

Advances in understanding bed level trends and gravel volume changes in the Motueka River

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Background

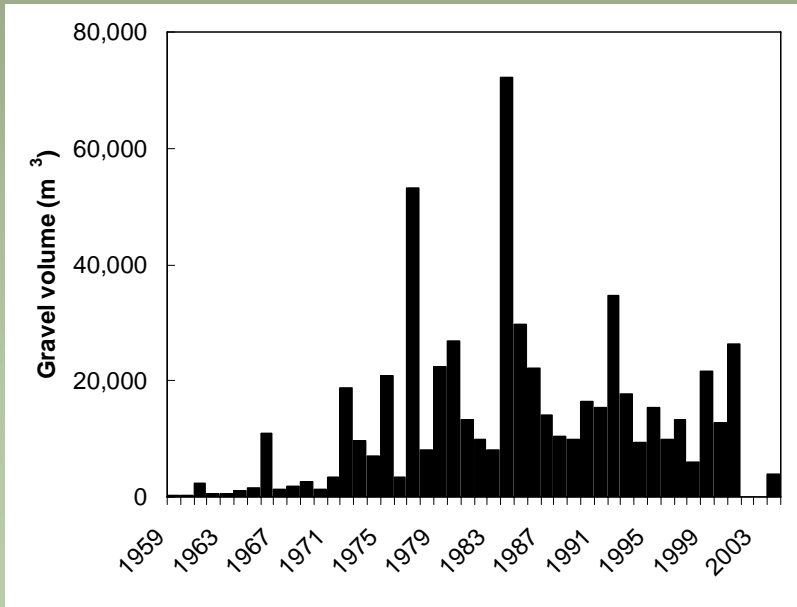
- periodic cross section surveys are the main tool used by councils to allocate gravel extraction from rivers bed by considering
 - trends in mean bed level (MBL) and gravel storage
 - estimates of gravel extraction
 - estimates of long-term rate of gravel supply
- debate about trends in MBL, changes in gravel storage within the Motueka, and the influence of gravel extraction on those trends

Recent work

- compiled all river cross-section data for the Motueka River and provided a comprehensive analysis of all data using a consistent methodology
- calculated changes in mean bed levels and volume of gravel stored in the river channel through time
- compare gravel volume changes with gravel extraction rates, and determine the influence of gravel extraction on trends in riverbed levels
- considered alternatives to cross section analysis

