

An Empirically-based Sediment Budget for the Normanby Basin

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Appendix 01: Study Area



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Appendix to the Final Report prepared
for the Australian Government's Caring
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This Version: 3/03/2013



Appendix 01 Study Area

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1. Catchment description

The Normanby River, approximately 200km long, originates in the mountains in the east and south of the Catchment area (16°S; 145°E) and flow north to Princess Charlotte Bay (14°24' S; 144°8' E). Major tributaries include the East Normanby, West Normanby, Laura and Jack River to the southeast and east, and the Mosman, George and Kennedy Rivers in the south and southwest. During the wet, the Normanby connects to the adjacent North Kennedy River (to the west). The North Kennedy river system includes the Hann River, Moorehead River, Saltwater Creek, and Annie River. Together these connected river systems form the larger Normanby Basin Catchment Area.

Topography in the upland areas ranges from undulating rises to steep mountain ranges, with deeply dissected sandstone plateaus and intervening plains (Howley, 2010). The lower part of the catchment comprises a low plain covered by residual sands and a floodplain consisting of Quaternary sediments up to 60 km wide (Bryce et al., 1998). The river is tidal to around 50 km from the mouth and the tidal reach meanders across an extensive, generally low-lying Chenier plain and mid Holocene deltaic plain (Bunt and Stieglitz, 1999).

The Catchment is located in the dry tropics where climate is characterised by extreme wet (summer) and dry (winter) seasons with 95% of its annual rainfall occurring between the months of November and April (Howley, 2010). Rainfall in the Normanby catchment has been estimated at 1085 mm/year (NLWRA, 2001). Long term annual median rainfall at Laura Post Office (stn 28000) is 928mm, however, there is pronounced inter annual variability with distinct wet and dry periods (Figure 1). Annual rainfall during the study period at Laura Post Office (which is located in the drier south western portion of the catchment) for water year 2009/10, 2010/11, 2011/12 were 709mm and 1543 mm, and 1211mm respectively. Hence the study period encompassed a significant range of conditions, with the 2009/10 wet season being around the 25 percentile; the 2010/11 season above the 95 percentile and the 2011/12 season being around the 75 percentile of long term annual rainfall.

Significant portions of the Normanby and its tributaries are ephemeral; late in the dry season surface water is largely stored in a series of waterholes connected via sub-surface flow through river sands. Wet season flood waters feed extensive wetland systems in the alluvial and marine plains of the lower catchment area and connect otherwise isolated wetlands and adjacent river systems.

