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**Manaaki Whenua**

# **Sediment dynamics and biological impacts in the Motueka River, New Zealand**

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**ANZGG Rivers Workshop**

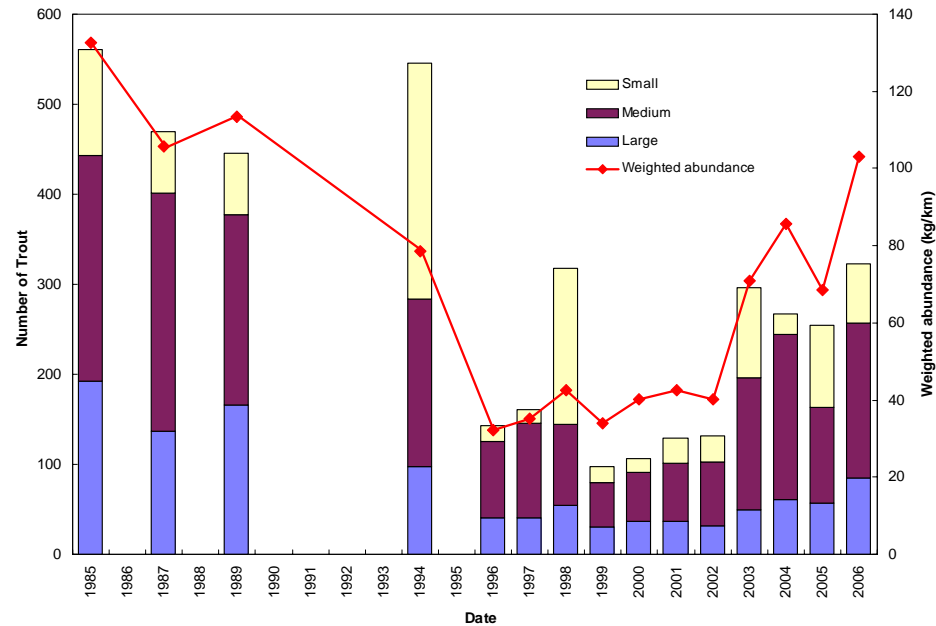
**Canberra and Kioloa February 2007**





## What is the impact of sediment on the trout fishery?

- Bed and wash load
- Particle size
- Sediment sources



# How does sediment input to Tasman Bay affect aquaculture ?

- Suspended sediment load
- Particle size
- Sediment sources





## **Aims of Motueka sediment research**

Develop an understanding (and ultimately model) of:

- sediment impacts on freshwater and marine ecosystems,
- the degree to which sediment impacts can be mitigated, and/or the constraints that sediment dynamics impose for freshwater and marine fisheries management,
- sediment dynamics (generation, transport and storage) within the Motueka river system, and associated marine environment.

Understanding sediment dynamics is the key to determining sediment impacts and management options, and appropriate modelling approaches





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## Current work

- Measurement of sediment yield at 4 sites
- Sediment source identification
- Fine sediment characterisation
- Bed level trend and gravel transport analysis
- Modelling erosion and sedimentation





