



Wood in streams

Large, stable pieces of wood in planted forest streams enhance in-stream habitat and biodiversity.



Wood is a natural component of New Zealand's waterways. In forest streams wood contributes to a wide range of natural functions and processes, enhancing habitat variety and aquatic biodiversity.

Indigenous forest streams and mature planted forest streams usually contain a high proportion of large stable pieces of wood. Some harvesting operations introduce logging slash into streams; these smaller unstable pieces of woody material are more easily transported downstream.

Retaining some large stable pieces of wood in stream channels after harvesting would provide similar benefits to stream ecosystem processes and freshwater biodiversity as those found in indigenous forest streams. However, management of wood in planted forest streams must meet statutory and regulatory requirements.

Wood in New Zealand waterways

The majority of New Zealand was covered in forest prior to human arrival and wood was a natural component of the country's waterways. With deforestation, many of the natural functions, processes and habitat provided by wood have been lost.

Wood is transported into streams from slopes via slips, landslides and debris flows. Tree mortality, fire, wind, snow damage and bank collapse along the riparian edge provides additional sources of wood. Floods transport up-stream sources of wood to downstream environments. In planted forests, logging slash (logs, stems, branches, twigs, needles) can enter streams during harvesting operations.

Ecological role of wood in streams

The structural complexity of wood and wood accumulations in streams supports a wide variety of aquatic species such as macro-invertebrates, kōura, indigenous fish, trout and birds such as whio (blue duck). These habitats provide a range of food resources, shelter, refuge in high and low flows, concealment from predators, sites for completing varying stages of their life cycles, and support the co-existence of competitive species.

Wood also holds litter in the system so that it can be broken down into a more easily digestible food source. As a result, fish and invertebrate production can be high and habitats created by wood are often 'hotspots' of biodiversity.



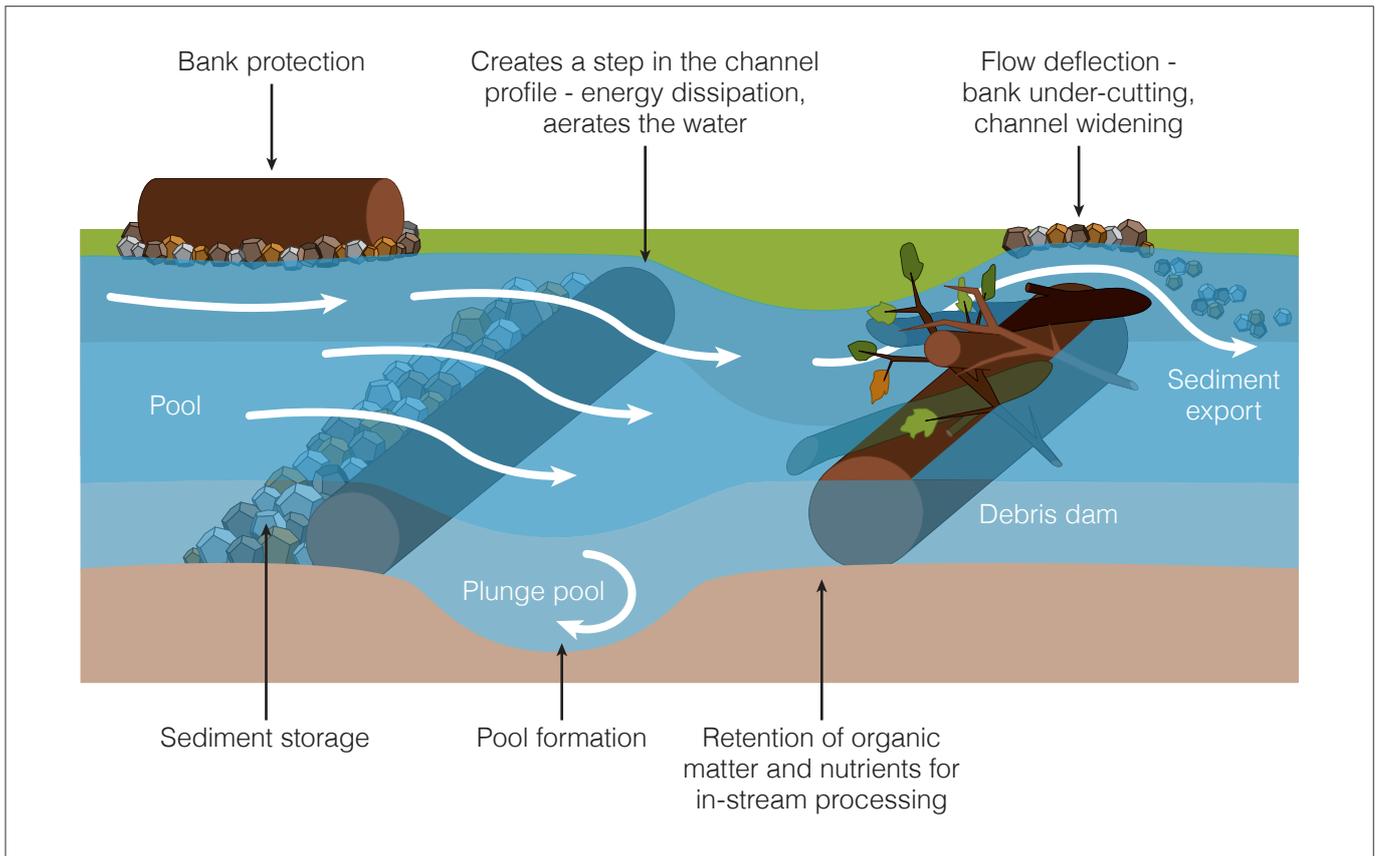
The wood in the stream (above left) created pools with overhead cover; habitat that contained the majority of larger longfin eels and banded kokopu. The litter trapped by the wood provided habitat and food for aquatic invertebrates (above right).