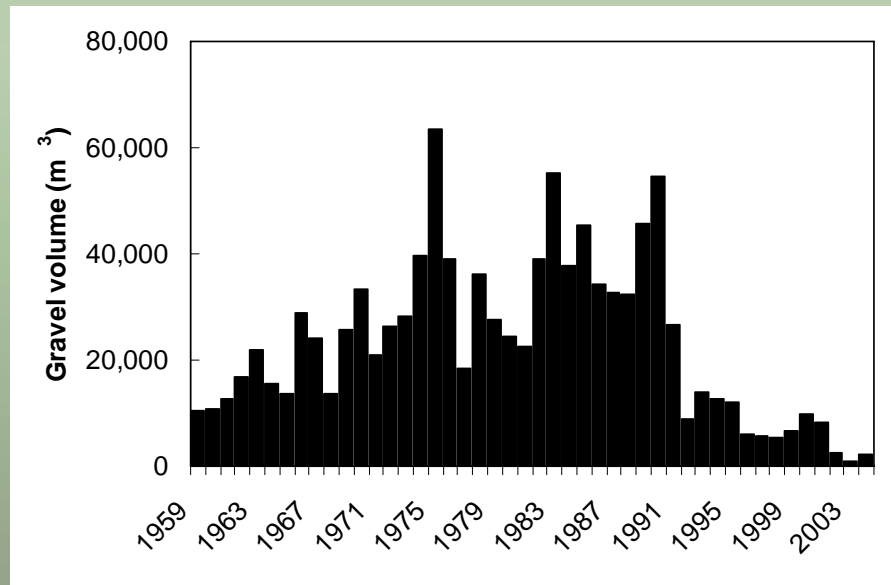


Trends in gravel extraction



Upper Motueka

Lower Motueka



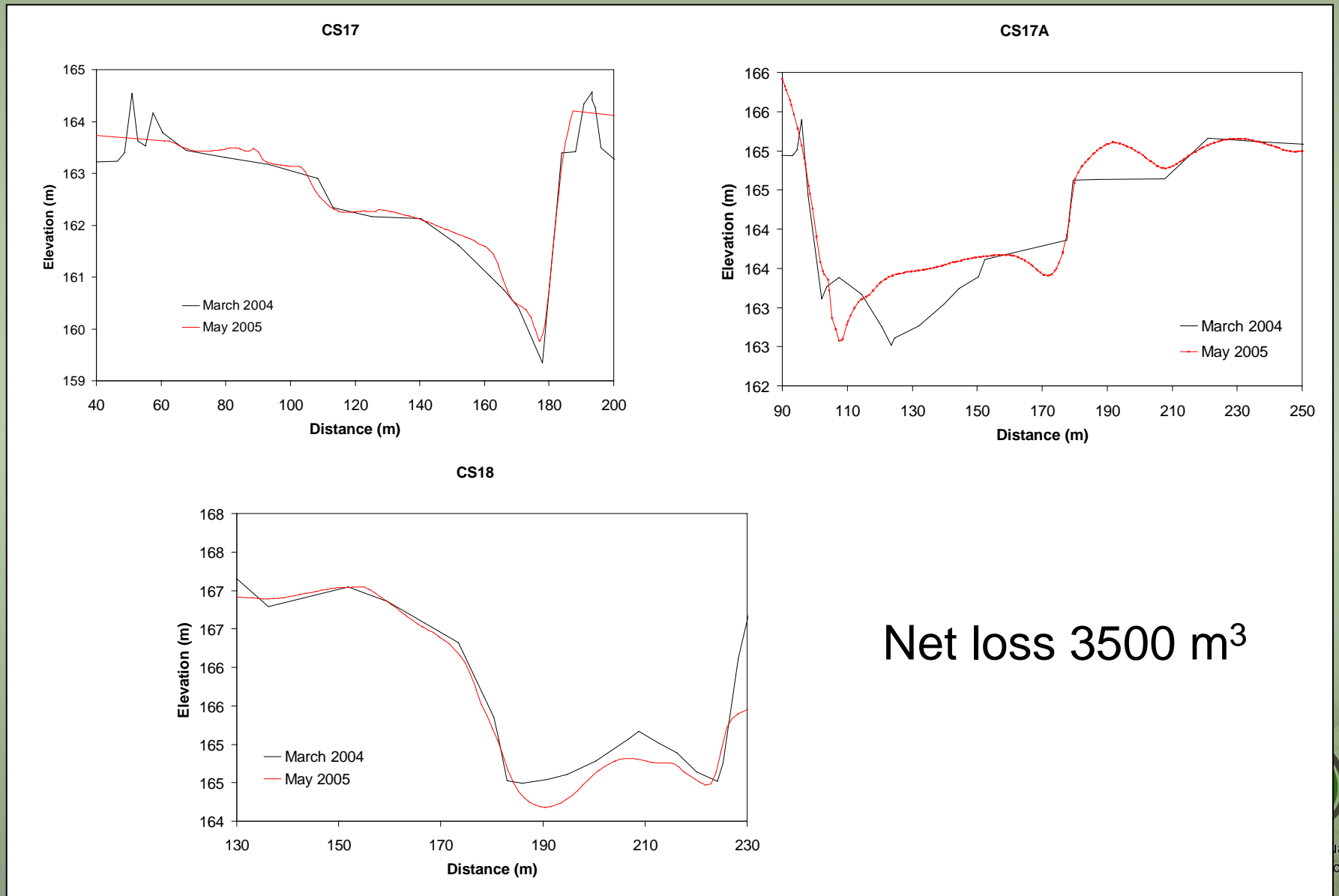
Bed level and gravel storage trends

- the river bed is degrading resulting in a loss of channel storage of gravel
 - Upper Motueka (1960-2004) –0.33 m
 - Lower Motueka (1978-2001) –0.34 m
- superficially much, but not all, the change in gravel storage can be accounted for by gravel extraction
- there are large error limits on the gravel storage volume changes derived from cross sections
- the cross sections probably underestimate the total gravel storage volume changes (and gravel transport)
 - don't account for spatial variation between the cross-sections
 - don't account for temporal variation between surveys