# Measurement of suspended sediment yield

## Methods

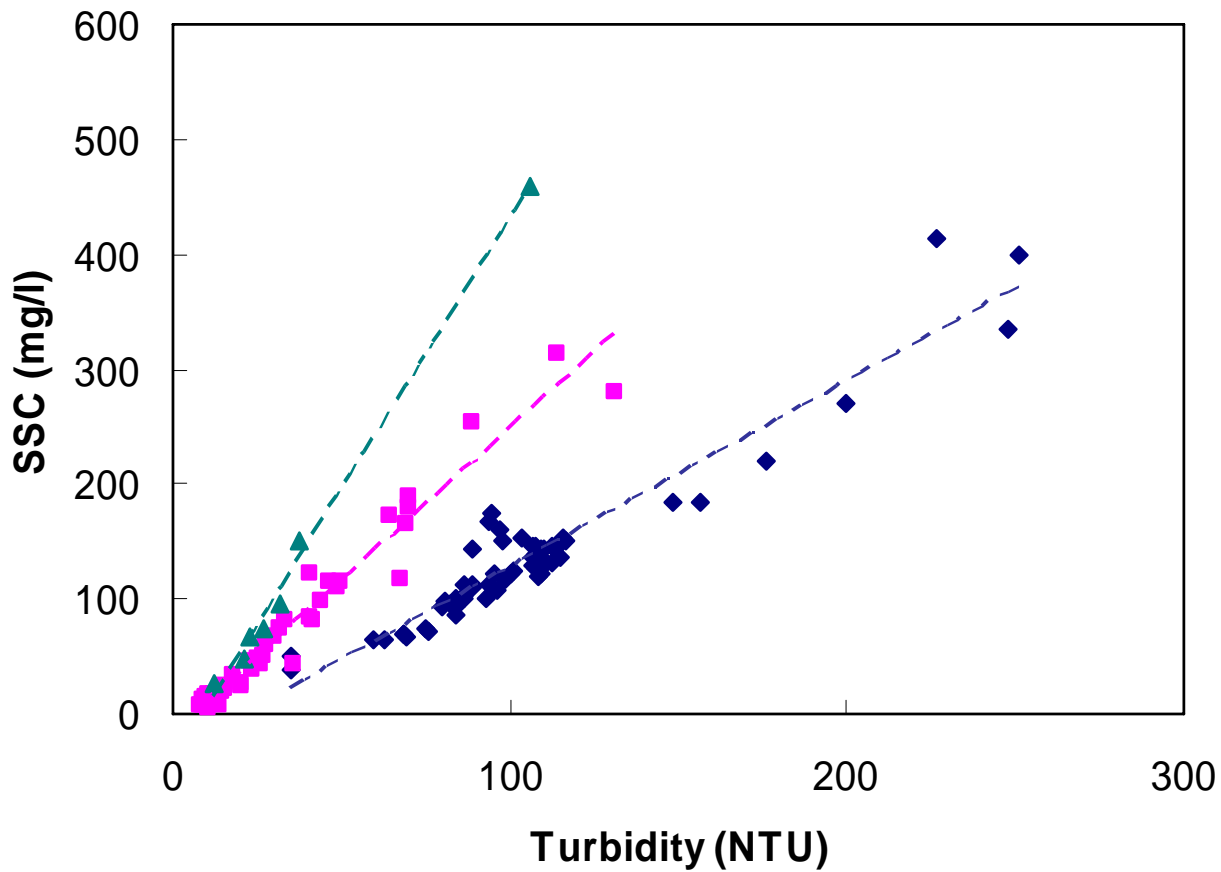
- continuous record of turbidity
- auto samplers and manual sampling to define turbidity - SSC relationship
- use this to generate time series of SSC and combine with flow record to estimate SSY
- focus so far on getting high quality records, SSY not yet calculated

## 4 sites

- Woodmans Bend (*suspended sediment delivery to Tasman Bay*)
- Motupiko at Christies (*hilly, low rainfall, Moutere gravel terrain*), Wangapeka at Walters Peak, Motueka at Gorge (*steep, mountainous, high rainfall, basement rock terrain*)



# Sensor calibrations



- ◆ Motueka at Woodmans Bend
- Motupiko at Christies
- ▲ Whangapeka at Walter Peak

