

Lower Gordon River erosion monitoring

Report for the period March 2013 to December 2015
 Natural and Cultural Values Division DPIWPE, March 2016



Introduction

The lower Gordon River erosion monitoring program to March 2013 is comprehensively documented in a report available at <http://dpiwpe.tas.gov.au/Documents/LGR%20Monitoring-2013-14.pdf>. This brief report contains only the most recent monitoring results and updated time-series plots. For geomorphological description, methods, previous results and discussion of their significance please refer to the earlier report. The monitoring documented here was conducted 7 – 9 May 2014 and 19 – 23 December 2015.

Estuarine banks

Estuarine banks are the very low lying banks comprised of organic rich mud and minor sand that occur between the mouth of the river and First Gorge. Estuarine bank erosion pins were measured twice during the period covered by this report and recorded erosion rates are summarised in table one and figure one.

Table one: summary estuarine bank erosion pin measurement statistics for the reporting period. Retreat is an absolute measure of erosion over the monitoring period and is expressed in mm, all other values except n are in mm/yr. Negative values indicate deposition.

monitoring period end	count (n)	minimum	maximum	mean	median	st.dev.	n < 0	n = 0	retreat
9-May-14	64	-11	87	4.7	0.9	14.1	8	20	5.4
23-Dec-15	52	-44	52	2.3	1.9	11.9	10	12	3.8

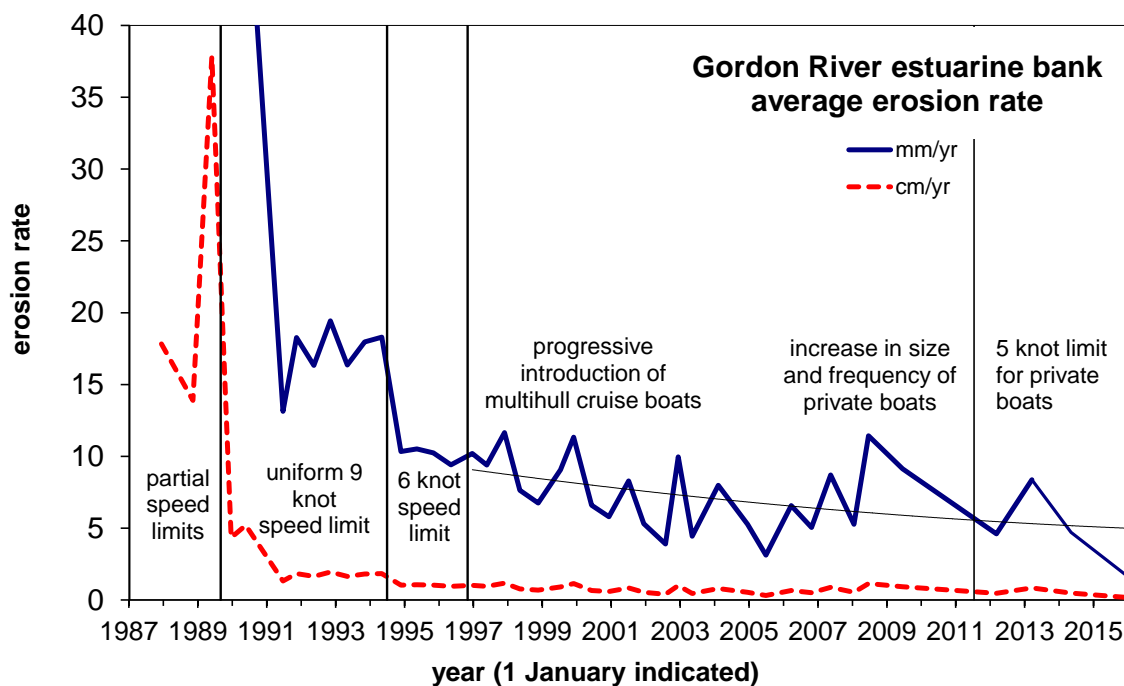


Figure 1: Mean rate of estuarine bank erosion through time. The fine smoothed line shows the best fit trend of the data since the first introduction of multi-hulled cruise vessels.