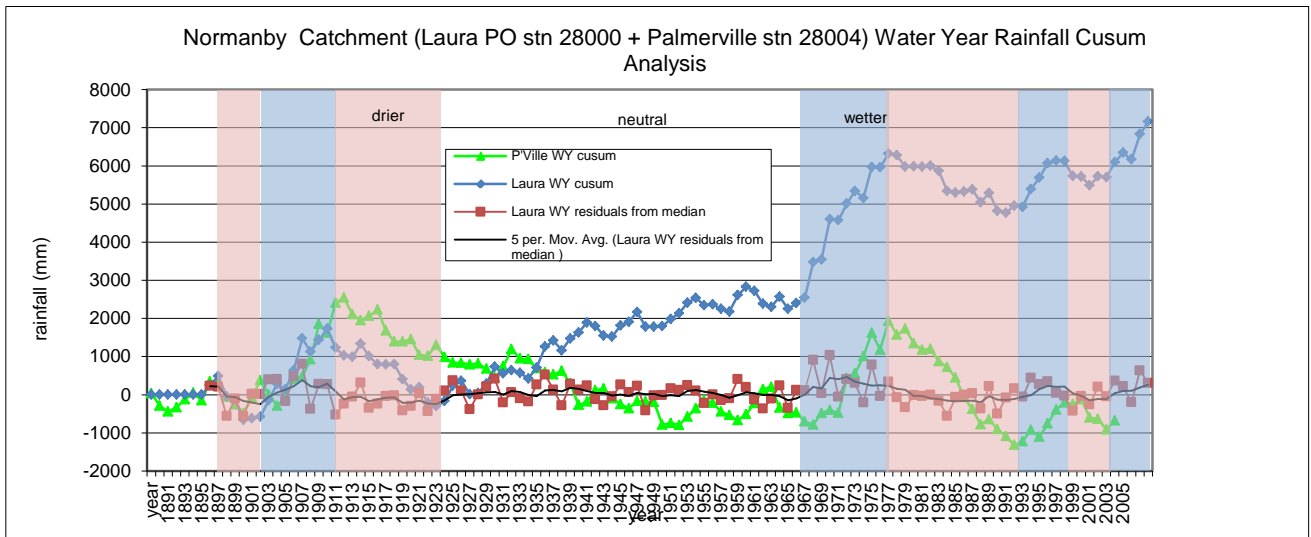


Figure 1 Inter annual rainfall variability as expressed by the cumulative sum of the annual deviation from the long term median water year rainfall (cusum) for the Laura Post Office record – the longest rainfall record within the Normanby Catchment. Also shown is the same trend from Palmerville Station – which is just outside the catchment to the south. Also plotted are the residuals from the long term median with a 5 year running average fitted.

Vegetation in the Normanby catchment is dominated by Eucalypt woodland and open forest with a groundcover of native and exotic pasture grasses and forbs (Furnas, 2003). Well-developed riparian vegetation grows along rivers. The estuary has a narrow fringe of mangroves, a few metres wide extending to tens of metres in width on the inside bank of some actively migrating meanders (Ridd et al., 1998). A total of 20 mangrove species have been recorded in the river (Bunt and Stieglitz, 1999). The lateral tidal limits along the river are characterised by sharp transitions to mud flats, samphire and grassland (Bunt and Stieglitz, 1999).

