

# Water notes

Water notes for rivers management



ADVISORY NOTES FOR LAND MANAGERS ON RIVER AND WETLAND RESTORATION



## Livestock management: Fence location and grazing control

One of the most significant issues of waterways management in Western Australia is the protection of the riparian vegetation. Healthy riparian vegetation is vital to maintain ecological diversity, stable stream channels and good water quality. A great deal of sedimentation in Western Australia's rivers and estuaries results from undercutting and erosion of bank material caused by livestock trampling and removing vegetation cover. It is therefore important that livestock access to waterways is restricted, though not necessarily excluded, so that the riverbanks can revegetate and stabilise. This should reduce stream erosion and improve water quality.

Unrestricted stock access generally has a number of damaging effects:

- grazing and trampling vegetation;
- preventing regeneration;
- compacting soil;
- increasing erosion and bank slumping;
- transportation of weed seeds in fur and faeces; and
- contributing nutrients and disease organisms through stock urine and faeces.

The only way to restrict livestock access to the waterways is by fencing. This Water Note describes the various fence types used along waterways and the preferred location of fences, both for the best management of the riparian zone and for the protection of the fence.

### Benefits of fencing waterways

There are many benefits of fencing waterways. Studies by Bell and Priestley (1999) in Tasmania have shown that farmers lost less stock in floods by drowning. Where riverbanks were particularly steep, some farmers felt that fencing made the environment less hazardous as they did not have to go down steep banks to rescue stock in bad weather.

The productive land adjoining waterways can often be prone to erosion once a stream channel has lost its protective vegetation. By maintaining healthy vegetation, roots and underground stems (rhizomes) add structural strength to the river banks. A structurally sound river channel will also provide a wide diversity of habitats for fauna.

Fringing vegetation acts as a natural filter so an improvement in the extent and condition of the native fringing vegetation will improve stream water quality. It will also ensure that sedimentation from eroding banks is reduced. By limiting the number of watering points or by pumping water from the stream, stock may still retain access to water, and water of superior quality to that of a degraded stream (refer to Water Note 7).

It is considered that fencing remnant vegetation may also provide shelter for stock, as the understorey returns and there is more protection from the wind and rain. Stock tend to move to the lee side of the fenced area which provides more shelter.

Fencing waterways allows improved habitat for native fauna. It also means that the waterway is an attractive place for recreation and will enhance property values due to an improvement in property appearance.



## Where to put fences

There are several considerations which should be taken into account when locating a fence. The form of the river, presence of riparian vegetation and frequent flood levels are all important factors.

Aerial photographs can be used to determine the best placement of fences along waterways. As a guide Gale and Heinjus (1994) recommend that the scale of the photograph suitable for property sizes are as follows:

Property Size (hectares)	Aerial photo scale
50 to 100	1:2000
100 to 750	1:5000
750 to 5000	1:10000
Over 5000	1: 20000

Aerial photographs allow all the remnant vegetation and landform features that need to be incorporated in the riparian zone to be identified. An overlay of the area's contours will also assist in planning the fence location.

Features that should be protected or restricted from stock access include:

- high quality vegetation and habitat areas;
- existing or proposed areas for revegetation;
- steep banks or banks with non-cohesive soils such as sand, clays and loams; and
- areas of erosion, salt scald or waterlogging. It is particularly important to fence well outside of salt scalds as they may creep outwards and up-slope overtime.

A frequently asked question in relation to fencing riparian zones is: How wide an area from the waterway should be fenced? The width of the area fenced will depend on the individual watercourse, as well as the features listed above. As a general guide, the fenced-off area must be able to function as a waterway and where ever possible the floodway should be included. The floodway is the broad channel where the water actually flows swiftly in a flood as opposed to the area where the floodwater merely spills over, which is the broader floodplain. Fencing outside the floodway will prevent stock and property losses and reduce fence repair and maintenance.

Consideration of the individual characteristics of the waterway should be taken into account when fencing. A general guide for the width to fence waterways in the south-west of the State is provided below. This is a guide only of suggested minimum riparian buffers appropriate for the size of the watercourse.

