

Water Quality Event Monitoring



Regional Natural Resource Management in Queensland

ID: WQEM 0634

Event Summary Load Calculation Baffle Creek (Mimdale) December 1988

Introduction

This fact sheet presents Event Mean Concentration (EMC) sediment load estimates collected from Baffle Creek at Mimdale gauging station associated with 5 days of rain in December 1988 (Fig.1).

the sum of the products of hourly discharge and TSS concentrations (Tab.2). The EMC was calculated by dividing the event load by the event volume (Tab.2).

Methodology

Nineteen suspended sediment samples (Tab.1) were collected from the gauging station GS 134001B (Fig.2) during a wet season flush (Fig.4), and recorded in the DNR archives. Discharge was assumed to be $\pm 10\%$ of actual flow (http://www.nrm.qld.gov.au/water/monitoring/pdf/wm_data_col_stds.pdf), although accuracy during high flows is likely to be poorer (David Amos, NRW Hydrographer, *pers. comm.*). Field replicates were not collected, so there was no precision estimate for concentration data.

A concentrated flush of sediment was carried by the rising limb of the hydrograph, after which suspended sediment concentrations (TSS in mg/L) could be related to discharge (m^3/s). It was possible to extrapolate hourly sediment loads based on modelled TSS projections, using the average TSS value on the rising limb (the first four samples), and the TSS relationship with discharge for the rest of the event (Fig.5). Error margins were 2 standard errors around the average TSS concentration for the period covered by the first four samples, and 2 standard errors around the power function used to relate TSS with discharge (Fig.5), which were propagated with the 10% variation in flow. The event load was

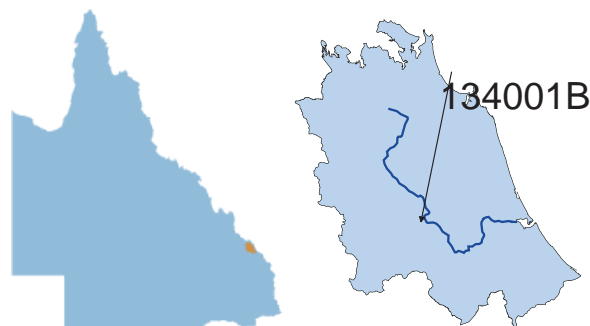


Figure 1. Baffle Creek event sampling location at Mimdale.

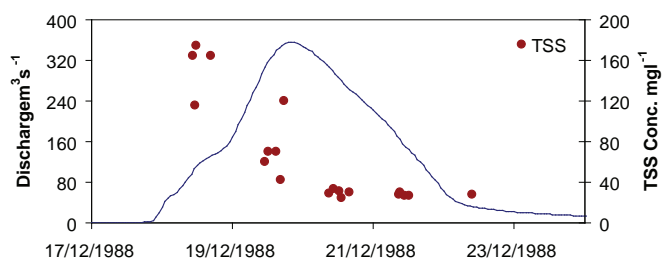


Figure 2. Sample times, discharge and TSS concentration of samples collected at Mimdale.

Flow Event Description

Catchment:	Baffle
Location:	GS134001B, Mimdale t 24°30'S; 151°44'E
Catchment Area:	3994 km ² (1402 km ² upstream of the gauge)
Dominant Land Use:	Grazing (65%), Nature conservation (18%), (upstream of gauge) Rural residential (6%)
Event Duration:	17/12/1988 - 22/12/1988

Cumulative Rainfall (mm)

18/12/88 - 22/12/88

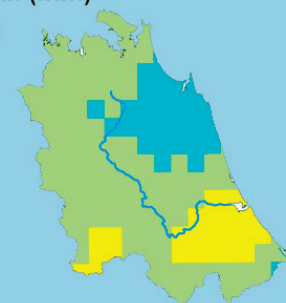
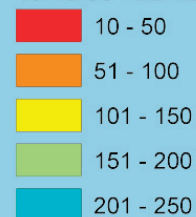


Figure 3. Cumulative rainfall during the event.

Results

This was a moderately strong runoff event from an unregulated catchment (Fig.4), which transported relatively high sediment concentrations on the rising limb. Many connecting streams are ephemeral, with cattle access down stream banks. The EMC for TSS resembled a similar magnitude flow from Bauple East (a forested section of the Mary River) in April of that year. The sediment load (4.1 KT) was predictable on the basis of loads observed at Mimdale in 1973, 1991 and 2003 (Fig.6).