Alluvial banks

Alluvial banks consist of silt and fine sand and display a flat to subdued levee morphology with a crest typically about 1 m above mean water level. They occur in the floodplain areas between First Gorge and Eagle Creek, and also sporadically in Limekiln Reach. Alluvial bank erosion pins were measured twice during the period covered by this report and recorded erosion rates are summarised in table two and figure two.

Table two: summary alluvial bank erosion pin measurement statistics for the reporting period. Retreat in mm, all other values except n in mm/yr.

monitoring period end	count	min	max	mean	median	st.dev.	n < 0	n = 0	retreat
Zone 1 alluvial banks									
9-May-14	29	-28	139	11.9	3.5	31.3	4	5	13.6
23-Dec-15	29	-4	20	6.3	3.7	7.3	1	7	10.3
Zone 2 alluvial banks									
9-May-14	52	-32	67	2.5	0.9	16.2	14	10	2.8
23-Dec-15	59	-46	22	0.0	0.0	9.3	20	10	0.0

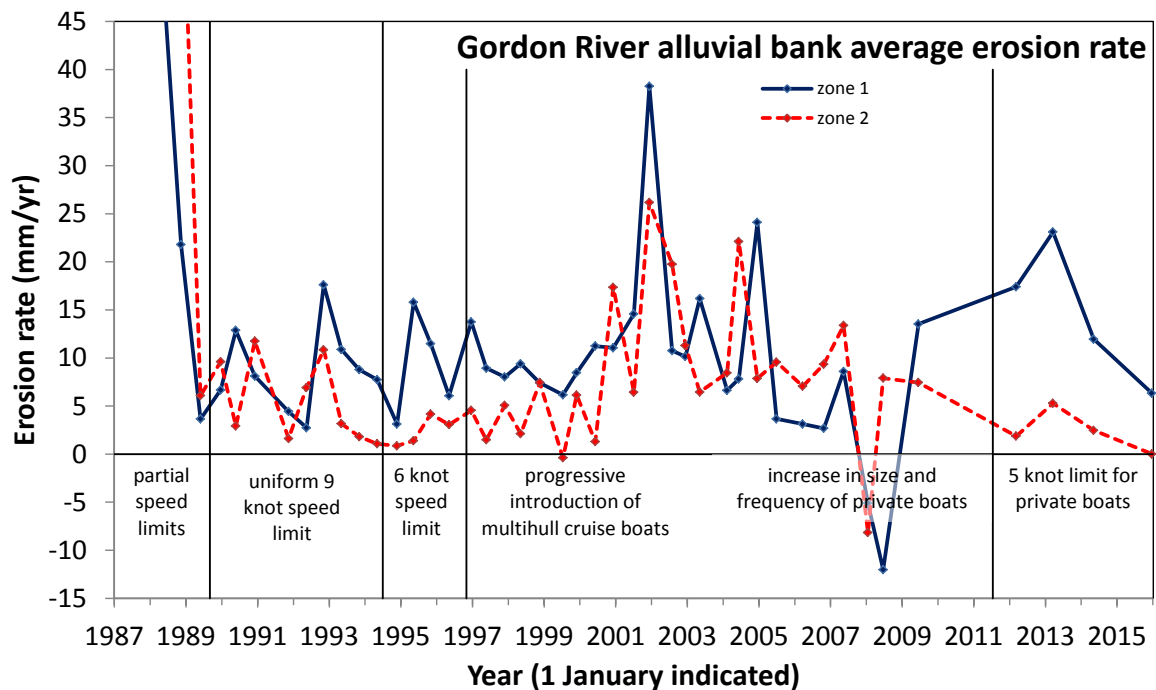


Fig. 2: Mean rate of alluvial bank erosion through time

Levee banks

The sandy levee banks of zone three are very susceptible to wake wave erosion and were rapidly eroded in the 1980s. The monitoring program recognises three discrete landforms; an upper scarp, a mid-level debris apron and low sandy bars. The latter consist of unconsolidated and largely unvegetated sand; these represent partial recovery from a catastrophic event and are a fragile buffer against renewed levee retreat. Levee bank erosion pins were measured once during the period covered by this report and recorded erosion rates are summarised in table three and figure three.