1.1 Geology

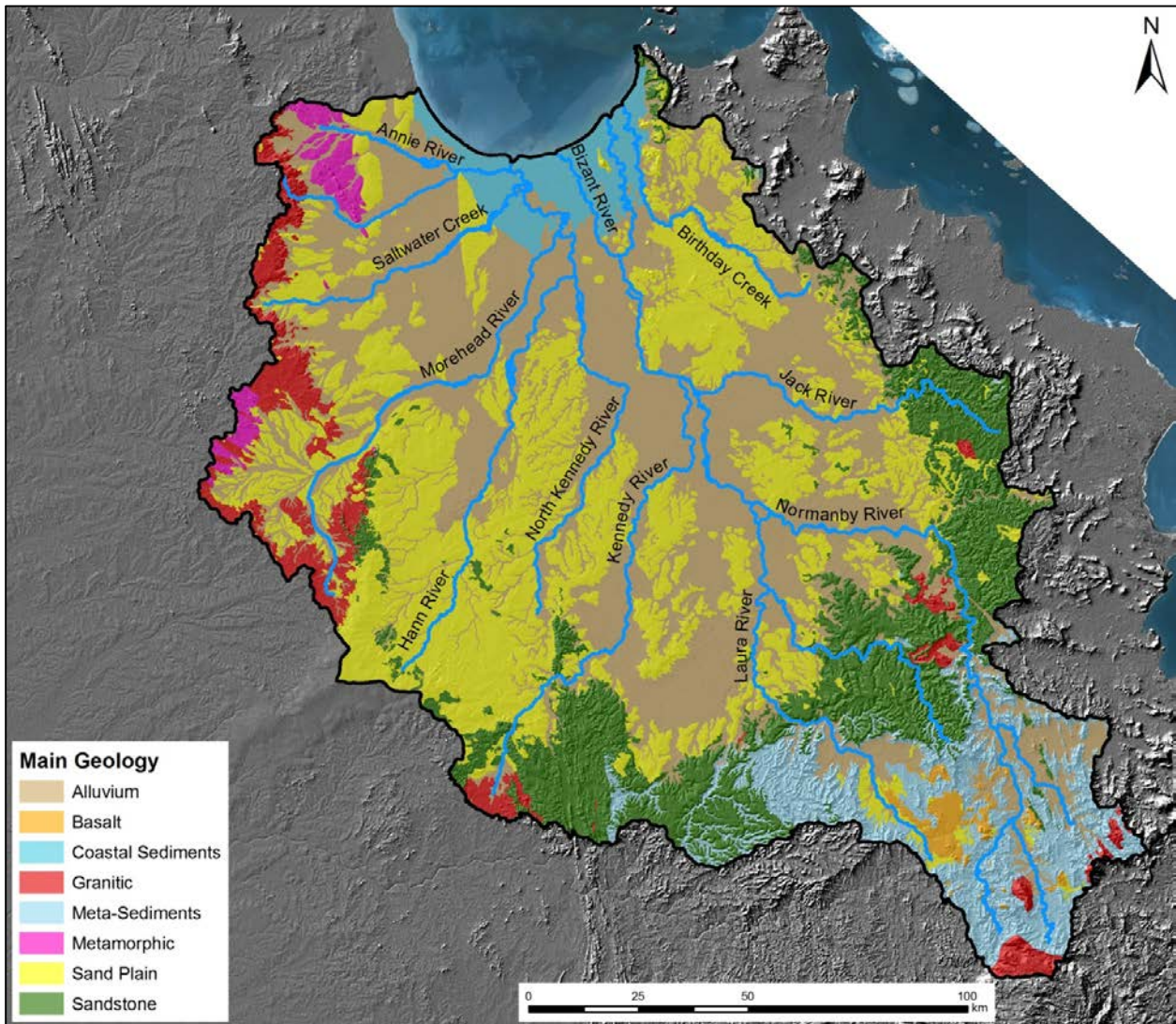


Figure 2 Normanby Catchment Geology map

1.2 Hydrology

In monsoonal catchments of Cape York Peninsula most runoff to the GBR occurs in a single wet-season flood (Furnas, 2003), although multiple smaller flood peaks during the wet season are common. Flood events are short and energetic, with flood-pulse periods of less than one month and water residence times in the river of approximately one week (Brodie and Mitchell, 2005).

Mean annual discharge calculated from flow data from the Battlecamp gauging station (105101A) with a 1.82 area correction factor is 1234 GL (Joo et al., 2012). Annual discharge calculated from the Kalpower Crossing gauging station ranged from 1762 GL to 3646 GL between 2006 and 2009, years which had low to moderate rainfall (Joo et al., 2012). Mean annual discharge was calculated at 1234 GL by Kroon et al.,(2010). Furnas (2003) calculated total annual discharge from the Normanby as 4,950 GL/year or approximately 5 km³. Mean annual run-off between 1986 - 2009 is estimated from this study at 4,600 GL/year (\pm 3400 GL - 1 stdev).

1.2.1 Flow Gauging Stations

There are currently five DERM gauging stations along the Normanby River and its tributaries, one in the adjacent Stewart River (Table 1) and five discontinued gauges.

Table 1 Normanby River Water Flow Gauging Stations

Gauging Station	River/ Location	Catchment Area (km2)	Annual Flow Volume (ML/y)			Mean Peak Annual discharge-Cumecs (m3/sec)
			Mean	Min	Max	
105001B	Hann River/ Sandy Creek	984	151505	14729	670870	
105101A	Normanby River/ Battlecamp Rd	2302	673415	18907	2091675	1585
105102A	Laura River/ Coalseam Creek	1316	331608	25642	1208537	864
105105A	East Normanby/ Development Rd	297	123859	2378	382863	314
105107A	Normanby River/ Kalpowar Crossing	12934	2871987	1742750	5964885	--

