



Water notes



ADVISORY NOTES FOR LAND MANAGERS ON RIVER AND WETLAND RESTORATION



Identifying the riparian zone

The first step in managing a river is to identify the riparian zone. The riparian zone can generally be described as the land that directly influences or is influenced by, a watercourse. That is, the corridor of land in which a stream functions.

The riparian zone includes the immediate vicinity of the stream, which consists of the bed, banks and adjacent land, as well as the floodplain, which carries large floods.

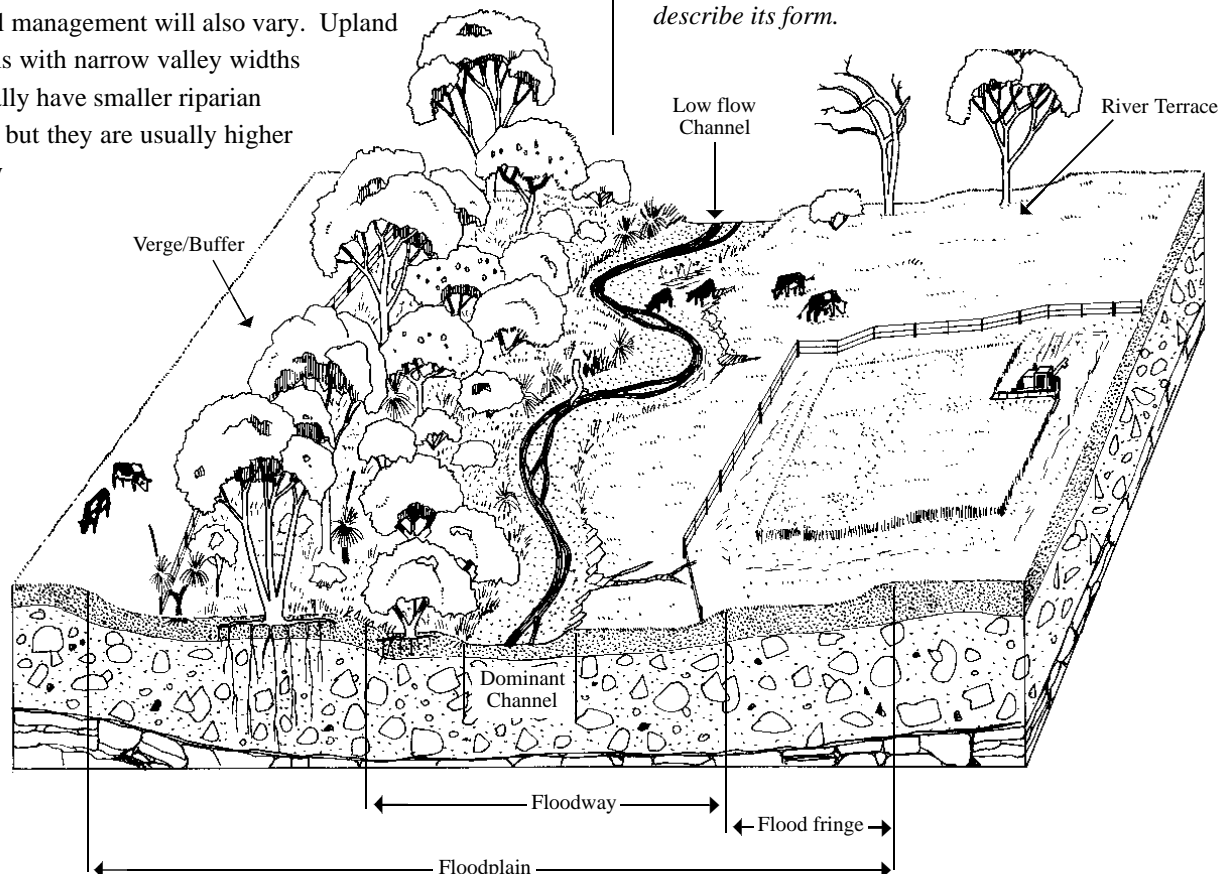
The width of the riparian zone can vary greatly depending on the type of river or stream and the catchment. Therefore the area of the riparian zone that requires special management will also vary. Upland streams with narrow valley widths generally have smaller riparian zones, but they are usually higher energy

streams, and this can require more intensive management. Lowland streams generally have broader valley widths and are more prone to meandering, therefore usually have larger riparian zones. However, they are generally lower energy streams and can require less intensive management. Each watercourse is unique and it is best to assess the area of the riparian zone that requires active management on a case-by-case basis.

Areas of the riparian zone

The highly seasonal nature of rainfall in south west Western Australia means that streams are mostly dry for much of the year (seasonal streams). It may be difficult to identify the various parts of the riparian zone and not all streams will have all the following components, particularly in cases where the channel is not well defined.