Table three: summary levee bank erosion pin measurement statistics for the reporting period. Retreat in mm, all other values except n in mm/yr.

	count (n)	min.	max.	mean	median	st. dev.	n < 0	n = 0	retreat
upper levee									
23-Dec-15	23	-1	4	0.6	0.0	1.3	1	12	2
middle levee									
23-Dec-15	27	-8	7	-0.9	-0.4	2.5	17	5	-3
lower levee									
23-Dec-15	35	-53	9	-8.9	-6.2	11.1	30	0	-24

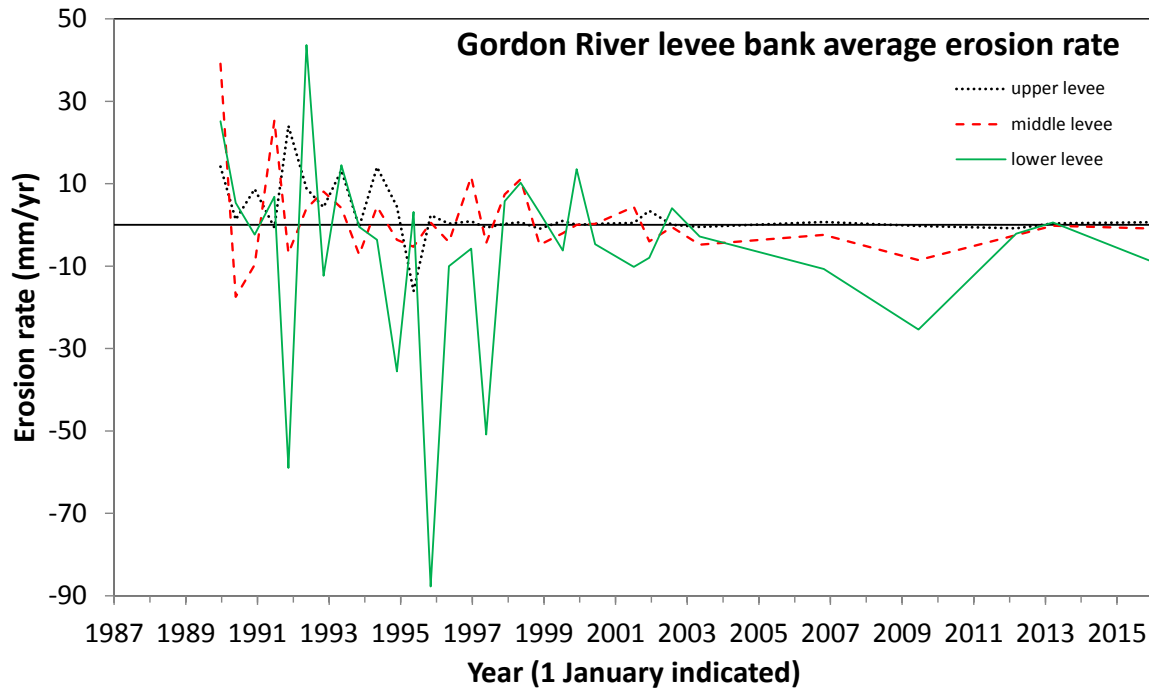


Fig. 3: Mean rate of levee bank erosion through time

Summary and conclusions

The reduced rate of estuarine bank erosion over the reporting period is encouraging. That may be due to any of the following, either singly or in combination:

- natural variation in conditions;
- revised cruise operations following release of the last monitoring report;
- adoption of the 5 kt speed limit by private boat users.

Turbidity monitoring would help resolve the cause however its reinstatement was delayed by technical problems. The system is now believed to be operational.

Although alluvial bank erosion rate also declined, zone one alluvial banks continue to erode at a significantly faster rate than similar banks in zone 2. The probability of that difference arising by chance is 0.004 using a one-tailed Monte Carlo randomisation test for difference in the means of two groups of samples. That would somewhat argue against the second dot point above, suggesting instead that change to cruise operations has not affected erosion rate.

Levee bank scarps and debris slopes showed little activity, mostly as minor slope adjustments and accumulation of organic debris. Some further sand was deposited from the river onto the low inset bars indicating a return to continued slow recovery.

It is recommended that erosion pin and turbidity monitoring be continued at the present frequency.