

Action Statement

Flora and Fauna Guarantee Act 1988

No. 194

Removal of woody debris from Victorian rivers and streams

Description

Woody debris consists of sticks, logs, trunks, whole trees, root balls and branches that fall into the stream from adjacent and upstream riparian land (Treadwell *et al.* 1999). In natural river systems, woody debris and other organic matter such as fallen leaves are scattered through the system. River and stream ecosystems (or riverine ecosystems) refer to the whole system from headwaters to the mouth, and so include the channel, the riparian vegetation, any associated floodplain systems and also the estuary or terminal lake.

The removal of woody debris, often referred to as desnagging, used to be considered an essential component of river management. Desnagging practices aimed to improve stream flow, reduce severity of flooding, improve the passage for navigation, make recreation safer and assist with substrate removal (sand, gravel and gold extraction). However, extensive research on the hydraulic effects of snags has indicated that snags, especially in large rivers, have little adverse impact on channel capacity and snag removal does little to improve conveyance, reduce flood frequency or reduce the height of major floods (Gippel *et al.* 1992).

Furthermore, there is an overwhelming amount of literature and research that identifies the important contribution that woody debris makes to aquatic flora and fauna and the ecological impacts of removing large woody debris are now well understood. Woody debris is a vital component of healthy rivers and streams and their associated estuaries and wetlands. It provides an important structural component of rivers and streams, influences many ecological processes

(such as the processing of carbon and nutrients by instream organisms), provides essential habitat for aquatic and terrestrial biodiversity and can assist in stabilising rivers and streams (Lloyd *et al.* 1991, O'Connor 1991, Gippel *et al.* 1996, Treadwell *et al.* 1999).

Removal of woody debris causes the loss of habitat for fish and other aquatic and terrestrial organisms has a significant impact on channel morphology creating uniform drainage channels, with fewer channel features such as scour holes and bars (Treadwell *et al.* 1999).

Even though the ecological importance of woody debris in rivers and streams has been documented and many arguments for snag removal can be refuted, removal of snags still continues in many rivers throughout Victoria. The challenge today is to address the perceptions that woody debris creates problems and demonstrate the positive benefits of maintaining woody debris in the river or stream. Another challenge is to restore woody debris in rivers and streams. This is very difficult because the source of woody debris (riparian vegetation) is often degraded or nonexistent.

A further consideration is the source of woody debris. Under natural conditions, the source of wood debris is from indigenous riparian vegetation. Many streams now have non-indigenous riparian vegetation. However, wood debris from non-indigenous species can still provide ecological benefit, which should be considered in any management program.

Status of threat

The removal of woody debris in Victorian rivers and streams is listed as a potentially threatening

process under the **Flora and Fauna Guarantee Act 1988**.

In its final recommendation the Scientific Advisory Committee (SAC 1996) has determined that the removal of woody debris from Victorian rivers and streams is a potentially threatening process as, in the absence of appropriate management, it:

- poses a significant threat to the survival of a range of flora and fauna;
- poses a significant threat to the survival of two or more taxa; and
- poses a significant threat to the survival of a community.

The removal of woody debris is considered the cause for the decline in the range and abundance of many freshwater fish species throughout Victoria (Cadwallader 1979, Cadwallader and Backhouse 1983, Koehn 1986 and Koehn and O'Connor 1990). Of the 19 native fish species threatened in Victoria, most live in lowland streams, and may be affected by the removal of woody debris.

The threatening process has occurred across the State, primarily in lowland rivers and streams. In some areas, the practice of desnagging has been replaced with a policy of moving snags within the river (realigning) to reduce perceived problems with erosion. However, desnagging still occurs sporadically across Victoria.

Management Issues

Impacts on waterways are often the result of a number of threats, so it is often the case that addressing a single threat will not restore the health of the ecosystem. To achieve Victoria's objective of healthy waterways as identified in the Victorian River Health Strategy (NRE 2002), integrated action and identification of priorities is required. The mechanism for delivering this is the Regional River Health Strategies. These Strategies will describe priorities for threat management at a regional and local level. The catchment management authorities and Melbourne Water will use a risk-based approach to assist in identifying priority management actions, as described in Victorian River Health Strategy.

Ecological issues

The distribution of fish, invertebrates and aquatic flora is related to the availability of suitable habitats. Aquatic flora and fauna may rely on a variety of habitats that are created due to the presence of woody debris in the channel.

Aquatic and terrestrial flora and fauna require woody debris for:

- In-stream habitat;
- A food source;
- Sites to spawn and rear juveniles;
- Protection from strong currents and sunlight;
- Orientation points to identify habitat and territory;
- Shelter from predators;
- Vantage points to help capture prey.

