



Large Woody Debris

WHAT IS LARGE WOODY DEBRIS?

Large woody debris (LWD) comprises trees, branches and limbs that fall into waterways, and are conventionally defined as material with a diameter greater than 0.1-0.2 metres and greater than 1 metre in length. LWD is naturally recruited from the riparian zone of waterways. The lower reaches of Victorian waterways generally contain more substantial quantities of LWD than upper (headwater) reaches.

The term 'large woody debris' is considered to be negative by many researchers who now more commonly refer to it as either 'large woody habitat' or 'structural woody habitat' to reflect its ecological values to waterways. However, these terms may narrow our perception of the value of large wood in waterways to that of *only* habitat provision, when in reality, large wood provides many other equally important ecological services that should also be recognised.



VALUES OF LARGE WOODY DEBRIS

Large woody debris provides a vast range of environmental values to waterways, including:

- Provision of physical habitat diversity and structural complexity for aquatic organisms;
- Hotspots of energy flow e.g. carbon;
- Hotspots of nutrient cycling;
- Stabilise stream channel and bed sediment;
- Provide a source of, and retain, fine particulate organic matter for biological processing;
- Stable substrate for colonisation by biofilm (algae, bacteria and fungi) and invertebrates;
- Refuge areas for fish to avoid predators, sunlight, high water velocities, and also for use as spawning sites or territory markers;

- Resting, perching, foraging, lookout and crossing points for terrestrial organisms;
- Re-oxygenation of water flowing over LWD and prevention of stagnation; and
- In some cases helping to provide floodplain inundation to allow fish species to spawn and food from the floodplain to be washed into the stream.

In addition to the above mentioned values, LWD also provides a number of social and economic benefits such as: tourism, due to increased biodiversity; enhanced recreational fishing opportunities; ecosystem services (natural maintenance of water quality); and an increase in the aesthetic value of waterways.

PERCEIVED THREATS

Community concern regarding LWD accumulations along rivers has largely been centred on the perception that they increase flood frequency or reduce the capacity of a river to carry flood waters, which may cause damage to land and infrastructure. However, there is little evidence to support this notion, except in circumstances where an accumulation of LWD is *significant* (covering more than 10% of the channel cross-section) and is orientated across (perpendicular) the direction of water flow. Under these conditions, LWD may contribute to substantial local water level increases and increase the chance of water overflowing stream banks during flood flows.

Another long held belief is that LWD increases the risk of damage to bridges and roads and reduces

recreational amenity; however, LWD in Australian streams consists mainly of native hardwood trees which are heavy and have a complex structure (many branches) making transportation downstream difficult, hence reducing their ability to damage bridges. Recreational amenity may be reduced as far as boating is concerned, but fishing is likely to be enhanced due to greater habitat provision and therefore species diversity.

In the majority of cases, other forms of channel constriction such as bridges and levee banks have more control over flood levels than LWD. It is therefore vital that the channel characteristics of the waterway and the surrounding infrastructure are well-understood before management action is considered.

PAST AND PRESENT MANAGEMENT

Extensive de-snagging and associated 'river improvement' works were conducted in rivers of south-eastern Australia between 1886 and 1995. As a result, the volume of debris in most of the lowland rivers has been depleted either through the persistent mechanical removal or clearance of riparian vegetation from which it is naturally recruited.

Debris was systematically removed to maintain navigability, control bank erosion, rejuvenate channels, lessen the risk of damage to bridges and infrastructure, improve recreational amenity, or to maintain or improve the hydraulic capacity of channels.

It is now widely recognised that LWD plays many important roles in streams from an ecological, geomorphic and hydraulic viewpoint. Modern LWD management is conducted in such a way that the ecological health of the river is enhanced at the same time that risks of flooding and stream bank erosion are diminished.

The current emphasis in debris management is to favour instream ecology by removing as little LWD as possible. Waterway managers should therefore consider less intrusive intervention, such as re-alignment, lopping or rotating of LWD before considering wholesale removal.

Removing snags may trigger other problems such as downstream channel instability and erosion.

Therefore a seemingly simple solution to a local problem may lead to an ever-increasing dependence on expensive stream engineering works.

The removal of LWD from Victorian waterways is listed as a potentially threatening process under the *Flora and Fauna Guarantee Act 1988* and the Victorian River Health Strategy. Many strategies note concern regarding the impacts of de-snagging on waterways, but few propose specific programs or management actions to address the threatening process.



Large woody debris accumulation in the Avoca River near Glenloth.