the living murray

sustaining communities and preserving unique values

MURRAY-DARLING BASIN COMMISSION

Resnagging: Risk Management Issues[1]

The presence of instream woody habitats ('snags') are a vital component of healthy functioning river systems. Native fish use snags to shelter from currents, for refuge from predation, feeding and spawning sites and as a nursery for juvenile fish. They are particularly important in the lifecycle of Murray Cod and the endangered Trout Cod, and also provide habitat for macroinvertebrates, terrestrial animals and birds.

A large scale resnagging project commenced in August 2006 to reinstate around 4000 snags at high priority sites in the Hume-Yarrawonga reach of the River Murray. This information sheet is intended to provide an overview of the experience gained in identifying and managing risk for the Murray River Resnagging: Hume Dam to Yarrawonga Project. When considering the implementation of a similar project, seek the advice of a legal professional.

The following steps were undertaken during the early stages of project planning, so risk management issues could be resolved:

1. Obtaining legal advice as to the current civil liability legislation in relevant jurisdictions.
2. Determining project risks and mitigation measures as per table 1.
3. Identifying risk mitigation measures to reduce the potential risk to 'Low'.
4. Formally documenting risk management process, for example a Safe Work Method Statement or Risk Management Plan, and having the documentation reviewed by relevant agencies (eg Waterways Authorities, River Management Authorities).
5. Recording who was responsible for each action and the long term maintenance of any risk mitigation measures.

Some examples of specific risks and mitigation strategies are given below. Note this list is not exclusive, and there is likely to be other site specific characteristics that should also be considered.

Risk of reinstated snags to other waterway users

In a River that is subject to high level of waterway use by recreational boaters, canoeists, fishers and water-skiers and a commercial paddle steamer vessel, submerged obstacles pose a risk to waterway users, particularly when travelling at high speed.

Likelihood: Possible

Consequence: Major

Initial Risk Rating: Medium

Risk Mitigation Measures:

- When determining the location of proposed resnagging areas take into account the heaviest use areas, and possibly avoid resnagging in these areas (eg around towns).
- Place snags closer to the bank to maintain navigable river channel.
- Warn waterway users of newly resnagged areas, eg through media, signage, public notices.

Revised Risk Rating: Low

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[1] To the extent permitted by law, the MDBC (including its employees and consultants) excludes all liability to any person for any consequences, including but not limited to all losses, damages, costs, expenses and any other compensation, arising directly or indirectly from using the information in this document (in part or in whole) and any information or material contained in it.

Photo 1: Resnagging on the Murray River places snags within 20m of the bank to maintain navigable channel (photo: M Casey)

Risk of increased flooding due to higher snag loads in the waterway

Reinstated snags may cause a reduction in channel capacity and cause water to reach bank full capacity faster and more often. Particularly of interest in rivers that convey irrigation water.

Likelihood: Possible

Consequence: Minor

Initial Risk Rating: Low

Risk Mitigation Measures:

- Gain an understanding of the channel capacity of the stream/river and the current snag loading.
- Consult hydraulic modellers for advice.
- Consider the localised impact of a reinstated snag, eg distance from bank, larger vs smaller items, the angle of the snag to the flow.

Revised Risk Rating: Low

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Risk of increased erosion rates around reinstated snags

If orientated inappropriately, a snag may cause localised erosion which may result in bank slumping and is of particular concern when erosion threatens infrastructure and high value assets.

Likelihood: Unlikely

Consequence: Moderate

Initial Risk Rating: Low

Risk Mitigation Measures:

- Orientate snags with the flow to prevent water being diverted into the bank.
- Be aware of sensitive bank substrates susceptible to erosion.

Revised Risk Rating: Low

Risk of reinstated snags moving during higher flows

Likelihood: Possible

Consequence: Moderate

Initial Risk Rating: Medium

Risk Mitigation Measures:

- Use dense green timber with root balls where possible, heavier complex logs are less likely to move.
- You may consider securing the logs in place through one or a combination of the various methods previously used in resnagging projects in Australia;
    - Key snags into bank or river bed
    - Drive piles (vertical timber logs) around the reinstated snags
    - Map the location and description of the reinstated snags and formulate a yearly audit program to review the location of snags once the resnagging project has been completed.
- Know the river: if there is significant infrastructure (eg a bridge) immediately downstream of a proposed resnagging area it is advisable to find an alternative site away from that area (eg downstream of the bridge or in an area without infrastructure).

Revised Risk Rating: Low

Table 1: Example Risk Score Matrix

1. How likely is it to be bad? (LIKELIHOOD)	2. How severely could it hurt or someone of how ill could it make someone? (SEVERITY OF CONSEQUENCE)				
	I CATASTROPHIC **Death, toxic release off-site with detrimental effect, huge financial loss**	II MAJOR **Extensive injuries, loss of production capability, off-site release with no detrimental effects, major financial loss**	III MODERATE **Medical treatment required, on-site release contained with outside assistance, high financial loss**	IV MINOR **First aid treatment, on-site release immediate contained, medium financial loss**	V INSIGNIFICANT **No injures. low financial loss**
A ALMOST CERTAIN **Is expected to occur in most circumstances**	High	High	High	Medium	Medium
B LIKELY **Will probably occur in most circumstances**	High	High	Medium	Medium	Low
C POSSIBLE **Might Occur at some time**	High	Medium	Medium	Low	Low
D UNLIKELY **Could occur at some time**	Medium	Medium	Low	Low	Low
E RARE **May occur only in exceptional circumstances**	Medium	Low	Low	Low	Low

Adapted from NSW Treasury Managed Funds based on Australian Standard AS 4360-1999 Risk Management.

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Other Native Fish Publications: (www.mdbc.gov.au)

Resnagging Project Newsletters – various topics

Building Fish Freeways – outlines results and achievements of the Native Fish Strategy's fishway program.

Fish n' Chips – information on tagging of native fish to monitor their numbers and movement – why, how and results.

Native Fish Strategy summary document – overview of the MDBC's long term strategy to rehabilitate native fish populations.

Fishes of the Murray-Darling Basin: an introductory guide – a book that covers the identification, ecology and distribution of all fish in the in the Murray-Darling Basin.