

Large wood (snags) and flooding

In the past, large wood – including fallen native trees, logs and branches, sometimes called ‘snags’ – was removed from Victorian waterways to increase the flow of flood water and because of a concern that the large wood caused erosion and damage to infrastructure.

However, it is now well recognised that there are significant benefits to keeping wood in waterways, and we have a better understanding of the relationship between large wood, flooding, erosion and infrastructure.

Large wood and flood risk

The concern

Snags, particularly large tree trunks, can impede river flows and lead to increased flooding.

What we know

A channel needs to be substantially blocked by wood (>10% of the cross-sectional area of the channel) before there is any measurable effect on flood levels. It is unusual to find anything like that amount of wood in river channels today.

Also, when flood waters reach the top of the river bank and move onto the floodplain, the wood within the channel has very little impact on the distribution of floodwaters. In fact, a good distribution of wood along streams and rivers helps slow floodwaters and reduce the height of downstream flood peaks.

Large wood and bank erosion

The concern

Snags deflect flows and cause river banks to erode.

What we know

Erosion is a natural process, and when it occurs around large wood it forms pools and undercuts banks – places that fish, platypus, crayfish and many other plants and animals call home. Not only does large wood provide habitat, it also helps stabilise river beds and banks by resisting and deflecting flows.

In fact, wood in the river channel can be an important control of bed and bank erosion by resisting and deflecting flows. Past de-snagging has contributed to the degradation of many Australian rivers. In some cases, de-snagging, especially when combined with channelisation, has caused increases in current velocity. This can increase bank and bed erosion, especially in sandy-bed rivers. De-snagging and channelisation have also contributed to increased sedimentation and more severe flooding of downstream reaches.



There are benefits for waterway structure and fish habitat in leaving large wood in waterways. Photograph: Jamin Forbes

Large wood and infrastructure

The concern

Snags can move during floods and damage or destroy structures such as bridges.

What we know

It is relatively difficult for even major flood events to roll large pieces of wood (>2m long) along a river. This is because our native hardwoods, particularly eucalypts, are very heavy and have complex branching structures which enable them to self-anchor in the bed and banks of the river channel.

Damage to infrastructure during floods is generally caused by the accumulation of small pieces of wood (which are more readily mobilised with flow), large native trees that have just fallen (where the high energy of the flow keeps them afloat) or wood from introduced trees such as willows (which are much lighter and always float).

Managing large wood

Large wood creates important habitat in rivers. It provides shelter, food sources and breeding sites for a variety of instream animals, including many fish. Anglers know that for some types of fish, the best place to catch them is around large wood.

Large wood also stabilises the river channel by slowing the flow. In large lowland rivers, it may be the only stable material in the bed.

Large wood also improves water quality by aerating the water that flows over it.

For these reasons, today's best practice is to 'let sleeping logs lie'. However, where recently fallen trees are causing excessive bank erosion or pose a serious risk to public safety, infrastructure or recreational access, intervention may be justified.

There are several options for managing large wood in river channels, including trimming, realigning, anchoring and selective removal. The first three options should be explored before considering removal.

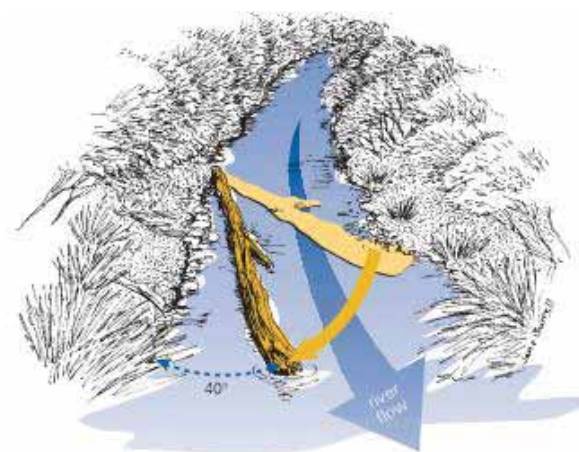
Trimming

Trimming generally involves taking off a branch that is directing flow into an asset on a bank or is trapping smaller pieces that then form large accumulations against a bridge, culvert or other infrastructure.

Trimming may also be appropriate to enable recreational access in some waterways.

Realigning

Large wood can be realigned to modify its influence on flow and water levels. Where large wood spans the entire channel, moving large trunks from an orientation perpendicular to the flow so they are at an angle of 20–40° to the stream bank, might assist in improving the flow or recreational access. However, wood realignment can be detrimental to the health of the waterway. Many native fish species require log jams or deep holes which don't tend to form if the log is realigned against the banks.



Realignment of large wood to reduce hydraulic effect. Source: Rutherford et. al. 2000'

Anchoring

Partial burial of a log and fixing of logs together to form structures may be an effective option where there is concern about the movement of instream wood (natural or reinstated). The photos below show wood being anchored into the bank, and a piece of wood with a complex root structure that will be buried into the bed to stop it from moving.

