



Australian Government



Snags and Resnagging

What are snags?

Snags are trees, branches and root masses that are found in our rivers. Also known as large woody debris, snags result from trees on the river bank either falling in or dropping their branches. This can occur because of flooding, bank erosion, wind or limb shedding and is a natural process.

Why are snags important?

Snags provide extremely important habitat for aquatic life, particularly native fish. There are around 45 native fish species in the Murray-Darling Basin. Many of these species, such as Golden perch, River blackfish, Murray cod, and the critically endangered Trout cod, rely on snags for a number of reasons.

Snags provide fish with:

- sites to attach adhesive eggs during breeding;
- sites to rest from fast river flows;
- shelter from predators;
- landmarks to define territories and aid navigation;
- ambush sites.

Some native fish even have preferences for certain types of snags and their location within the river. Trout cod for example have been shown to use snags closer to the middle of a river, whereas Murray cod use snags closer to the river bank.

Macroinvertebrates, an important food source for many native fish, use snags not only for shelter, but also as food, grazing on the wood itself and the microbes and algae that grow on it. Snags are also important habitat for other terrestrial and aquatic animals, such as birds and amphibians.

Snags play an important role in shaping our rivers, creating variability in depth and flow that in turn leads to a greater range of habitat for fish and other aquatic life. As a significant source of carbon, snags also contribute to the chemical composition of the water.



Snags – such as these on the Murrumbidgee River, NSW – provide vital habitat for many species of native fish in the Murray-Darling Basin. Image Courtesy: Arthur Mostead



Snags contribute to the shape of our rivers. Image courtesy: Jim Barrett

Where have all the snags gone?

Some rivers of the Murray-Darling Basin still have good numbers of snags, an asset that should be managed to ensure their protection. However, millions of snags have been deliberately removed in the past in large-scale desnagging operations. These largely came about because of several misconceptions. Among these was the belief that snags cause erosion of river banks. While in certain instances they may contribute to small-scale and short-term erosion, in many cases the presence of natural loads of snags may reduce erosion by protecting the river banks.

Many also thought that snags increased the incidence of flooding by reducing the capacity of water that the river channel could hold, a view we now know to be largely incorrect.



Trout cod. Image courtesy: Esther Beaton, Environment ACT



Golden perch. Image courtesy: Gunther Schmida



River blackfish. Image courtesy: Gunther Schmida



Murray cod. Image courtesy: Gunther Schmida



The result of tree clearing and desnagging in the Upper Condamine River in Queensland. Image courtesy: David Moffatt

The effects of snag removal are long-lasting. In fact, the removal of snags, or desnagging, is acknowledged as one of the primary threats to native fish in the Murray–Darling Basin’s Native Fish Strategy – a long-term plan to rehabilitate the Basin’s native fish populations. Furthermore, snags are now protected in some States by legislation, with heavy fines for illegal removal.

Resnagging – Bringing back the wood!

Increased scientific understanding of the importance of snags to native fish and river health has led to significant efforts to reverse the loss of this vital habitat. The most obvious way to achieve this is to put the snags back in. Whilst simple in principle, there is a lot of science and engineering that goes into the replacement of snags, or resnagging. Consideration must be given to the type, size, shape and quantity of snags needed, as well as the position and orientation of each individual snag in the river. This level of detail is necessary to ensure that the structures are placed to maximise the ecological benefits.

Once it has been decided where they are to go, the next job is to get the snags in there. These snags are heavy and require considerable work to get them into the river in the right position. This is usually done with cables and heavy machinery, or with barges. Helicopters have even been used to lower snags into place.

Resnagging the River Murray

Downstream of Yarrawonga

Since 2002 14 sites that were resnagged below Yarrawonga on the Murray River have been evaluated by Victorian scientists, under funding from the MDBA’s Native Fish Strategy. The results from this project have identified the positive response that can be expected from native fish to resnagging. Another component of this program has been the establishment of a mark-recapture data set that will provide estimates of the growth rates and population statistics of Murray cod, Trout cod and Golden perch.



A resnagged section of the River Murray. Image Courtesy: Simon Nicol

This has already been used to assist with advancing the management of Murray cod in the Basin.

Hume Dam to Yarrawonga

Re-snagging works have been completed between Hume Dam and Yarrawonga through a project funded under The Living Murray initiative. A plan to identify areas for re-snagging was developed in 2004. This plan included a ‘snag assessment’ which recorded the location, size, complexity, alignment and depth of snags. It also recorded the associated riparian vegetation communities for presence/absence and connectivity. Knowledge of the number and location of snags previously removed were also included. This assessment allowed a target ‘instream woody habitat load’ to be calculated. The ‘instream woody habitat load’ estimates the level at which snags should occur to maintain native fish populations within the reach.

Three priority areas were selected for resnagging along the reach. The selection process incorporated the above assessment results and also considered connectivity with existing healthy instream habitat and logistics associated with resnagging. This included sourcing and transporting woody habitat and access to resnagging sites. Re-introduction of snags have now been completed at the three priority areas.

A comprehensive monitoring program has been underway since February 2007 to conclusively demonstrate the benefits of resnagging. The two key questions being asked are: 1) does the reintroduction of snags result in the growth of native fish populations; and 2) does the reintroduction of snags result in an increase of native fish distributions. Early results show that large-bodied native fish such as Murray Cod are responding positively to resnagging.

What else can be done?

Resnagging is a sound management intervention we can use to restore snags to our rivers, and early indications suggest that native fish respond strongly as a result. However it is an expensive and labour intensive option. The key is to better manage riparian vegetation, trees in particular, so that there will be a constant supply of snags in the future.

It is also important to raise awareness of the benefits of snags in order to minimise their removal by those that don’t understand the role they play in maintaining functional, healthy rivers with self-sustaining fish populations and communities.

Further information

Land and Water Research and Development Corporation. 2000. *Managing snags and large woody debris*. Riprap: LWRDC’s River and Riparian Lands Management Newsletter Edition 16. Canberra.

Rutherford, I. Marsh, N., Price, P. and Lovett, S. 2002. *Managing woody debris in rivers*. Fact Sheet 7. Land & water Australia. Canberra.

For more information about the Native Fish Strategy for the Murray–Darling Basin and to find out what you can do to help, contact the Murray–Darling Basin Authority on (02) 6279 0100 or visit www.mdba.gov.au