Creek arising in the property or just beyond it (not shown on 1:50 000 topographic maps)	10 –20m on either side of the creek centre line.
Typical creek (not shown on 1:50 000 topographic maps)	Average 20-30 m either side of the creek centre line.
Major creek (shown on 1:50 000 topographic maps)	30 m or more from the edge of the channel.
Rivers (shown on 1:50 000 topographic maps)	30 –100 m from the edge of the channel as appropriate.

On the edge of steep and deep valleys, the fence should be located back from the crest of the high embankment. This will enable tree and shrub roots to anchor the embankment to the adjacent land. Firebreaks should be located beyond the crest of the deep river valley.

For shallow river valleys, such as those on coastal plains and in the wheatbelt, fences can be located on the crest (the top of the floodway banks) ensuring that the floodway is well protected with fringing vegetation. Fire breaks or tracks that run parallel to the river channel should not be located within the floodway due to the risk of washouts, or off-channel scours, as shown in Figures 1 and 2. There is the risk that a poorly placed fire break may become a new flood channel.



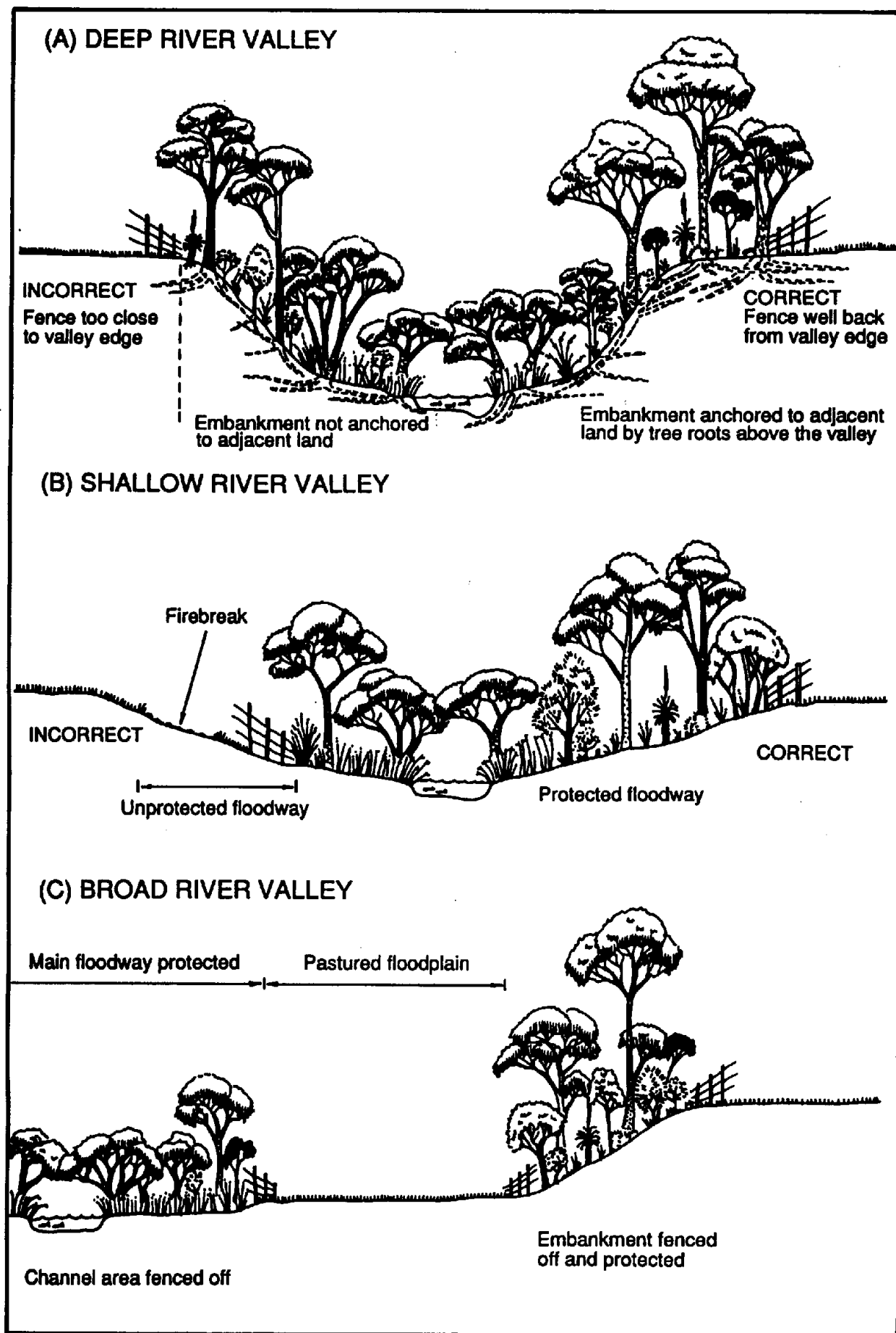


Figure 1: The correct and incorrect placement of fences in relation to the river valley.



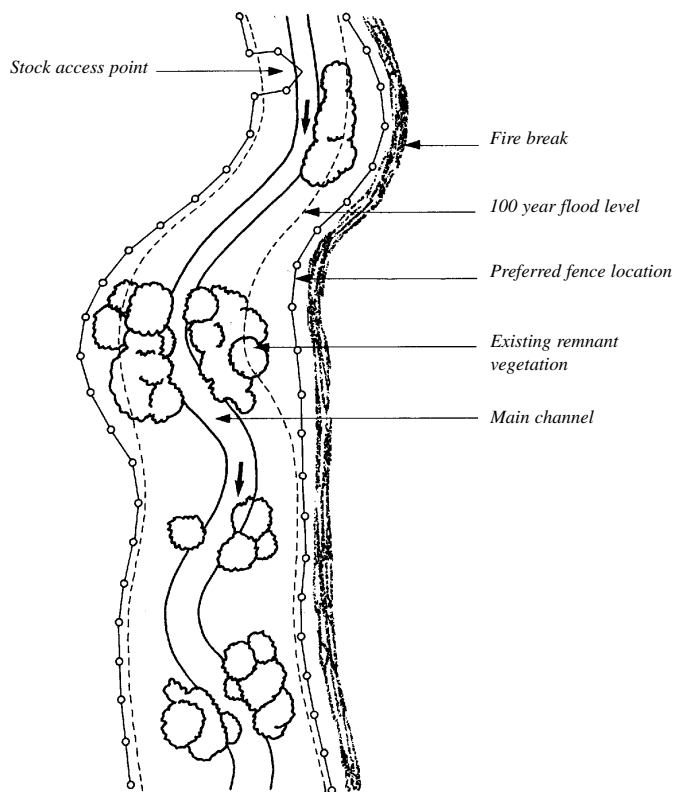


Figure 2: Ideal location of fences for a typical south-west Western Australian waterway.

Rivers with broad floodplains, such as many rivers in the wheatbelt, should be fenced to ensure the integrity of low flow channels and the embankments. It is often impossible to identify a definite riparian zone so fencing a corridor of riparian bushland may not achieve effective riparian zone management. An alternative is to create river paddocks that retain native vegetation and perennial grasses that are carefully grazed. The vegetation could be kept at a density to enable good flood conveyance without causing erosion; and it is suggested that the vegetation condition be maintained as a B grade bushland according to the Pen – Scott (1995) classification. This is where the riparian vegetation has an overstorey of native vegetation but the understorey has some weeds. Soil disturbance in a B grade foreshore may be common but not extensive and there is no erosion. Paddocks can be grazed in late winter and spring but may need to be kept stock free in summer to prevent soil exposure and degradation. Grazing would also help to control weeds and fire hazard presented by annual grasses.

In the pastoral regions, fencing entire rivers is generally not practicable. It is, however, recommended to fence river pools which are either permanent or retain water when floodwaters have long passed from the main river channel. This ensures that the fringing vegetation is protected in areas that are most ecologically valuable.