Figure 1. The immediate river valley and the terms used to describe its form.



Wetland or riverine vegetation, or areas of green when surrounding pastures have “browned off”, may be good indicators during times of low to no flow, while viewing the stream during higher flows may also help you to identify the different areas of the riparian zone. The main areas of the riparian zone are described below.

Low flow channel

Within the bed of a channel there may be a ‘low flow channel’. This is the channel in which the water is contained during periods of low flow or base flow, when the stream is not in flood. The actual location of the low flow channel within the bed of the stream will vary over time.

Main channel

This is also known as the ‘dominant’ or ‘bankfull’ channel. It is generally what is recognisable as ‘the watercourse’. However defining the main channel can be difficult in dry inland areas.

The main channel carries flood flows following heavy rainfall and is the one where ‘channel forming flows’ occur, that is when the stream has the most power to do work and to transport sediment. Sometimes this is measured by a flow frequency, most often given as the flood flow which occurs on average once every 1-2 years. However, research done on Australian streams has found that due to our extremely variable rainfall, sometimes the main channel is determined by flows that occur once every 7, 10 or even 20 years and that defining the main channel on a recurrence interval will not represent the actual dominant (bankfull) discharge in a large majority of cases.

On a biological basis, the main channel contains wetland or riparian species, however, these are often found on the floodplain as well, and can prove difficult to use to distinguish the channel from floodplain.

Floodplain

In terms of flood management the floodplain is the area that includes the floodway and the flood fringe (see opposite), and includes all typically floodprone land. It is the portion of the river valley that is covered with water when the main channel ‘overflows’ in time of flood.

Floodway

The floodway forms the main flow path during floods. The floodway is where the flooded stream has the capacity to transport material and is therefore an area of main interest for management. In the South West, because floodways are mostly dry or only moist throughout the year, they are often colonised by dense wetland or riparian vegetation which stabilises the soil and largely prevents erosion.

Flood fringe

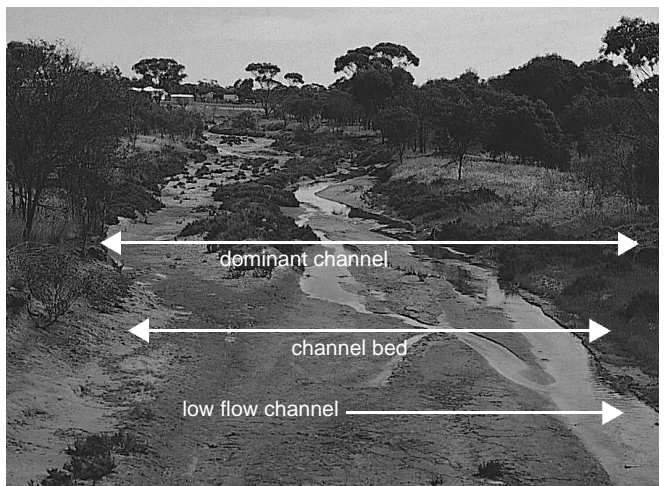
The area of the floodplain that is not flooded as frequently and where the water is merely spilling over from the floodway or is moving slowly over adjacent land, is known as the flood fringe. This often tends to be an area of deposition, where sediment and debris carried by floodwaters is deposited.

Terrace

Over time streams carve their way deeper into the landscape. In so doing they leave behind sections of old floodplain which are no longer inundated by floodwaters. These are known as terraces and they may or may not be considered part of the riparian zone.

Using biophysical criteria for management of the riparian zone

While the riparian zone can generally be broken down into the areas mentioned above it is often very difficult to delineate between them. It is important to remember that defining the width of a riparian zone is largely a management decision and is dependent on its required functions. For example, the width of riparian zone needed to act as a sediment trap may be a fraction of that required for the provision of fauna habitat. Using biophysical criteria can help to identify the riparian zone, and the important management areas.



Start with a base map, using any information that you may have available. This may be a cadastral (shows property lines), or topographic map obtained from Department of Land Administration or your local government office, or it may be a simple sketch map of the section of stream you are interested in. Once you have some points of reference on your map you can begin to add further information. Aerial photographs can also be very helpful.



Mapping the above elements of the riparian zone provides you with a good basis for making management decisions. Ongoing monitoring of the foreshores is also important and there are locally relevant, easy to use foreshore assessment techniques for both urban and rural environments⁴.

Once you have mapped the extent and features of the riparian zone it may also be useful to define a **foreshore protection area**⁵. This is the area that you have defined as being critical to the ecological functioning of the waterway. It is not necessarily an area of exclusion but one in which careful management of the stream is required.



Each watercourse is unique and the areas of the riparian zone can vary greatly.

