Title: “Review of Hurst Creek (including Coxs Rivulet) environmental water requirements report.”

SUMMARY: Prior to the initial commencement of work to review the Water Management Plan for the Great Forester River catchment, DPIPWE conducted studies to develop environmental water requirements for lower Hurst Creek and Coxs Rivulet (DPIW, 2007). These EWR recommendations are reviewed and form the basis for simplified cease-to-take triggers that may be considered for inclusion in the revised water management plan for the catchment.

Summary of background information

- The DPIW study into environmental water requirements for the Hurst Creek sub-catchment (Report WA 07/08; DPIW, 2007) was completed in October 2007 for the first planned review of the Great Forester WMP
- The study divided the area into the upper catchment (upstream of Oak Dene Road and Shanty Road; where most of the instream dams and intensive agriculture is situated) and the lower catchment.
- A brief CFEV analysis showed that the middle to lower reaches of the Hurst Creek catchment have significant conservation value whilst the upper reaches have low to moderate conservation management priority. The majority of Coxs Rivulet is of moderate conservation management priority.
- Independent environmental ground-truthing confirmed the poor condition and low Conservation Values of both streams in the upper catchment.
- For river sections in the lower catchment, *Melaleuca ericifolia* swamp forest, shrubby *Eucalyptus ovata* forest, and a priority riparian vegetation community are values contributing to ‘H’ or ‘VH’ conservation management priority (CMP). There is also a diverse community of native fish, including the listed Australian grayling (*Prototroctes maraena*) which occurs in the Great Forester estuary and the lower sections of Hurst Creek (Davies and Cook, 2006). Upstream penetration by many of these migratory

species is limited by the instream dams of the upper catchment. The listed giant freshwater crayfish (*Astacopsis gouldi*) was also found during surveys in 2004 and 2006.

- Lower Hurst Creek is where most of the 'H' and 'VH' CMP river sections and 'High' CMP wetland patches occur.
- Water quality in both streams appears to be modified; it was noted at the time that Coxs Rivulet received outflow from the Scottsdale WWTP, the impact of which could be seen in conductivity values downstream. This is likely to have changed since the closure of the Simplot vegetable processing factory and the changed operation by the WWTP.
- River health sampling was conducted first in 2002 and then again in 2004 and 2006. The results broadly suggest that both Hurst Creek and Coxs Rivulet vary between significant to severe impairment (B-C band). Poor water quality and severe instream habitat degradation were both seen as likely influences on these results.
- Departmental and Consultancy studies have shown that the proliferation of instream dams in the upper catchment have greatly modified the hydrology of both streams, particularly in summer (although local groundwater discharge points in the upper Coxs Rivulet were noted as lifting baseflows in this stream).
- It was noted that of the 67 storage dams within the Hurst Creek catchment (WIMS, 2007) approximately 50 to 80% are not designed to allow for the passage of flows when they are below their Maximum Flood Level (MFL). It was also noted that in most years dams in the upper catchment do not reach their MFL until the period March - July (SKM, 2004), thus capturing all surface runoff up until this time. Once dams are filled, winter flows downstream are closer to 'natural' and likely to be sufficient to maintain instream and riparian values in lower Hurst Creek and Coxs Rivulet.

Environmental Flow Recommendations

- Baseflow environmental water requirements (EWR's) are recommended for the lower reaches of both Hurst Creek and Coxs Rivulet (Boddingtons Road) based on flow estimates made using aerially scaled gauged flow data from the Great Forester River corrected with spot gaugings from both creeks (Tye and Clayton, 2001). There is no gauged data from these sites, but it was noted that from the spot gauging data that there is little correlation in flow between the two streams.
- The recommended EWR's (provided in the tables below) are based on the 20th percentile winter flows and 30th percentile summer flows (as per Graham et al., 2000). This is now a generic approach used within DPIPWE's Water Allocation Tool, and is not based on specific localised environmental studies other than the general environmental information presented above.
- The report also recommends further water development be restricted until a Sustainable Diversion Limit (SDL) is developed for the Hurst Creek catchment or alternatively that the current operation and allocations be maintained with no further development permitted into the future.