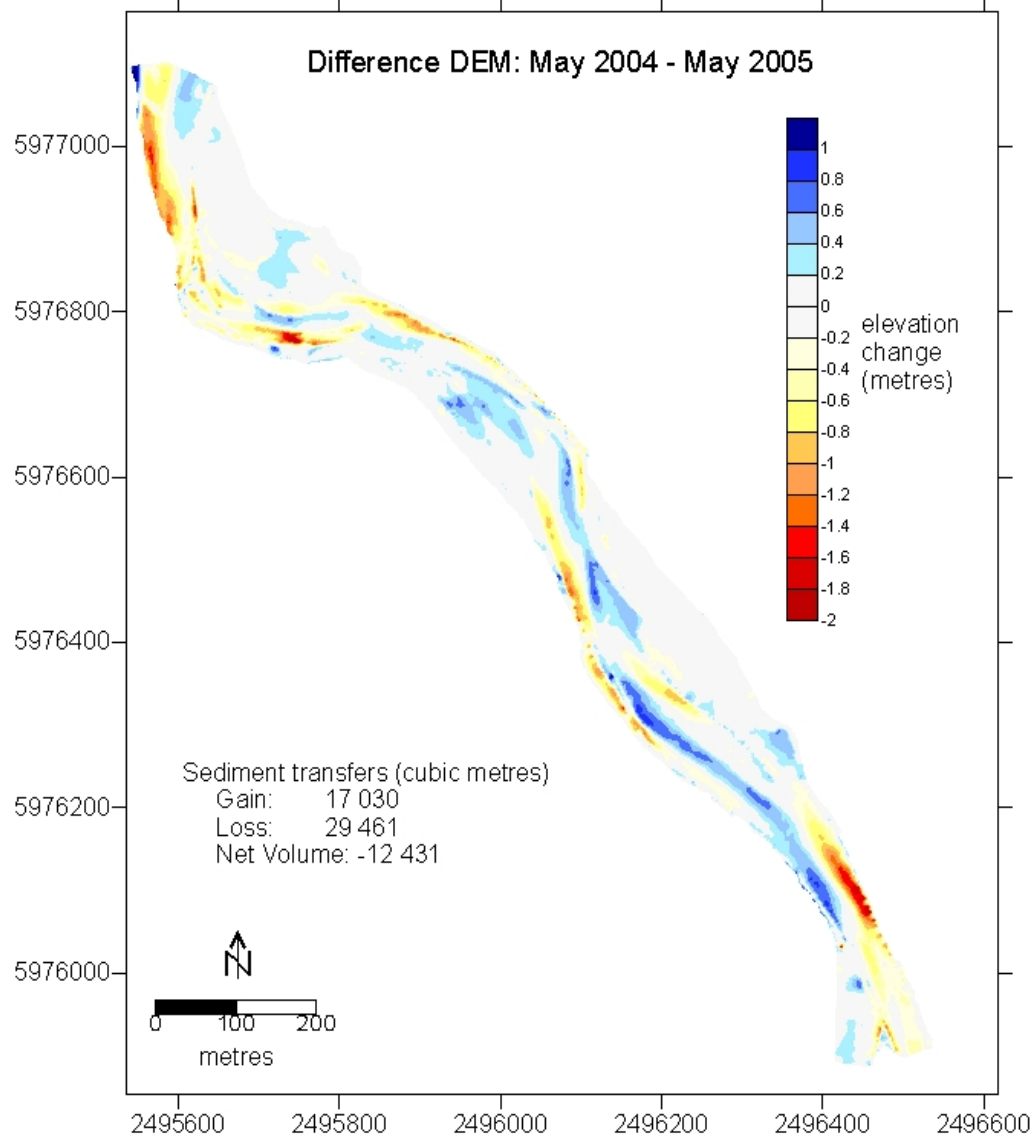


Do the cross sections represent bed level dynamics?

The cross section approach, March 2004 – May 2005



Do the cross sections represent bed level dynamics? The DEM approach, March 2004 – May 2005



Implications

- there are large error limits on the gravel storage volume changes derived from cross sections (and hence on gravel load)
- there may be large error limits on estimates of gravel extraction derived from resource consent applications
 - since not all allocated gravel is extracted
 - returns from extractors may not be accurate
- to better understand how much river gravel extraction affects riverbed levels we need better information on
 - changes in bed levels (e.g., from RTK-GPS or LIDAR surveys),
 - gravel supply
 - the amount and location of gravel extraction
 - the consequences of over extraction