Woody debris itself may provide the only stable environment within the channel in lowland streams. Lowland streams often have silty or sandy stream beds, which provide poor habitat for invertebrates. In these streams, woody debris may form the major stable habitat. Woody debris provides a physical stable structure which many organisms colonise and use as a critical part of their habitat. Removing these structures has a huge impact on entire food chains affecting algae, fungi, aquatic plants, invertebrates, mammals, birds, reptiles, amphibians and fish.

Woody debris assists in the formation of pools, scour holes, gutters and variations in the substrate (Koehn and O'Connor 1990, Keller and Swanson 1979, Montgomery *et al.* 1995, Abbe and Montgomery 1996). This variation in channel structure provides a variety of habitat conditions required by aquatic flora and fauna.

For example, deep holes can be scoured underneath snags providing habitat for fish such as Murray cod. Recent studies have shown that 87% of Murray cod within a stream are located amongst woody debris. After their spring spawning migration Murray cod will return to exactly the same log or hollow, sometimes travelling 100 kilometres upstream.

Woody debris creates a diversity of flows in the stream. Areas within the branches of a fallen tree or just downstream of a snag, have slow currents. Fish use these areas to rest or hide from predators.

Woody debris also provides important spawning sites for many fish species. River Blackfish *Gadopsis marmoratus*, Two-spined Blackfish *G. bisinosis*, Murray Cod *Maccullochella peelii peelii*, Trout Cod *M. macquariensis* and Southern Purple-spotted Gudgeon *Mogurnda adspersa* are among the species that use large woody debris as a major habitat for spawning (Jackson 1978, Koehn 1986, Koehn 1987, Cadwallader and Backhouse 1983, Koehn and O'Connor 1990, Cadwallader 1978, Treadwell *et al.* 1999).

Murray Cod, Trout Cod and Freshwater Blackfish all lay their eggs in woody debris. The two cod species attach the eggs to firm surfaces, in hollow logs or on the surface of the debris. Blackfish attach a single layer of eggs on the inside of hollow logs.

Woody debris protruding from rivers and streams provides valuable habitat for birds, reptiles, mammals, amphibians and insects. Insects that have both aquatic and terrestrial phases in their life cycles also use emergent woody debris during the transition between environments. Water birds use emergent woody debris as sites for roosting, preening and nesting. Reptiles, amphibians and water birds use emergent and submerged woody debris as vantage points for catching aquatic prey.

Biota in rivers and streams are dependent for most of their energy or nutrient supply on inputs of organic material (leaf litter) from terrestrial systems (Cummins 1974). Woody debris helps trap organic material entering rivers and streams and provides conditions conducive to the breakdown of organic matter by invertebrates and microbes that produce fine particulate organic matter that passes through the river system providing an important energy source. The slow decay and high stability of woody debris is itself an important long term organic source.

Wider conservation issues

The release of the Victorian River Health Strategy (NRE 2002) provides a solid basis for improving the management of woody debris, and for implementing this action statement and meeting the conservation objectives.

The Victorian Government recognises the importance of improving waterway management for a range of ecological, economic and social reasons. Protection, maintenance and enhancement of the natural resource are seen as a key requirement for economic and social health of the community. A primary goal of catchment management authorities, Melbourne Water and the Department of Sustainability and Environment is to protect the ecosystems of waterways through targeted activities. It is through such programs that the objectives of this action statement will be realised.

The natural source of all woody debris in rivers and streams is riparian vegetation. Artificially re-introducing woody debris into sections of rivers and streams that have been desnagged is an expensive action, so most actions to address the threatening process will rely on natural accretion from healthy riparian vegetation. Restoration of riparian vegetation has wider conservation significance for both terrestrial and aquatic biodiversity (OCE 1988, OCE 1991, McMahon *et al.* 1994, Askey-Doran *et al.* 1999, NRE 2002). The action statement for the potentially threatening process 'degradation of native riparian vegetation along Victorian rivers and streams' addresses this.

Management of this threatening process is therefore an integral part of achieving quality

catchment management and ecologically sustainable development.

Previous Management Action

The policy for protection and management of instream habitat, including wood debris is set out in the Victorian River Health Strategy (NRE 2002). The strategy states:

"Large woody debris shall not be removed from rivers unless it is demonstrated to be a serious threat to a high value asset or to human lives. Where this has been demonstrated, the option of realigning the snag will be investigated to retain as many of the ecological benefits as possible." (NRE 2002 p. 111).

In addition, some legislation states in its purposes the protection of aquatic habitat, but does not provide explicit arrangements to manage woody debris. However, under the **Fisheries Act 1995**, Fisheries Notices have been issued to protect woody debris in particular instances.

