What's happening in the Motueka riverbed?

Preliminary results from analysis of river cross section data

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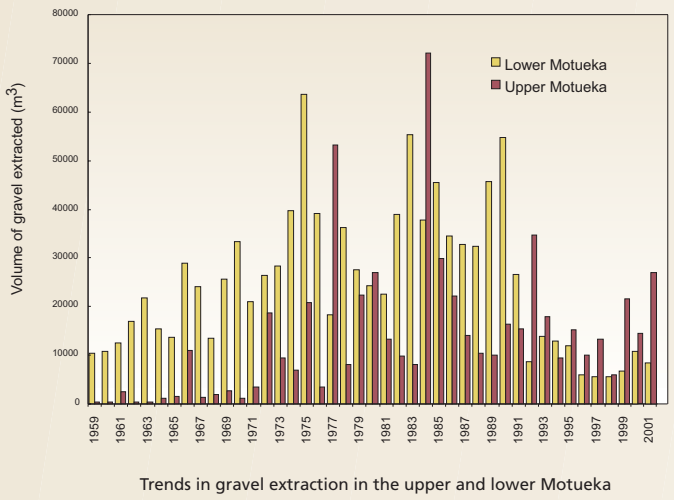
Background

Gravel extraction from the Motueka riverbed has been controlled since the 1950s because of concerns that extraction might be causing excessive riverbed degradation and bank instability. Gravel extraction increased from the 1950s to the mid-1980s, but has been progressively reduced since in recognition of the low rate of gravel supply to the river. There is debate about trends in mean bed levels and changes in gravel storage within the Motueka riverbed, and the influence of gravel extraction on those trends (e.g., TDC 1993, 2000). Changes in gravel storage are also important in understanding sediment sources and fluxes within the Motueka catchment, a major aim of the Motueka Integrated Catchment Management research programme.



Trends in gravel extraction in the upper and lower Motueka between 1959 and 2001

River cross section surveys have been the primary method of investigating trends in mean bed levels (MBL) and changes in gravel storage. Parts of the available data set have previously been analysed, but there has never been a comprehensive analysis of all the data to assess long-term trends in bed levels.

What we did

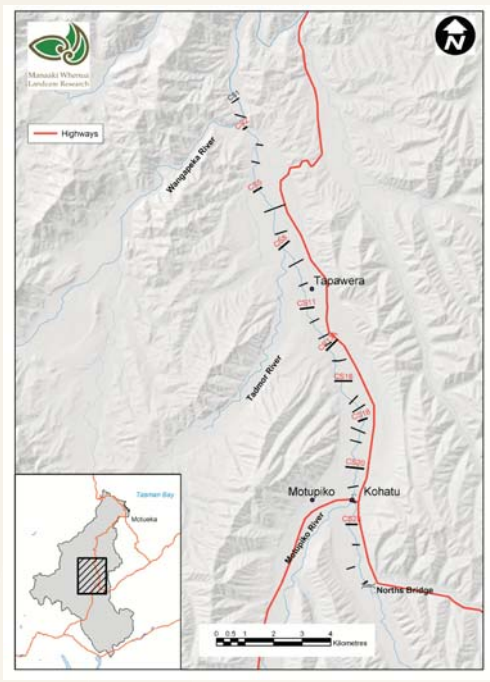
Survey data were analysed for

- a 19 km reach of the upper Motueka between the Wangapeka confluence and Norths bridge
  - up to 30 cross sections
  - surveyed in 1960, 1988, 1995 and 2000
- a 13 km reach of the lower Motueka between the coast and Alexander Bluff bridge
  - up to 17 cross sections surveyed in 1957, 1960 and 1967/8
  - up to 52 cross sections surveyed in 1978, 1982, 1984, 1990, 1997/8 and 2001

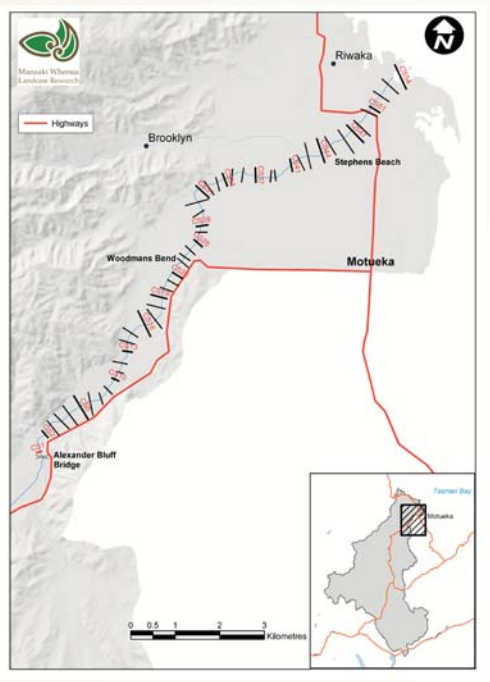
At each cross section we calculated

- MBL in the active channel
- gravel volumes stored in the active channel

Gravel storage changes between surveys were compared with gravel extraction to determine the influence of gravel extraction on trends in riverbed levels. Detailed results are given in Sriboonlue and Basher (2003)