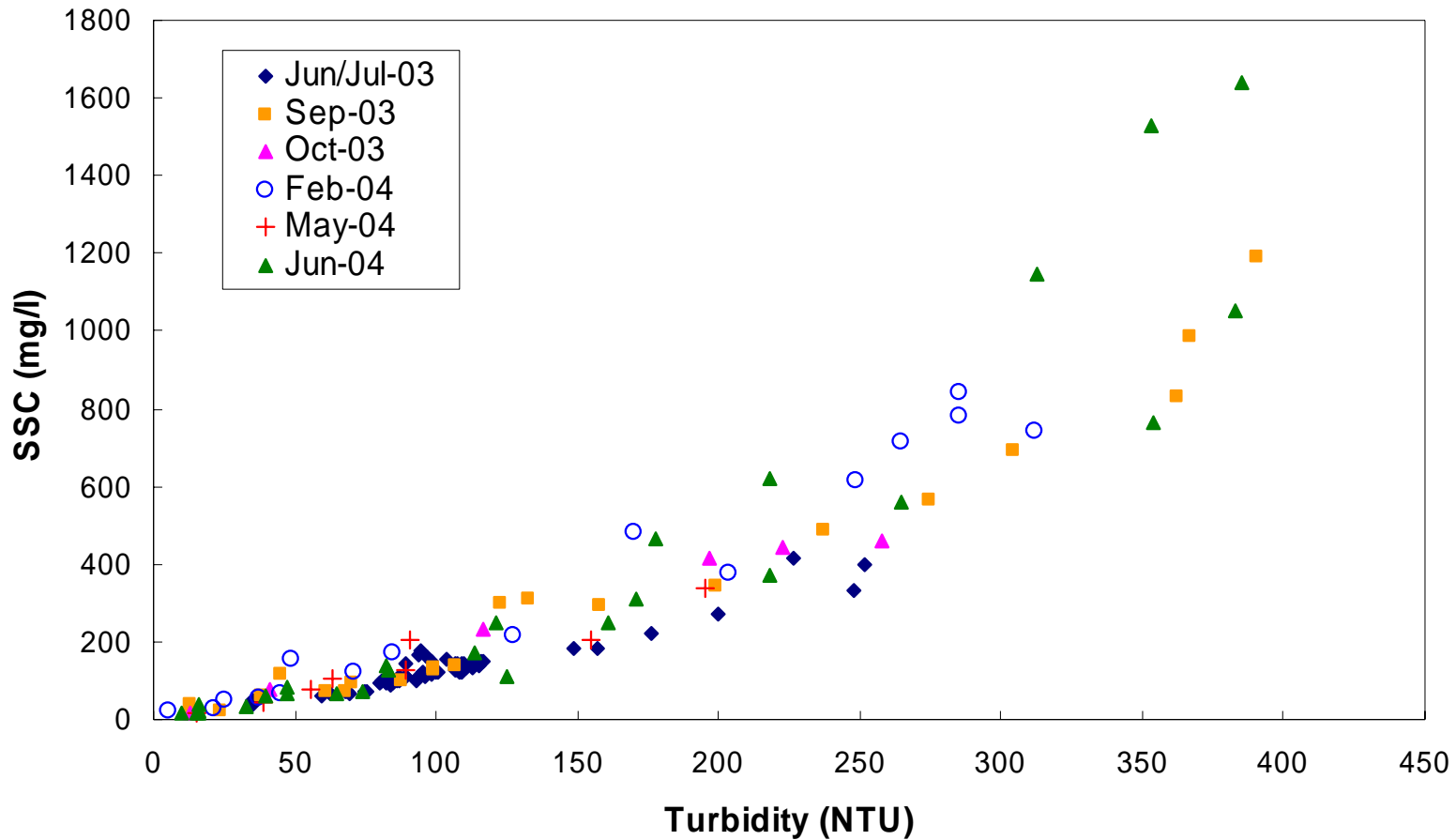
$$y = 3.8172x - 29.78$$
$$R^2 = 0.9254$$

$$y = 2.6222x - 15.673$$
$$R^2 = 0.9544$$

$$y = 1.6148x - 34.343$$
$$R^2 = 0.9117$$



**Motueka at Woodmans Bend**







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## Where does the sediment come from?



This?

Or this?