The following criteria are useful in helping to determine the various areas of the riparian zone listed above.

Landform/Morphology

The contour lines on a topographic map will help to define the riparian areas. Where possible, you should also identify the sort of channel and floodplain you have overall (e.g: channel enlarging, migrating, aggrading etc) and any particular trouble spots (e.g. bank erosion, wash-outs, overgrown vegetation, slumping etc). Other management issues such as trampled areas from livestock access and stream crossings should also be noted.

Soil and sediment types

The various areas of the riparian zone may be distinguished by changes in soil type due to the varying flow patterns in each area and the resulting differences in erosion and deposition of sediment. Changes in soil type will usually be reflected in the vegetation cover. For example, the red loamy soils of the Swan-Canning floodplains support flooded gums and, today, old orchards and vineyards.

Knowing the soil types is important for making management decisions. For example, iron and calcium rich soils can bind nutrients that would otherwise enter the waterway, while loose sands and gravelly loams are typically prone to erosion.



Flood prone land

Identifying flood prone land is important for riparian management. The Water and Rivers Commission has mapped the floodways and floodplains for some areas, including 1 in 100 year flood levels. This information is important for landuse planning, but identifying flood prone land on a physical basis is usually more useful for riparian management. Talk to older people who have lived in the area for some time, they will probably remember past floods and the most frequent flood levels. Look out for flood debris in trees and left at the high water mark on paddocks. Also, vegetation that grows in seasonally inundated wet areas can often be used to identify the flood prone area, although this can be disturbed by some farming practices.

Vegetation



Changes in vegetation can be good indicators for the riparian zone and identifying management boundaries.

Vegetated foreshores act as sediment and nutrient traps, habitat corridors and anchor banks to minimise erosion. Identifying areas of remnant riparian vegetation is useful as it can provide information about the sorts of riparian species that should be used in an area, and also those areas which are in need of protection and those which are in need of rehabilitation. The species and structure of vegetation occurring in the riparian zone will reflect the catchment geology, the location within the catchment and the physical

and biological processes occurring in the riparian zone. Initially, aerial photographs can be used for mapping of the extent of the vegetation, however ground observations are also needed to confirm the mapping and to provide details of the species, structure and also any weed problems that might exist and need to be managed.

Land use

Although landuse may not help you to define the physical areas described above, it is important to map landuse. By identifying the surrounding land uses, and the potential problems or pressures that result from these, you will be able to manage your foreshore more effectively. This will assist you in determining the most appropriate landuse that balances both the effective and efficient use of land and the protection and rehabilitation of the riparian zone. Include details such as type (e.g: grazing, farming, etc), existing and potential fencing, stream crossings and stock watering points, and location of infrastructure.

Further reading

Available from the Water and Rivers Commission

Byrne, J. (1999) *Foreshore Policy*. Water and Rivers Commission Policy Update 2.

ⁱ Water and Rivers Commission (1999) *Planning and Management: Foreshore condition assessment in urban and semi-rural areas of south-west Western Australia*. Water and Rivers Commission River Restoration Report No. RR 2.

Water and Rivers Commission (1999) *Planning and Management: Foreshore condition assessment in farming areas of south-west Western Australia*. Water and Rivers Commission River Restoration Report No. RR 3.

ⁱⁱ Waterways Commission (1994) *Guidelines for determining a protection precinct*. Waterways guidelines (3) June 1994.

Water note WN6 *Livestock management: Construction of livestock crossings*.

Water note WN7 *Livestock management: Watering points and pumps*.

Water note WN8 *Habitat of rivers and creeks*.

Water note WN9 *The value of Large Woody Debris (Snags)*.

Water note WN10 *Protecting riparian vegetation*.

Water note WN12 *The values of the riparian zone*.

Water note WN13 *The management and replacement of Large Woody Debris in waterways*.

Water note WN15 *Weeds in waterways*.

Available from other sources

Land and Water Resources Research and Development Corporation (1996) *Managing riparian land*. Riparian Management Series (1) September 1996.

For more information contact



WATER AND RIVERS
COMMISSION

Level 2, Hyatt Centre
3 Plain Street

East Perth Western Australia 6004

Telephone: (08) 9278 0300

Facsimile: (08) 9278 0301

or your regional office

Website: <http://www.wrc.wa.gov.au>

This water note is produced as part of the Waterways WA Program. Managing and enhancing our waterways for the future.

Text by Jodie Oates. Photos by Dr Luke Pen. Illustrations by Dickinson Art.

Water note project coordination by Jodie Oates and Heidi Oswald.

Printed on recycled paper January 2000

ISSN 1442-6900

This Water Note is intended to be a general guide only and is not a comprehensive document.

For further information on any particular issue please contact the Restoration & Management Section at the Water and Rivers Commission.