

Gordon River (Basslink) fluvial geomorphic monitoring

Background

The Gordon River is located in the Tasmanian Wilderness World Heritage Area (TWWHA) in South West Tasmania. Controlled by power-station operation from a dam on Lake Gordon, the Gordon River has already seen geomorphic alteration through past regulation. Basslink which connects Tasmania to the National Electricity Market (NEM) saw further development in how lake levels were managed with increasing variability in river levels from reservoir discharge. As a result of proposed alterations to reservoir management the Tasmanian government specified that geomorphic baseline assessments and monitoring was to be completed prior to any alterations. The term baseline assessment in the Gordon however, is slightly misleading since alterations were occurring in a previously modified environment, thus there was already a shift in the 'natural' baseline.

The Gordon River and one aspect of the fluvial geomorphic study, the erosion pins, has been drawn out from the detailed study and is the focus of this poster.

Environmental considerations

In the study area, bank materials consist of bedrock (60%), cobbles (5%), sandy alluvium (35%), or combinations. The largest concentration of sandy alluvial banks is found in a 3 km reach between the mouth of the Albert River and the Gordon River Splits, designated as "Zone 2, where about 75% of the banks are of this type.

- Increased median flows and water levels in the river. The sandy alluvial banks in Zone 2 have been most affected by these processes. In Zones 1 & 2 power station flow dominates the hydrology, water level fluctuations are large, up to 4.5m, and drawdown rates are high, up to 2.6 m/hr.
- In alluvial zones bank slopes have been altered and channel widening of up to 10 m has occurred since the dam was built in 1967. Power station related impacts decrease with distance downstream, especially below the Denison River which contributes approximately 30% of the total downstream flow on a yearly basis.

Study aims and objectives

Identify the main geomorphic processes operating under the present power station operating regime and predict what impacts the proposed Basslink operating regime would have on the geomorphology of the Gordon River. The preliminary investigations were completed between September 1999 and April 2001.

Methodology - erosion pins

Geomorphology monitoring includes the biannual measurement of 200 erosion pins located at 48 monitoring sites in the middle Gordon River. The geomorphology monitoring zones are shown in Map 1.

- An erosion pin is essentially a benchmark. It is usually a long metal stake, hammered into the ground till stable. The initial measure from ground level to head of pin is taken as the benchmark. Erosion pins are one of the simplest, least expensive and most effective methods of monitoring changes in ground surface.
- Pins were installed in the Gordon River in sets of 3 to 5 in a line perpendicular to the flow of the river. Repeated measuring of the length of pin exposed above the surface of the bank allows the quantification of net erosion or deposition at a site over time.

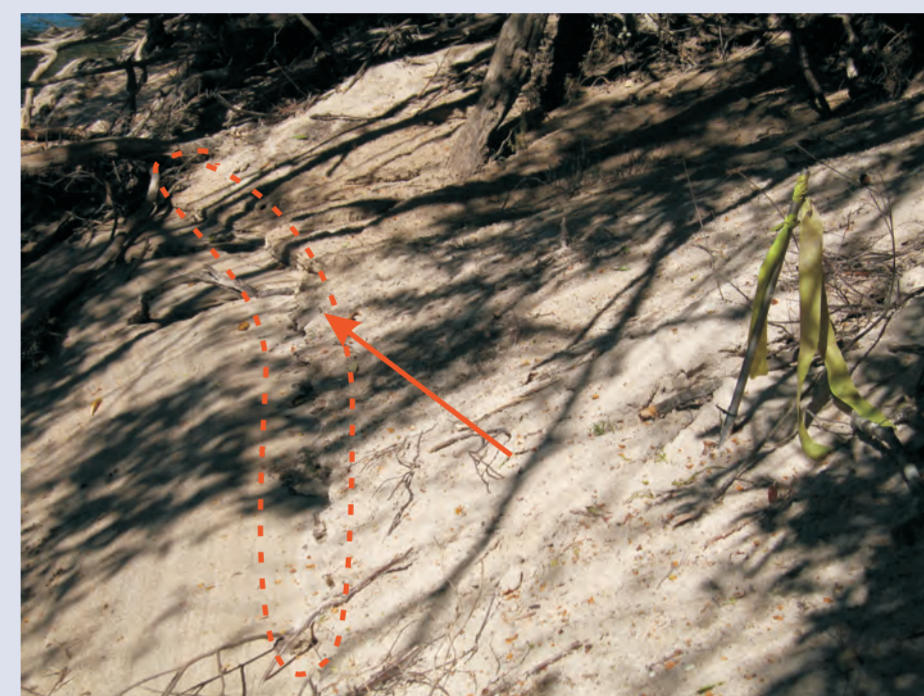
Erosion pin results 2006 - 2007

2006 - Increase in erosion in zones 4 and 5, and a decrease in bank toe erosion.

2007 - Erosion pin results showed erosion rates of bank toes returned to previous rates in zones 4 & 5, and bank erosion continued at the higher flow mark.

Conclusions

It is too soon to draw conclusions from this study as the river is currently in a state of adjustment. The erosion pin results show that sediment is moving through the system and as predicted, the alluvial reach zones are experiencing classic fluvial geomorphic alterations from flow regulation.



Sandy bank showing the distinction between the operation of turbine number 2 and 3



Bank attached lateral bar in Zone 1 comprising of a cobble matrix with classic imbrication visible in the foreground



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