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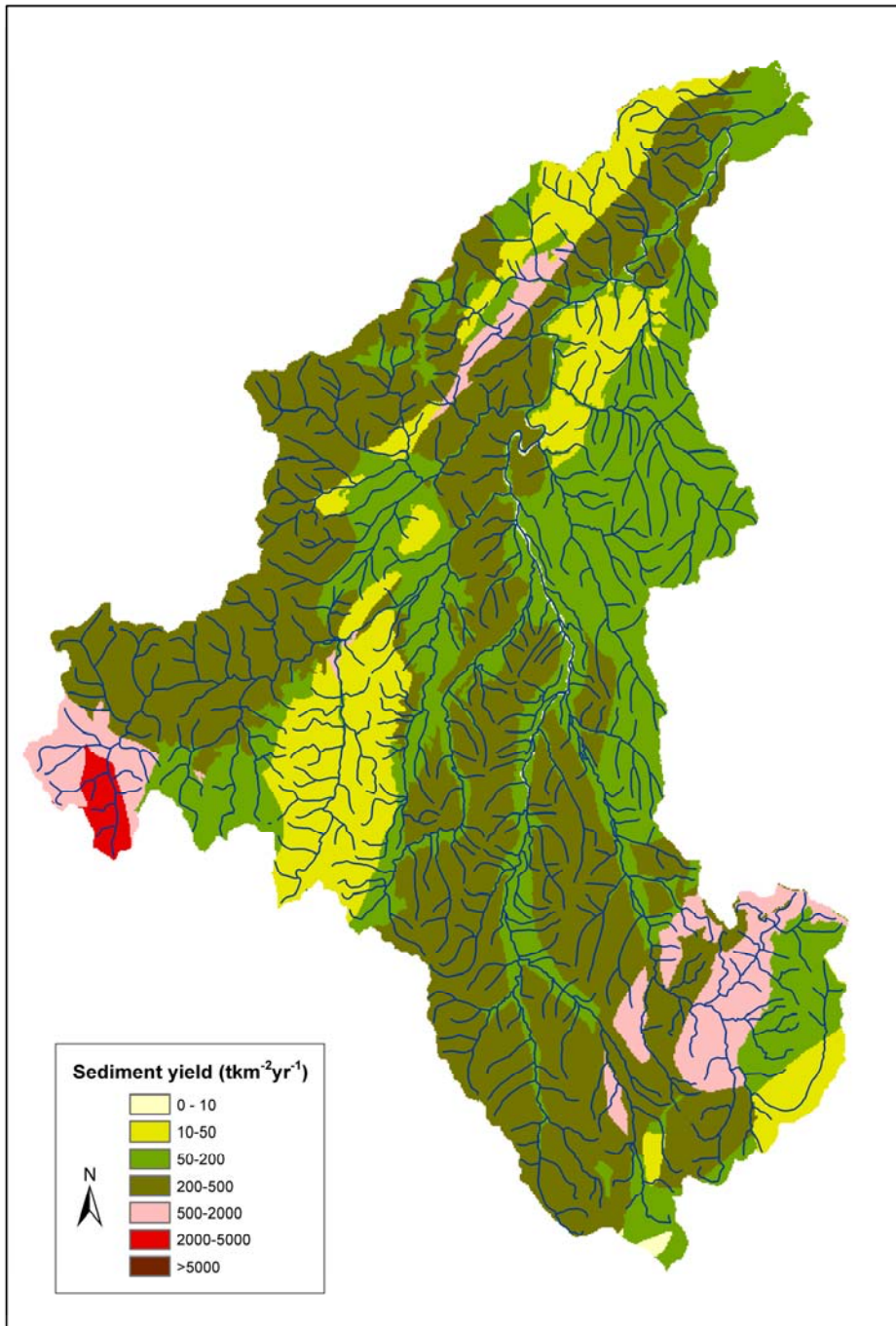
## Where does the sediment come from?



50 t/km<sup>2</sup>/yr

180 t/km<sup>2</sup>/yr





Sediment yield  
predicted from  
rainfall and rock  
type





## Fine sediment characterisation

- developed a rapid, visual assessment procedure suitable for demonstrating large changes in the proportion of fine sediment through frequent surveys
- uses a semi-quantitative, class-based technique
- 29 sites covering a range of stream types/sizes
  - main tributaries
  - confluences