## Types of fencing

In deciding on the type of fencing to be installed, first identify your specific riparian management requirements so that the design of fencing and gates is appropriate.

Electric fencing is a common choice as it can cost half that of conventional fencing and has the added benefits of being quicker to erect, moveable and can fence along curves most effectively. Electric fencing can be fitted to posts with clips so that the fence can be unclipped and layed down (when the power is off) to allow for maintenance and vehicle access into the fenced area. Conventional fencing is in many cases more expensive, as the fence generally needs to be built stronger than an electric fence.

When choosing an electric fence, it is important to remember the average height of the animals being controlled to ensure that they can neither walk under or over the wires, nor push their head easily between any of the wires. A single, well-placed electric wire will allow grazing under the fence but not through it. Dairy cows and cattle generally will only need one ‘hot’ wire while sheep will require at least four wires on an electric fence. (Speedrite- Tru-Test Perth 1999). Where trees are present, electric fencing can be tied from tree to tree. Tying the wire using loose rubber straps is preferred to nails which damage trees and can cause infection.

Virtual fencing is providing an economically viable and more efficient alternative to traditional fencing for pastoralists. Stock are given ear tags which emit an irritating sound to encourage them to stay outside a virtual exclusion zone. The zone is created by a transmitting device which can be easily maintained and the boundary can be altered remotely (Quigley *et al* 1990; Rouda 1999). Virtual fencing is providing an exciting opportunity to maintain riparian vegetation in good condition in pastoral zones without conventional fencing.

Further information on fencing designs and types for specific stock can be sought from Agriculture WA or the Kondinin Group (contact details are provided in further information).

## Options to reduce fence damage

Damage to fences may be caused by a number of factors including stock, flooding, fallen timber and fire. Below are some principles for fence design and fence location that can be considered when planning fences in or adjacent to the riparian zone.

Fences should be placed well out of the floodway to avoid loss and damage during high flows. Damage is often caused by debris that may be carried by floodwaters. Placing



fences as close as possible to the low flow channel may seem to be a good way of maximising paddock area, but this has proven to be a false economy in the long term. On many rivers several old fence lines can be seen along the river, where landowners have progressively placed fences a little further, but not far enough, up embankments. (Information on fencing in floodways is covered in Water Note 19).

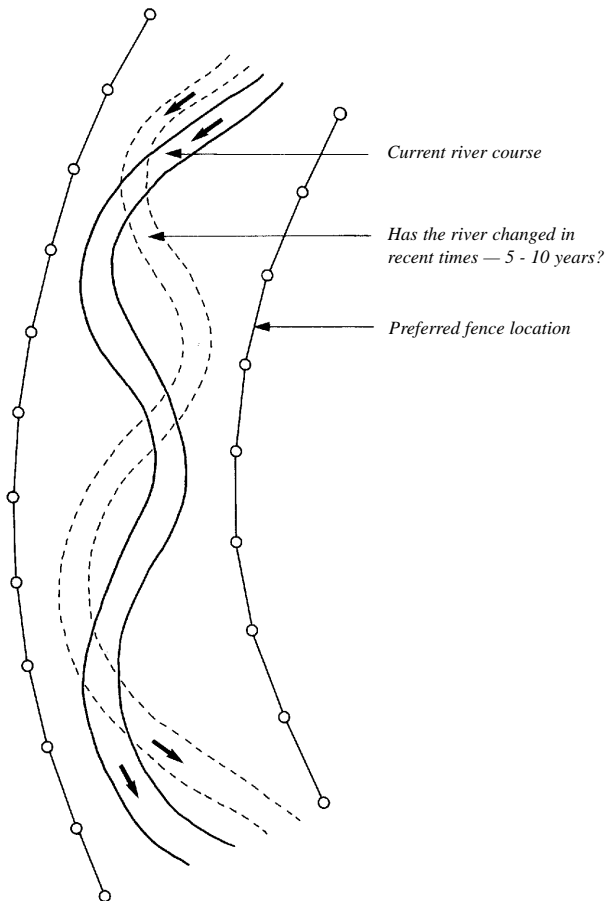


Figure 3: Locating fences on a dynamic river.