Source: <http://watermonitoring.derm.qld.gov.au/host.htm>

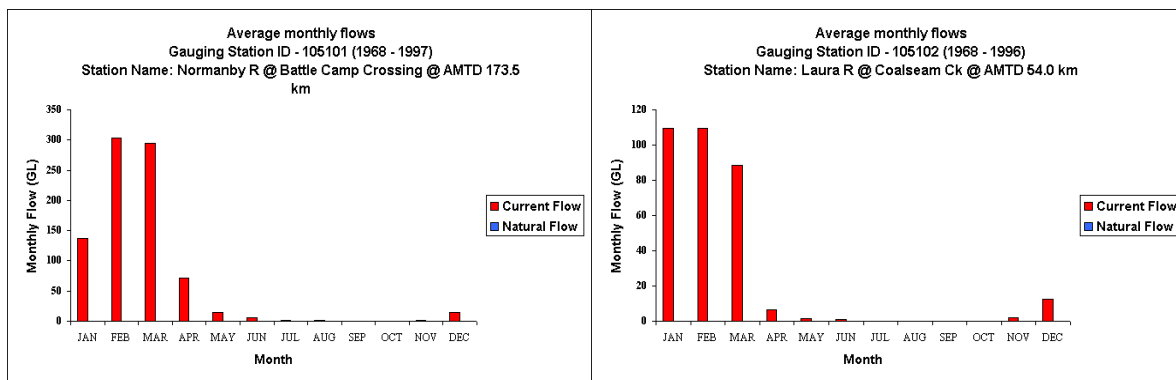


Figure 3 Average Monthly Flows Normanby River (Battlecamp Crossing) and Laura River (Coalseam Creek)

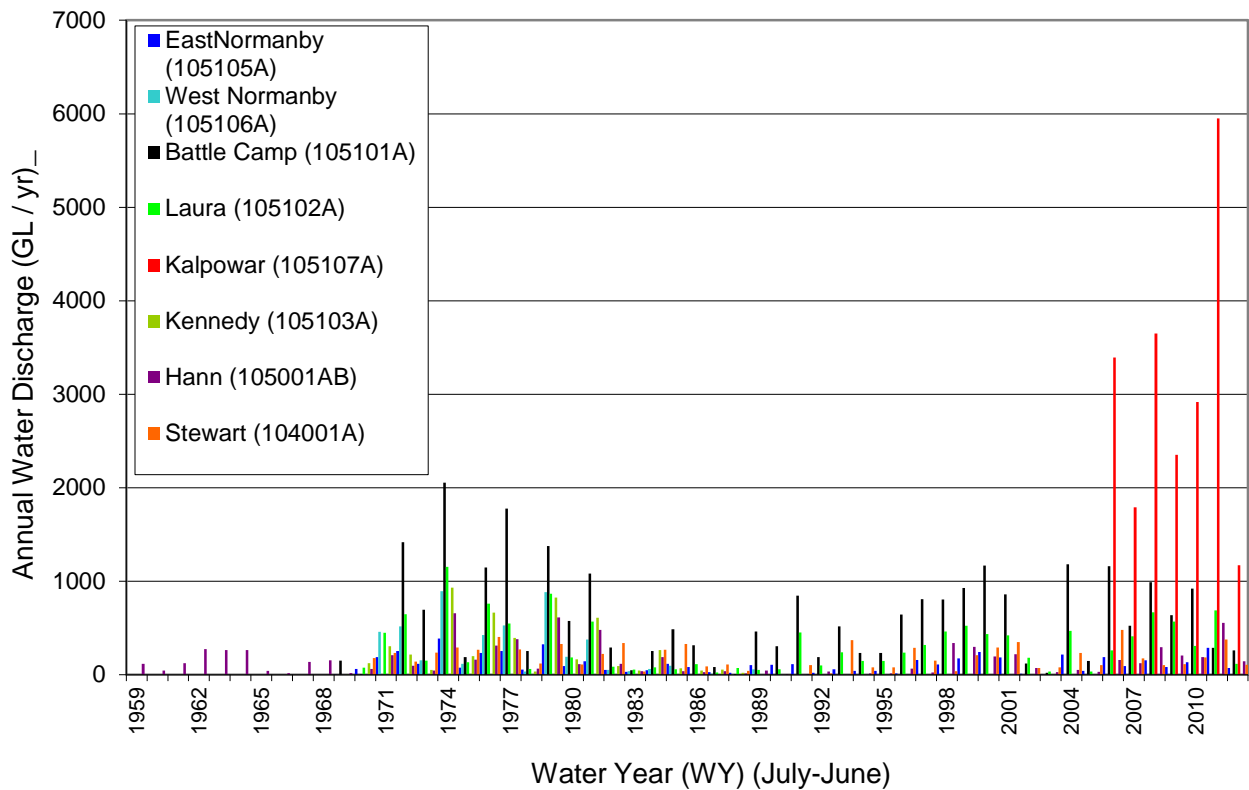


Figure 4 Annual water discharge for the 7 active gauges in the Normanby and Stewart basins (i.e. PCB catchments). These data are the official DNRM records, however there are missing data for some years.

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Please also see main document, or visit the website: <http://www.capeyorkwaterquality.info>

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