Hurst Creek (at Boddingtons Road)

Percentile	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.1	11	9	9	15	17	27	35	38	32	23	19	14
0.2	12	10	11	16	21	33	43	45	40	29	22	16
0.3	12	10	11	17	23	36	50	59	44	31	26	17

Coxs Rivulet (at Boddingtons Road)

Percentile	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.1	15	11	12	19	21	35	45	49	41	30	25	18
0.2	15	13	14	20	28	42	56	58	52	37	29	20
0.3	16	14	15	22	30	46	65	76	56	40	33	22

Additional information following discussion with Rural Water Management Officer (RWMO):

Discussions with Fiona Woodward (previous local RWMO for the area) highlighted a couple of issues pertaining to this matter:

- Tasmania Irrigation will be delivering water into Hurst Creek (downstream of the main dam developments in the upper catchment) for users lower in the catchment.
- While DPIPWE may consider creating a specific zone within the revised WMP for managing water users in lower Hurst and Coxs creeks, there are not that many water users (RWMO pers comm.) and they are now habituated to the current restriction practices based on the Great Forester gauge.
- If a new management zone is created, then the RWMO has indicated that a single gauge board on lower Hursts Creek could be sufficient for local management – however, this would need some sort of rating. If this occurred, then DPIPWE should consider a simple summer and winter set of EWR (cease-to-take) thresholds, recognising the limited nature of the EWR derivations developed.

Comment and recommended action:

Review of the Hurst Creek and Coxs Rivulet EWR report from October 2007 revealed that the approach taken to making environmental flows recommendations has simply followed the standard WAT formula (30th percentile threshold in summer and 20th percentile threshold in winter). Given the problems that have arisen more recently with this approach in other catchments, and the fact that the thresholds for each stream are based on modelled data from the Great Forester River, it should only be viewed as a rough guide. A flow and gauging analysis undertaken in 2001 (WRA 01/11) also states that flow in the two streams are not well correlated and may experience quite different volumes of groundwater inflows.

While it seems clear that there are a number of significant and important environmental values in the lower reaches of both Hurst Creek and Coxs Rivulet that warrant some sort of environmental flow provision, without reliable flow data, deriving local cease-to-take thresholds is problematic. However, installation of streamflow gauging stations in either or both of these small tributaries is not likely to be economically viable.

In light of this, the following actions should be considered:

- That in the first instance a clear decision is made (following discussions between DPIPWE and local water users) that there is a need for a new water management zone under a revised Great Forester WMP.
- Following the decision to create a new water management zone, local water level gauge boards are installed in lower Hurst Creek and Coxs Rivulet.
- During the 12 months following gauge board installation, at least 10 flow gaugings are collected at these locations so that relationships between water level and flow in these streams can be better understood. Towards the end of this period advice on the ecological relevance of flows can be provided by the Ecohydrology section.
- To commence, and with the aim of ultimately refining local flow triggers for these two streams, the following simple summer and winter flow threshold figures for Hurst Creek and Coxs Rivulet be considered:

	Summer (Oct – Apr)	Winter (May-Sep)
Hurst Creek	15 ML/day	35 ML/day
Coxs Rivulet	20 ML/day	45 ML/day

References

- DPIW (2007) Environmental Water Requirements for the Hurst Creek Catchment. Water Resources Division. Department of Primary Industries and Water, Hobart, Tasmania.
- Graham, B., Nelson, M., Read, M. & Fuller, D. (2000) Desktop Method for Environmental Water Requirements in North East Tasmania. Resource Management and Conservation Division. Department of Primary Industries, Water and Environment, New Town, Tasmania.
- Tye, I. & Clayton, M. (2001) Great Forester catchment stream gauging program 2001: work undertaken to assist the water management planning process in the catchment. Department Primary Industries, Water and Environment, Hobart, Tasmania.