Fine sediment in the Motueka River

In the mid-1990s, trout numbers in the internationally renowned brown trout fishery on the Motueka River declined dramatically and remained low for almost a decade (Fig. 1). Many people attributed this to the effect of sediment in the river. Others went even further and suggested the source of this sediment was related to forestry activities on highly erodible granite at Separation Point (Photo 1). This material naturally breaks down to coarse sand particles that may be washed into the river. These particles fill the spaces among stones on the river bed, affecting the invertebrates and small fish living there, and can also fill deep pools, thus reducing adult trout habitat.

While trout numbers have recovered in the last 4 years (Fig. 1), debate continues about the cause of the decline. Other than anecdotal accounts, there are no data to support the claim that sediment from forestry activities caused the decline in the fishery. As part of the Motueka Integrated Catchment Management research programme, we have designed a low-cost method of describing variation in the amount of fine sediment in different parts of the river to see if the variations in trout numbers could be explained.

Photo 1. Impact of harvesting and roading on granite outcrops at Separation Point

Photo 2. Site with elevated levels of fine sediment

We first reviewed how other researchers tackled this issue and found a wide variety of measures used to characterise fine sediment abundance. These included detailed measurements of sediment particles sampled from the river bed, visual assessments of gravel embeddedness, analyses of bed stability, and surveys of the volume of fine sediment deposited in pools. Most measures were relatively time consuming and expensive, and there was considerable debate about their suitability for assessing the abundance of fine sediment.

We also wanted a technique that would enable a large number of sites to be characterised quickly, could be used by Fish & Game staff in conjunction with trout-drift dive surveys, and was suitable for documenting large changes in fine sediment abundance, rather than a highly precise, time-consuming method. Most parts of the Motueka River have <5% fine sediment on the bed for most of the time, but as slugs of fine sediment pass through this proportion may rise to over 30% (Photo 2).

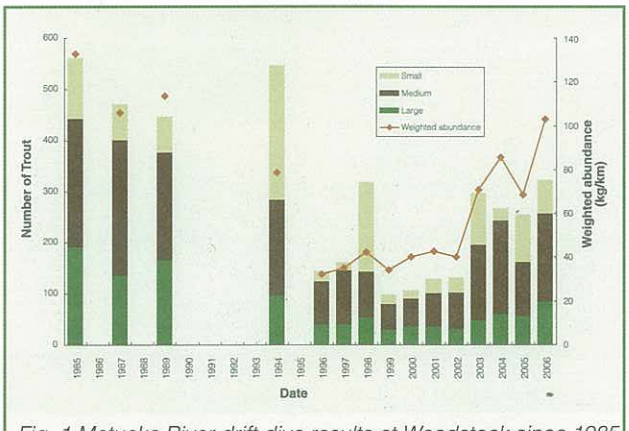

Fig. 1 Motueka River drift dive results at Woodstock since 1985

We chose 25 sampling sites throughout the catchment and made a visual assessment of the proportion of fine sediment at points along several transects across the stream at each site. The number of transects and number of observations per transect varied according to stream width. The start point of each transect was accurately located by GPS, allowing repeat measurements to be made at the same location in the future. We recorded the proportion of fine sediment using class intervals of <1%, 1–5%, 5–10%, 10–20%, 20–50% and >50%. A comparator chart was used to record the proportion of fine sediment accurately and consistently. At least 100 observations at each site were recorded directly into a datalogger connected to a GPS. All sampling was carried out under base flow conditions, and only the wetted area of the channel was characterised. Frequency of occurrence of each "% fines" class was then calculated.

At most sites, the proportion of fine sediment was very low: approximately 75% of observations exhibited <5% fine sediment, and only 7% showed >20% fines. A small number of sites, whose catchments drained areas dominated by Separation Point granite, had greatly elevated amounts of fine sediment. Repeat surveys were performed at all sites, and at Motueka