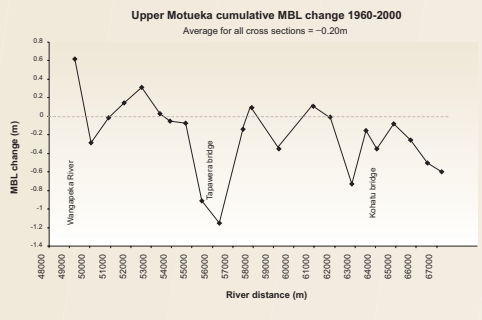


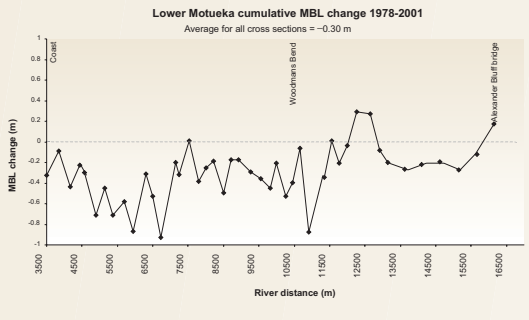
Location of cross sections in upper Motueka reach

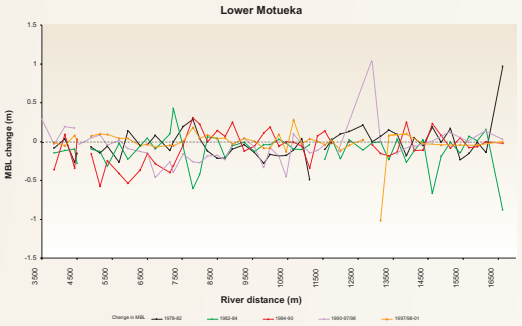


Location of cross sections in lower Motueka reach

What we found



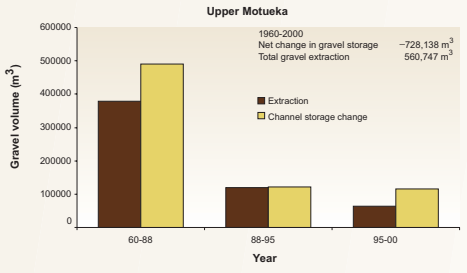


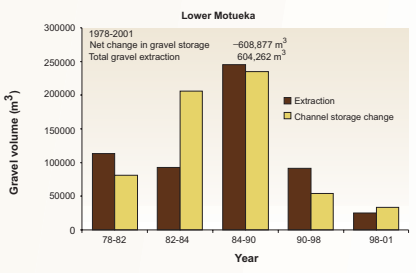


On average both reaches of the river have degraded over the last 40 years.

At individual cross sections MBL was very dynamic often with fluctuation between degradation and aggradation from one survey to the next. Few cross sections showed persistent degradation or aggradation over all survey periods, suggesting a very dynamic riverbed.

In the lower Motueka the total amount of gravel lost from the river was very similar to the the total amount extracted. In the upper Motueka the total amount of gravel lost from the river was 30% greater than the the total amount extracted. In both reaches there were periods when gravel loss exceeded gravel extraction and vice versa.





Conclusions and recommendations

- the two surveyed reaches of the Motueka river have shown a net decline in mean bed level, implying a net loss of gravel since surveys began (c.1960)
- extraction accounts for a large proportion of the gravel lost, although in some periods channel storage loss exceeds gravel extraction and in others extraction exceeds channel storage loss
- further work is needed to
  - assess how well the cross section surveys reflect whole river behaviour
  - improve estimates of the long-term rate of gravel supply
  - improve monitoring of gravel extraction

References
Tasman District Council. 1993: River gravel management, issues and options: A public discussion paper. Tasman District Council, Richmond.
Tasman District Council. 2000: Environment Today, Tasman 2000. Tasman District Council, Richmond.
Sriboonlue, S. Basher, L.R. 2003: Trends in bed level and gravel storage in the Motueka River 1957–2001: a progress report on results from analysis of river cross section data from the upper and lower Motueka River. Unpublished Report for the Integrated Catchment Management programme and Tasman District Council, Landcare Research, Lincoln, Canterbury.

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