- The Fisheries Act 1995 provides a legislative framework for the regulation, management and conservation of Victorian fisheries including aquatic habitats;
- The Water Act 1989 provides a formal means for the protection and enhancement of the environmental qualities of waterways and their in-stream uses but also empowers authorities to remove woody debris; and,
- The Conservation, Forests and Lands Act 1987 provides for the protection of the quality of aquatic habitats during works that may relate to waterways.

In addition, many strategies note concern regarding the impacts of desnagging on waterways, but propose no specific programs or management actions to address the threatening process (e.g. DCE 1992). The Mid-Murray Forest Management Plan 2002 addresses management of floodplain woody debris in relation to water movement and maintenance of adequate levels of in-stream habitat.

Major Conservation Objectives

Long term objectives:

1. To provide self sustaining levels of woody debris in rivers and streams by promoting healthy stands of riparian vegetation;
2. To reverse declines in the conservation status of many individual species or ecological communities that have been adversely affected by the removal of woody debris from Victorian rivers and streams.

Short term objectives:

1. To stop the practice of removal of woody debris in all Victorian rivers and streams, unless it is demonstrated to be a serious threat to a high value asset or to human lives;
2. To continue educating waterway managers and the community on the benefits of woody debris and address the perceptions that woody debris creates problems;
3. To protect all stands of native riparian vegetation through existing statutory and planning processes and develop priorities for restoration of riparian vegetation through regional river health and regional vegetation planning processes, regardless of land tenure.

Intended Management Action

The intended management actions listed below are further elaborated in DSE's Actions for Biodiversity Conservation Database. Detailed information about the actions and locations, including priorities, is held in this system and will be provided annually to land managers and other authorities.

Planning and Co-ordination

1. Ensure that the regional river health strategies address management of woody debris in rivers and streams in line with the Victorian River Health Strategy (NRE 2002).

Responsibility: Catchment Management Authorities, Melbourne Water.

2. Ensure that all authorities with land or water management responsibilities include, as part of their business plans, strategies or annual work plans, measures to protect and restore woody debris. Authorities include, but are not restricted to, catchment management authorities, Melbourne Water, DSE, water authorities and local councils.

Responsibility: DSE (Catchment and Water Services, Biodiversity and Natural Resources Division, Regions), DPI (Fisheries Victoria), Catchment Management Authorities, Water Authorities

Production of guidelines, legislation

3. Update the 'Environmental Guidelines for River Management Works' and 'Guidelines for Stabilising Waterways' (Standing Committee on Rivers and Catchments 1990, 1991) as indicated in the Victorian River Health Strategy. Ensure these guidelines include guidance on the management of woody debris in streams, along the lines of those in Lovett and Price (2002).

Responsibility: DSE (Catchment and Water Services, Biodiversity and Natural Resources Division)

Protection, restoration and rehabilitation of riparian vegetation

4. Implement the management actions outlined in the action statement for the Potentially Threatening Process "Degradation of native riparian vegetation along Victorian rivers and streams" that would benefit woody debris in rivers and streams.

Responsibility: DSE (Biodiversity and Natural Resources Division)

Education and extension

5. Identify and promote best practice examples to waterway managers, landholders and other relevant agencies, specifically:
 - Promote educational material detailing the positive benefits of woody debris;
 - Consult with riparian landholders to encourage their support and, where relevant, involvement in river conservation and restoration activities; and
 - Address negative perceptions of woody debris in relation to impacts on flood frequency or conveyance.

Responsibility: DSE (Catchment and Water Services, Biodiversity and Natural Resources Division, Regions), DPI (Fisheries Victoria), Catchment Management Authorities, Melbourne Water

Research

6. Undertake, as funding becomes available, technical research in priority areas:
 - Evaluate the benefits/disbenefits of snag realignment compared to leaving snags in place;
 - Evaluate the ecological and geomorphological impact of re-introducing snags into waterways
 - Determine cost effective and sustainable methods for reintroducing snags into high priority waterways;

Responsibility: DSE (Catchment and Water Services, Biodiversity and Natural Resources Division, Regions), Catchment Management Authorities, Melbourne Water.

Resource assessment and monitoring

7. Develop appropriate performance indicators for this threatening process to assist land and water management authorities in environmental audit and condition of catchment requirements.

Responsibility: DSE (Catchment and Water Services, Biodiversity and Natural Resources Division)

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Further information can be obtained from Department of Sustainability and Environment Customer Service Centre on 136 186.

Flora and Fauna Guarantee Action Statements are available from the Department of Sustainability and Environment website: <http://www.dse.vic.gov.au>

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