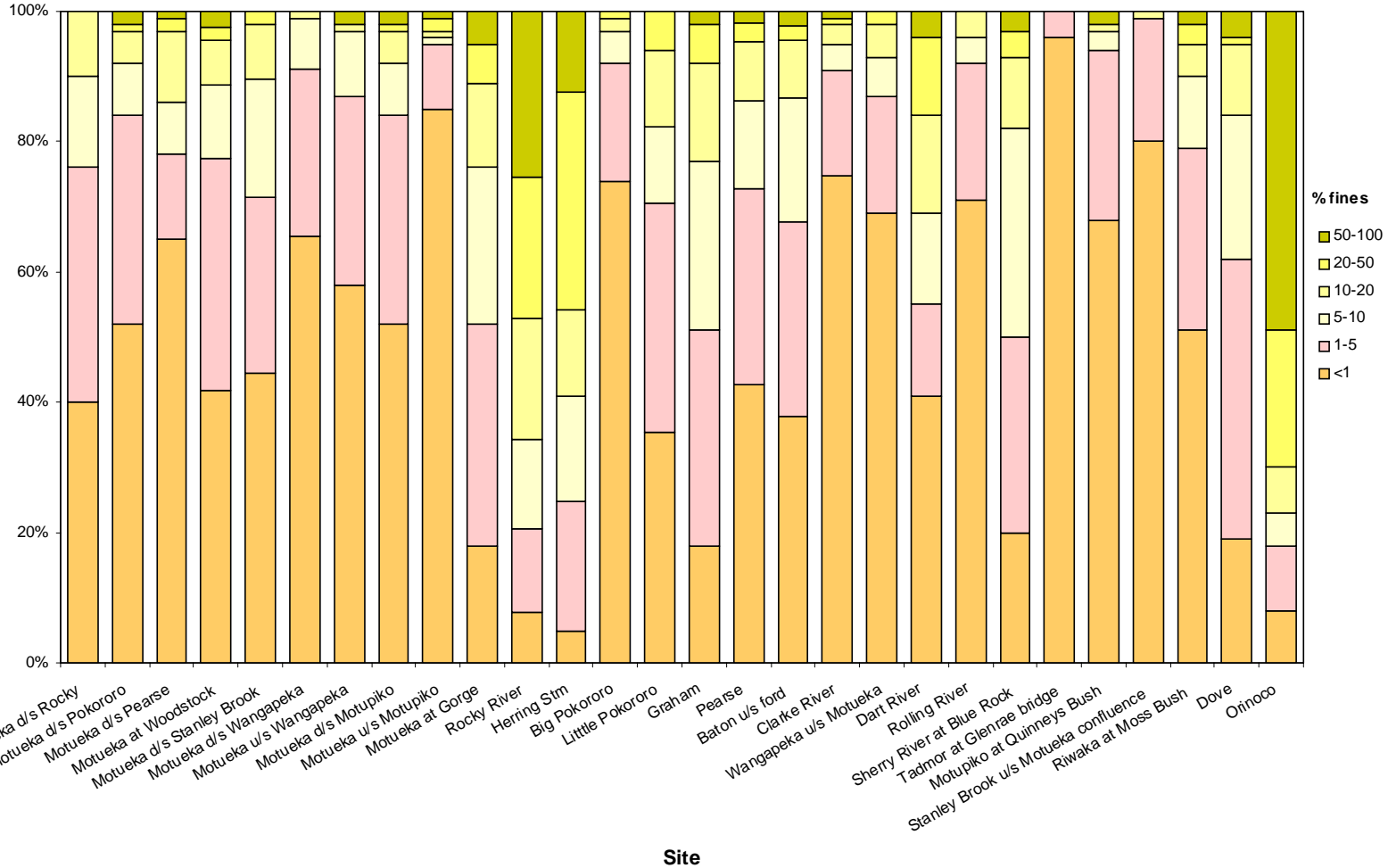
Most of the sites have some form of biological characterisation - drift dive surveys for trout, invertebrate sampling

