rivers and water quality

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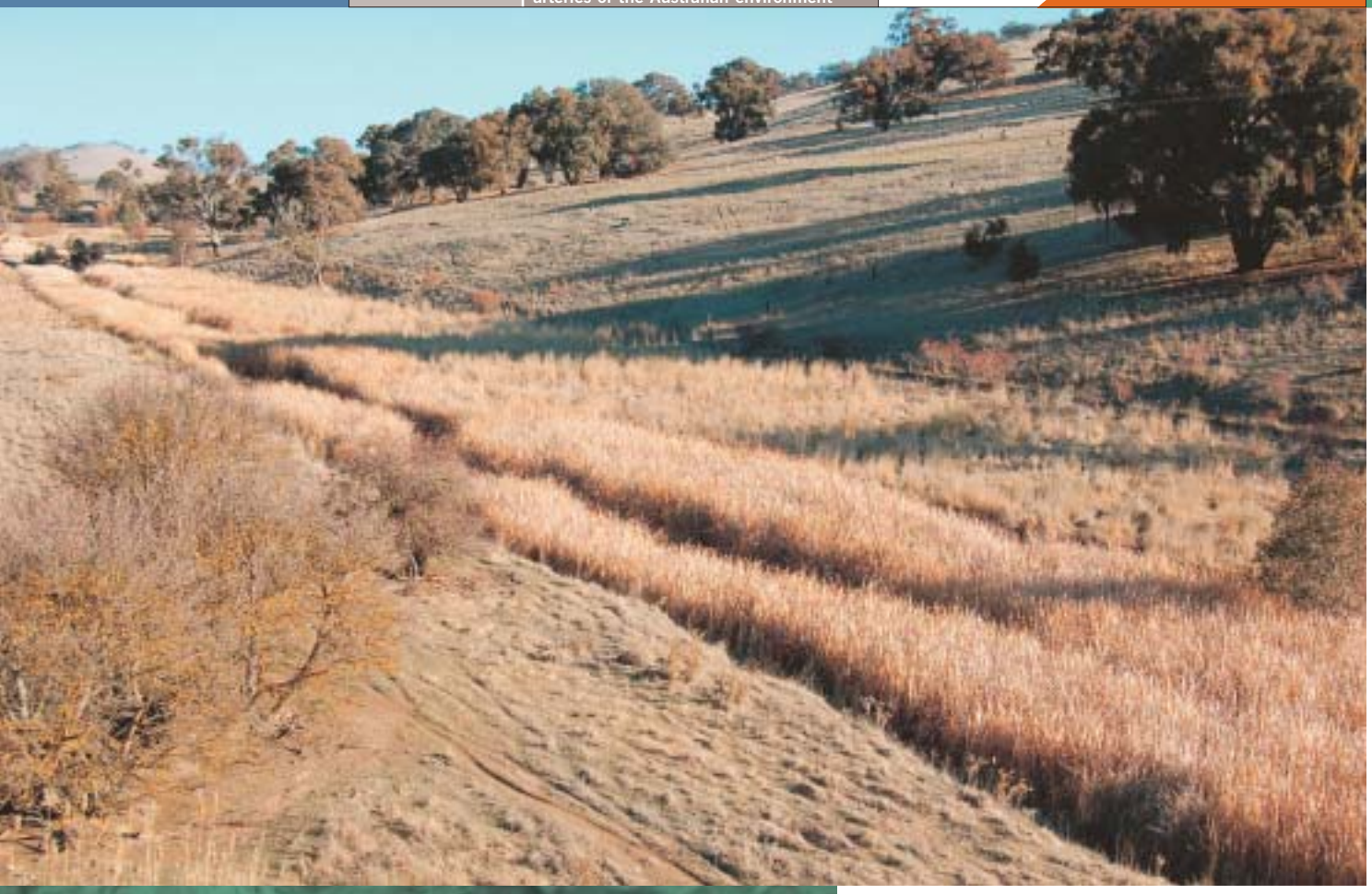


Photo Roger Charlton.

Managing in-stream wetlands on wool-producing farms

This fact sheet from the Land, Water & Wool Program summarises information about in-stream wetlands and their management, so that woolgrowers can make informed decisions about what to do on their own property. The Program's Rivers project was established in 2003 in the Yass region of New South Wales with links to work being conducted by the CSIRO Murrumbidgee catchment Open Air Laboratory on the functions and management of in-stream wetlands. Some of the information here has come from that project, but this fact sheet is also applicable to many areas where in-stream wetlands are a natural and common feature of the landscape.

What is an in-stream wetland?

Wetlands are found in parts of the landscape where either the water table is at or near the surface for much of the year, or where the land is covered by a shallow pool of water either temporarily or permanently. The saturated or flooded soil supports vegetation and ecosystems that look different to those found on the surrounding land, and wetlands can be thought of as a transition between terrestrial and aquatic systems.

In areas of gentle gradient, for example on the western slopes and plains of tablelands, or in steeper country that has valleys filled by sediment, wetlands often occur within the channels of streams and creeks. These are known as in-stream wetlands, and can be identified as an area of dense vegetation, often native or introduced reeds, growing in the stream or creek.

