



# Repeated fine sediment pulses may impact stream restoration projects

## What we know

Resource managers responsible for protecting New Zealand's freshwater environments are particularly focussed on managing the impacts of fine sediment. While previous research has proven increased levels of deposited fine sediment have negative impacts on stream ecosystems, much of this research has focused on the impacts of a single addition of fine sediment. As rivers and streams are ever-changing environments, fine sediment levels are expected to vary over time, potentially altering stream ecosystem responses to this variation.

Our research aims to explore how past fine sediment conditions and continued fine sediment loading impacted stream communities.

## What we found

- After the first fine sediment pulse, a significant number of sensitive stream invertebrates drifted away from our mesocosms due to fine sediment creating unfavourable conditions. Far fewer stream invertebrates drifted after the second sediment pulse.
- Interestingly, the third fine sediment pulse saw a similar proportion of stream invertebrates drift as the first pulse, leaving nearly no sensitive stream invertebrates remaining in the mesocosms.

## Conclusion

Within a real-world stream, these results suggest two influential thresholds for sediment-sensitive stream invertebrates, the first after one fine sediment pulse and a second after three pulses. As stream restoration relies on invertebrates coming from elsewhere in the catchment, if fine sediment exceeds the equivalent of three pulses, stream restoration may be unsuccessful.

This research stresses the importance of ensuring fine sediment does not exceed levels where future stream restorations are negatively impacted.





## Stream invertebrates

The presence of certain invertebrates tells us a lot about the health of streams.

Some invertebrates dislike fine sediment, actively avoiding or moving away from streams high in fine sediment. We refer to these as sensitive invertebrates.

Other invertebrates are tolerant to fine sediment.

In our experiment, the type of drifting invertebrates indicated how stream health responded to fine sediment pulses, as if we had sensitive invertebrates drifting out of the area it meant the habitat quality was decreasing.



## What we did

We conducted an eight-week streamside mesocosm experiment in North Otago, New Zealand to investigate the impacts of repeated fine sediment pulses on stream invertebrates.

Water from the Kauru River was pumped through our mesocosms (diameter 25 cm), which were set up to replicate conditions in small real-world streams.

Sediment pulses were added to mesocosms at up to three points in time to mimic ongoing increases in fine sediment (due to runoff during rain).

Sampling occurred after each sediment pulse, capturing stream invertebrates that left the mesocosms (“drifting”) due to the unfavourable conditions.

**Research conducted by PhD student Noah Davis, with supervision from Christoph Matthaei at the University of Otago. Research was funded by the Critical Ecosystems Programme (CRESP) at the Department of Conservation.**



This research was conducted using the University of Otago's *ExStream System*. Thank you to the landowners who house the *ExStream System* and the fieldwork team who assisted with completing this project. Photos by Noah Davis.

For the scientific papers prepared from this research, please see Davis et al. (2021) and Davis et al. (2024) on the CRESP webpage [Critical Ecosystem Pressures on Freshwater Environments \(CRESP\) programme](#)