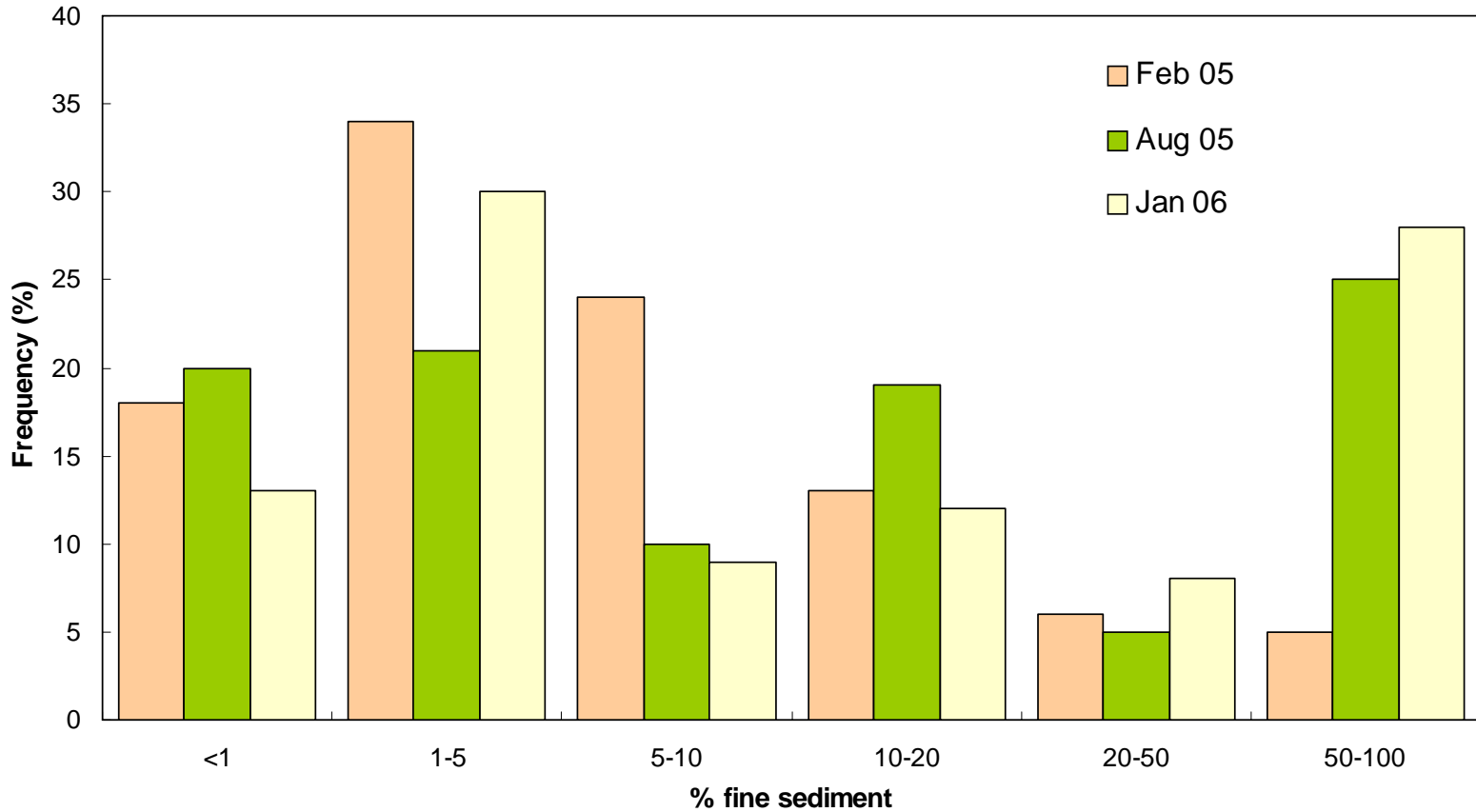




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Nov05Jan06





Change in proportion of fine sediment between February 2005 and January 2006 at Motueka gorge





## Conclusions

- Working towards accurate estimates of SSY
- Determining the land use signature still difficult
- Can now help marine ecologists determine whether persistent near-bottom turbidity is due to riverine input of sediment or resuspension by bottom trawling
- We can now track slugs of sand moving through the river and assess whether trout populations respond