This dense reed bed is a common form of in-stream wetland on the tablelands and slopes.
Photo Roger Charlton.

Why are in-stream wetlands important?

In-stream wetlands improve water quality by filtering out sediment and nutrients eroded from areas upslope. Their dense vegetation slows down any flow from within the channel, so that soil particles and their attached nutrients drop out and are eventually stabilised when plant roots grow into them. The plants can also take up nutrients from solution. This filtering action produces cleaner, clearer water that is valuable for downstream users and river systems. In-stream wetlands also provide important habitat for native birds, frogs and other animals. Most wetlands contain native reed species, and are unlikely to impede or have any noticeable effect on the occasional high flows that can cause localised flooding. If they absorb sediment and nutrients from farm runoff, this will lead to an overall improvement in the health and water quality of streams on-farm, and ultimately of major river systems.

A typical in-stream wetland in grazing country. Water moving from the adjacent slopes collects in an upland flat and supports the growth of reeds which stabilise the channel.
Photo Greening Australia.

In low gradient landscapes, channels with low and/or ephemeral flow may become colonised with reeds to form in-stream wetlands like this one.
Photo Currie Communications.

How do in-stream wetlands form?

The combination of low channel gradient (slow and non-erosive flow) and long dry periods (stream may flow for only a few months of the year) allows vegetation to become established within the channel, and this is not dislodged by normal stream or creek flows. New areas of wetland are established by wind blown seeds, and once established the reeds can expand by migrating slowly along the stream bed, their underground horizontal shoots (rhizomes) anchoring them to the stream floor. Wetland reed beds occur naturally in damp stream channels, and have been there since long before European settlement. The records of early explorers noting that streams had the form of 'chain of ponds' may reflect in part the widespread occurrence of in-stream wetlands along low-gradient parts of the landscape.

When catchments were opened up for agricultural development, one result was increased erosion from roads and stock tracks, urban development and overgrazing. Much of this sediment found its way into streams and creeks where, if the flow was not sufficient to move it through the channel network, it remains. There is evidence that in some regions colonisation of stream beds by native reeds has increased due to the large amount of sediment that is now filling the channels. Once vegetation becomes established, it is much harder for flow to move the sediment.

This wetland has been fenced to control access by stock.
Photo Roger Charlton.

Case study

Storing sediment — the importance of in-stream wetlands

Data from a monitored site near Binalong in southern New South Wales shows that the in-stream wetland (a dense reed bed) was able to trap about one third of the suspended sediment entering it, equivalent to 160 tonnes per linear kilometre per year. It has been calculated that the 485 kilometres of in-stream wetlands (about 25% of the total channel network) within the Jugiong Creek catchment are storing approx. 2 million tonnes of total sediments (and its attached nutrients). This is likely to provide a large improvement in water quality over bare and eroding channels, and emphasises that graziers should not 'clean out', burn or otherwise disturb these wetlands. It appears that although sheep may graze pasture plants along the edges of these reeds, they do not eat the reeds themselves nor do they enter the dense reed beds. Hence, it is probably unnecessary for woolgrowers to fence off the wetlands, unless they also graze cattle.

What should I do (if anything)?

In-stream wetlands are sometimes perceived as a problem by graziers, because they are said to be weed beds that impede water flow. However, unless they can be shown to be causing a problem, existing in-stream wetlands should be left to perform valuable filtering and ecological functions. They have little or no effect on the infrequent large flow events that may cause flooding, as the reeds are either overtopped by the flow or lie down and protect the bed of the channel. Recent scientific research suggests that the slight slowing effect on peak flows provided by in-stream and riparian vegetation helps to reduce the impact of large floods lower in the catchment.

This in-stream wetland has helped to stabilise the channel in sloping grazing country, and traps and filters sediment and nutrients entering it. It should be left undisturbed to continue to provide these ecosystem services. Photos Gary Caitcheon.

The reeds becoming established in this upper part of a gully will stabilise its bed and help to reduce further erosion. Sheep should now be excluded from both the gully itself, and from the adjacent pasture which is becoming over-grazed and another erosion risk. Photo Roger Charlton.

Some woolgrowers have chosen to fence off their in-stream wetlands to prevent disturbance by grazing and stock access, and to assist in parasite control programs and in mustering. Fencing to control stock access (funding for capital costs may be available from Landcare or other community grants schemes) may be all that is needed to promote the establishment or extension of in-stream wetlands, for example to repair eroding sections of a channel or gully.

Burning the reed beds or excavating them in an attempt to increase channel flow is unlikely to be successful over the long term, and if it is followed by a large flow event could lead to catastrophic erosion within the channel and the start of a new gullying episode (see Land, Water & Wool fact sheet on gullies). In-stream wetlands, and the sediment they have stabilised, can provide an important form of grade (slope) control on the channel, and should therefore be left undisturbed. State and territory legislation generally requires a permit for any works in or adjacent to a stream channel.