A trained dog sniffs out roost habitat under a log (above left) used by the nationally vulnerable whio (above right).

Differences between wood in indigenous forest streams and planted forest streams

Wood in indigenous forest streams and mature planted forest streams usually contain a high proportion of large stable pieces of wood and a lower proportion of smaller pieces of wood. However, this is reversed at tree harvesting. The logging slash that ends up in streams is mainly comprised of small pieces of wood. This material is unstable and easily flushed downstream, particularly in the first few years after harvest.



Wood, particularly large pieces of wood, contribute to a wide range of functions and processes in streams.



Wood in an indigenous forest stream.



Logging slash in and over a small recently harvested stream.



Natural windthrown stems in a mature planted forest stream.

How much wood is deposited in the stream at harvesting depends on the harvest system and practises used, as well as the width of the riparian set-back from the stream edge. Systems that extract timber across a stream tend to deposit the largest amounts of logging slash; systems that can fell and extract away from the stream edge deposit the least.

'Stream-cleaning' during and after harvest removes the majority of logging slash from the stream channel. However, if large pieces of wood are left in planted forest streams, they would provide benefits to stream ecosystem processes and functions and freshwater biodiversity, similar to those provided by wood in indigenous forest streams.

Management of wood in planted forest streams

- Minimise the amount of logging slash entering streams during harvesting (Forest Practice Guide).
- In steep, inaccessible streams, where it is unsafe and/or impractical to remove logging slash, identify downstream machine-accessible, natural accumulation points to trap and remove logging slash. These sites should be monitored on a regular basis, particularly in the first few years after harvest.
- Where safe and practical to do so, the management of *in situ* logging slash in streams should focus on removing the majority of the small mobile pieces of wood while retaining the larger more stable pieces, being mindful of downstream infrastructure and property risks.
- The most stable pieces of wood to retain in the stream channel are logs with a length exceeding the channel width, logs that are suspended or partially suspended across the stream channel, logs that have an intact root system, and logs that are partially buried.
- Trees that have fallen into the streams prior to harvesting such as windthrow and large non-merchantable pieces of logging slash that meet the stability criteria, provide ideal large stable structural pieces of wood for stream ecosystems.
- Retention of intact riparian forested margins will provide a long-term source of wood to streams.



Slash trap.

Management of wood in streams must meet statutory and regulatory requirements. Council approval will be needed if the slash management practices deviate from Council rules and the National Environmental Standards for Plantation Forestry.

Key links and references:

FOA Forest Practice Guides

<https://docs.nzfoa.org.nz/forest-practice-guides/> for harvest slash management and slash traps.

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About Scion

Scion is a New Zealand Crown research institute that specialises in research, science and technology development for forestry, wood and wood-derived materials, and other bio-material sectors.

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