Pinning logs in place with hardwood piles is essential in high energy environments to allow the timber to become saturated and/or collect sufficient sediment ("bond with the bed") and so prevent them becoming re-mobilised. Partial burial is not sufficient alone as the weakness within the bed will allow the large wood to be readily gouged out by high flows.

1 Rutherford, I., Jerie, K. and Marsh, N., 2000. Rehabilitation Manual for Australian Streams,



Large wood trapped against a bridge on Sutherland Creek.
Photograph: Corangamite CMA



Large wood being anchored into a waterway. Photograph: North East CMA

Removing

Best practice is to only remove large wood from waterways in extreme circumstances. Realignment or anchoring, rather than removal, is recommended.

Generally, the only situations where large wood should be removed are where a valuable asset is threatened or where safety is a consideration for waterway users, such as water-skiers and canoeists.

In some cases, removed large wood may be able to be reintroduced into other waterways.

Approvals

Several authorities are responsible for administering legislation and regulations for the management of vegetation in and around waterways.

Before undertaking any action, talk with your local catchment management authority (CMA) about your concern and what you are proposing to do.

Works on waterways permits

CMAs have a regulatory role in authorising individuals and organisations to carry out works and activities in and affecting waterways¹. Works and activities such as large wood removal will generally need a CMA works on waterways permit^{2 3}.

If flood risk is the primary reason for wanting to remove large wood, the CMA may also require you to commission a flood study that will make a hydraulic assessment of the wood. You would need to demonstrate that the benefits associated with removing the wood (i.e. in terms of reduced damage) are greater than any costs to waterway health. As a general principle, the onus of proof in removing large wood to mitigate flood risk lies with those wanting to make the change.

If you would like further information on how to obtain a works on waterways permit, please contact your local CMA.

- ¹ Melbourne Water is the manager of designated waterways for the Port Phillip region so should be contacted for advice about waterway and riparian management matters in that region. References to CMAs in this fact sheet mean Melbourne Water for the Port Phillip and Westernport region.
- ² The Glenelg Hopkins CMA (GHCMA) does not issue works on waterways permits. It authorises works through issuing a licence under the Water Act. The types of works or activities that can be authorised by the GHCMA and the authorisation process differ from other CMAs.
- ³ Works on waterways permits are only required for 'designated' waterways. These are most waterways in a CMA's region, but your local CMA will be able to advise whether your waterway is designated.

Other permits and approvals

The granting of a works on waterways permit does not exempt an applicant from the need to comply with other legislation, e.g. to comply with Aboriginal cultural heritage legislation. Further information about Aboriginal cultural heritage requirements can be found on the [Aboriginal Victoria](#) website.

The Department of Environment, Land, Water and Planning (DELWP) will also need to give approval if the proposed works and activities occur on Crown land. Most beds and banks of Victorian waterways and nearly 30,000 kilometres of riparian land are Crown land. If you are uncertain whether the riparian land is your private property or Crown land, you can contact DELWP, which can advise you if Crown land abuts your property.

The requirement to obtain other approvals is ultimately the responsibility of the applicant.

Further information

This is one of four fact sheets available to provide information about the relationship between waterway vegetation and flooding. The series includes information about managing the vegetation and approvals that may be required for its management:

- **Managing vegetation and large wood in and around waterways**
- **Large wood (snags) and flooding**
- **Instream vegetation and flooding**
- **Riparian (streamside) vegetation and flooding.**

CMAs and Melbourne Water, as the floodplain and waterway manager for their regions, are the key point of contact to assist with information in this fact sheet and to provide advice and information in relation to local waterways and floodplains.

East Gippsland CMA	5152 0600
West Gippsland CMA	1300 094 262
Corangamite CMA	5232 9100
Glenelg Hopkins CMA	5571 2526
Wimmera CMA	5382 1544
Mallee CMA	5051 4377
Melbourne Water	131 722
North Central CMA	5448 7124
Goulburn Broken CMA	5822 7700
North East CMA	1300 216 513

Authorised and published by the Victorian Government, Department of Environment Land Water and Planning, 8 Nicholson Street East Melbourne, 2019
© The State of Victoria Department of Environment, Land, Water and Planning 2019
This work is licensed under a Creative Commons Attribution 4.0 International licence. You are free to re-use the work under that licence, on the condition that you credit the State of Victoria as author. The licence does not apply to any images, photographs or branding, including the Victorian Coat of Arms, the Victorian Government logo and the Department of Environment, Land, Water and Planning (DELWP) logo. To view a copy of this licence, visit creativecommons.org/licenses/by/4.0/
ISBN 978-1-76077-539-1 (pdf/online/MS word)

Disclaimer

This publication may be of assistance to you but the State of Victoria and its employees do not guarantee that the publication is without flaw of any kind or is wholly appropriate for your particular purposes and therefore disclaims all liability for any error, loss or other consequence which may arise from you relying on any information in this publication.

Accessibility

If you would like to receive this publication in an alternative format, telephone the DELWP Customer Service Centre on 136 186, or email customer.service@delwp.vic.gov.au, or via the National Relay Service on 133 677, www.relayservice.com.au. This document is also available on the internet at www.delwp.vic.gov.au