In-stream wetlands are highly significant catchment features. There are 478 kilometres of wetland in the Jugiong Creek catchment, colonising streams with catchment areas up to 150 km^2, and many have been present since 1944. On average, there is 13,000 tonnes of mud trapped per kilometre of wetland. Averaged over the whole catchment, the sediment volume is equivalent to that generated by five years of erosion. Some valleys contain up to 20 years of eroded sediment within the now-stabilised channel (source: Zierholz et al. 2001).

Community members replanting the riparian area adjacent to an in-stream wetland. Photo Greening Australia.

What are the costs and benefits of managing in-stream wetlands?

Established in-stream wetlands generally require no intervention to maintain them, particularly for native reeds that are adapted to the local environment. Fencing or careful grazing management can reduce the impact of stock when they are in the adjacent paddock. The benefits of establishing and maintaining in-stream wetlands are improved water quality on the farm, and for other down stream users. Time spent chasing sheep out of these areas is also reduced when a fence is used to manage access. Greater habitat diversity and health of waterways are important environmental benefits.

Fencing to exclude stock may enable in-stream wetlands re-form in sections of this channel and help to stabilise it. Photo Greening Australia.

Where can I get more information?

Details about the ability of in-stream wetlands to trap sediment and filter water, and about their ecological importance, can by found in the following scientific publications. Information about managing in-stream wetlands, or extending or replacing them by planting, can be obtained from your local government agency, catchment board, council, or from Greening Australia.

Australian Freshwater Ecology: Processes and management, Boulton, A.J. & Brock, M.A. Brock 1999, CRC for Freshwater Ecology, Gleneagles Publishing.

Zierholz, C., Prosser, I.P., Fogarty, P.J. & Rustomji, P. 2001, 'In-stream wetlands and their significance for channel filling and the catchment sediment budget, Jugiong Creek, New South Wales', *Geomorphology*, vol. 38, pp. 221–35.

Don't get fleeced, in-stream wetlands are valuable parts of a wool-producing farm.

Photo: Roger Charlton. Inset image Australian Wool Innovation Limited.

Contact list

Contact the government land management agency in your state. Other useful web sites are listed below:

Land, Water & Wool — www.landwaterwool.gov.au

Land & Water Australia — www.lwa.gov.au

Greening Australia — www.greeningaustralia.org.au

National Plan for Salinity and Water Quality — www.napswq.gov.au

NSW: Department of Natural Resources (DNR) — Tel: 02 9762 8044. Web: www.dnr.nsw.gov.au

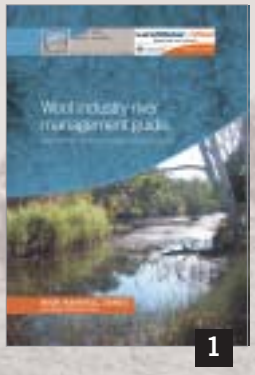
NSW: Department of Primary Industries — Tel: 02 6391 3100. Web: www.dpi.nsw.gov.au

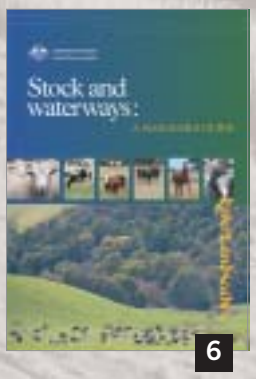
QLD: Department of Natural Resources, Mines and Water (DNRMW) — Tel: 07 3806 3111. Web: www.nrm.qld.gov.au

QLD: Department of Primary Industries and Fisheries — Tel: 132 523. Web: www.dpi.qld.gov.au

VIC: Department of Sustainability and Environment (DSE) — Tel: 136 186. Web: www.dse.vic.gov.au

VIC: Department of Primary Industries — Tel: 136 186. Web: www.dpi.vic.gov.au





Publications for woolgrowers

The *Wool industry river management guides* bring together the latest science and recommended management practices for riparian areas within the context of a commercial wool-growing property. The Guides are available for the high rainfall regions (above 600 mm) and sheep/wheat regions (300–600 mm) of Australia. Each book has over 200 full-colour pages.

In addition www.rivers.gov.au/lww will offer an active contents list which will give you a snapshot of what is in each section.

1. High rainfall zone: product code PX050951
2. Sheep/wheat zone: product code PX050952

Managing rivers, streams and creeks: A woolgrowers guide — is a summary of the key recommendations from the 'Wool industry river management guides' and provides an introduction to river and riparian management issues on farm.

3. Product code PX051003

Are my waterways in good condition? — a checklist that provides colour coded pictures that you can use to assess the condition of your stream or creek. It is a quick and easy way to work out the health of the streams or creeks running through your property, and it suggests management actions to improve or maintain these vital parts of your farm.

4. Product code PB061114

River Insights — a publication featuring the stories of ten woolgrowers and what has motivated them to manage their rivers, creeks and streams in ways that make both economic and environmental sense.

5. Product code PK050950

Stock and waterways: a manager's guide — offers practical advice on how stock farmers can manage riparian land both productively and sustainably, and includes a number of case studies from farmers throughout Australia who have seen the benefits of changing their management practices.

6. Product code PR061132

These products are available from CanPrint Communications on freecall 1800 776 616 in hard copy, or can be downloaded from — www.landwaterwool.gov.au or www.rivers.gov.au

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