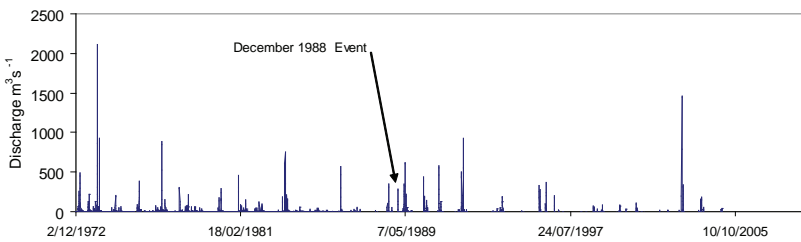


Figure 4. Baffle Creek Dec. 1988 event sampled at Mimdale in the context of historical (mean daily) discharge.

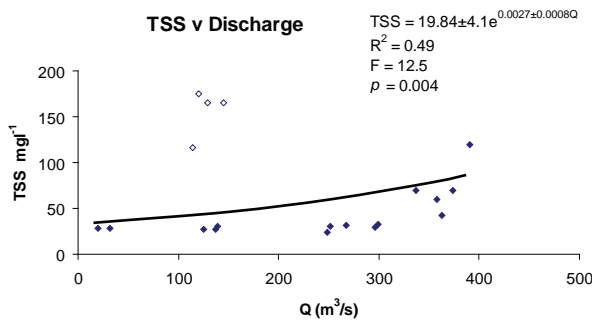


Figure 5. TSS related to discharge on the falling limb. Open symbols were not used to derive the function. Error margins are 1 standard error.

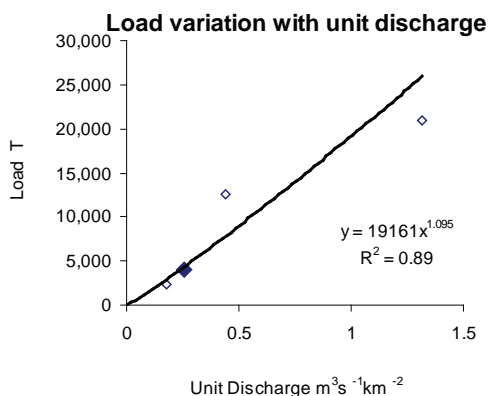


Figure 6. Suspended sediment delivery for the December 1988 event (closed symbol), in relation to other events (open symbols).

Table 1 Discharge and sediment data for the December 1988 event at Mimdale.

Date/Time	Gauge Height (m)	Q (m ³ /s)	TSS (mg/l)
18/12/1988 10:20	5.94	129.361	165
18/12/1988 11:15	5.43	114.018	116
18/12/1988 11:45		120.313	175
18/12/1988 16:40	6.26	144.687	165
19/12/1988 11:10	9.92	357.837	60
19/12/1988 12:20	3.1	337.442	70
19/12/1988 14:50	10.24	373.678	70
19/12/1988 16:22	10.3	362.863	42
19/12/1988 17:40	10.35	390.294	120
20/12/1988 9:00	9.78	296.086	29
20/12/1988 10:25	9.7	299.206	33
20/12/1988 12:15	9.56	267.555	31
20/12/1988 13:15	9.39	248.17	24
20/12/1988 15:55	9.24	251.58	30
21/12/1988 8:45	6.16	20.206	28
21/12/1988 9:00	7.18	139.606	30
21/12/1988 10:30	6.97	137.116	27
21/12/1988 12:10	6.65	124.863	27
22/12/1988 9:30	2.43	31.588	28

Table 2 Estimated load and event EMC for the December 1988 event at Mimdale.

Gauging station number	134001B		
Site Name	Mimdale		
Total Event Discharge (ML)	74,159	Lower-bound	Upper-bound
Number of samples	19		
TSS Load (Kilo-tonnes)	4.1	1.9	8.4
TSS EMC (mg/L)	55	26	113
Maximum Event Discharge (m ³ /s)	356		
Period of record (yrs)	34		
Percent of time that the peak is equalled or exceeded	0.48		

For Further Information

Visit Water Quality Online, the NAP Water Quality website:

www.wqonline.info

We would like to thank the NRM&W Hydrographic unit, Bundaberg for collecting samples and supplying data.

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