Problems can arise when the waterway is subject to over-bank flooding, channel widening, meandering and the formation of new channels during heavy flooding. Figure 3 shows that, when there is evidence that a river course is dynamic or has shifted from a previous stable state, it is wise to place the fence so it encompasses the outside meanders of the old and new channels. Changes in channel form and location leading to fence damage are most pronounced on rivers where protective vegetation has been lost, and mostly where livestock grazing has not been controlled.

Fences that run parallel to the direction of a flood are less likely to be damaged by flooding than those that span the floodway and floodplain. Keeping the number of fences that cross the river to a minimum is advisable. In areas where high floods are common and fences are regularly lost or damaged, traditional fencing may not be appropriate. Suitable alternatives may include electric fences,

drop-down fences and hanging fences (refer to Water Note 19). Fencing can also be partially protected by vegetation on the upstream side, to intercept any debris that may be carried in floodwaters.

## Managing the fenced area

Initially, fencing is to exclude grazing in order to enable some regeneration of native species and provide some protective surface covering of natives and pasture grasses. Once the bank has stabilised and plants are established, it is appropriate to maintain some controlled grazing for short periods to reduce pasture grasses that may be a fire risk and to control major riparian weeds (see Water Note 15). Care needs to be taken to prevent protracted heavy grazing that would degrade the riparian zone and ultimately eliminate native plant species.

Total exclusion of stock will be necessary where the bank is steep and sandy or very prone to collapse. However, where there has been some history of grazing, revegetation of native vegetation will be needed to help control weed invasions. Total exclusion of stock may also be necessary where the objective is to maintain high quality riparian habitat. In both cases constant vigilance will be needed to pre-empt any serious weed invasions. As native species grow, introduced weeds will be shaded out and reduced.

In pastoral areas, **Total Grazing Management** systems can help manage the grazing pressure on riparian areas. Permanent trapyards potentially offer a cost-effective system of controlling the combined grazing pressure of domestic stock, feral animals and kangaroos. The permanent trapping system can increase the ability to control all animals and the ability to rest areas from grazing (see Pearce *et al* 1998).

The use of fire to control weeds is not preferred in the riparian area due to the presence of many fire sensitive species and the probable low frequency of the natural fire regime. Land holders should seek advice from their local Bushfire Brigade if they wish to burn in riparian areas. Firebreaks should be placed on the paddock side of the fence and not within the riparian area. Information on fire is given in the Water and Rivers Commission's *Wetlands and Fire* Water Note WN2.

The use of herbicides in the riparian area must be undertaken with great care, using only low toxicity herbicides approved for use in such areas. Herbicides should be used only as a last resort and further information on weed control techniques can be sought from the Water and Rivers Commission's 1999 *Revegetating riparian zones in south-west Western Australia* Report No RR4.





## Planning

When fencing your waterway you may wish to undertake works which affect the stream bed and banks or alter the water flow (for example a stock crossing). Under the *Rights in Water and Irrigation Act 1914*, approval from the Water and Rivers Commission is required prior to undertaking works that obstruct or interfere with the waters, bed or banks of any watercourse proclaimed under the Act. Contact your local office of the Water and Rivers Commission if you are in doubt as to whether your waterway is proclaimed.

If your waterway is proclaimed under the Act, a design plan of the fencing, crossings or other works should be submitted to the Water and Rivers Commission if the structure will:

1. raise the height of the channel by more than 300 millimetres above the existing natural level;
2. significantly inhibit downstream flow of the river; or
3. significantly alter the natural shape of the channel.

## Timing of the works

Ideally, fence construction within the floodway should be undertaken early in summer and disturbed vegetation around crossings be reinstated prior to the following winter. However, plantings in high flow areas, and especially of sedges and rushes, should be carried out in late spring and early summer. Brushing of the disturbed site may be an alternative in the short term. The site should be monitored through winter and modified if required.

## Cost of fences

The cost of fencing will vary depending on the site and conditions and what stock is being kept out of the waterway. The materials for electric fences are generally in the range of \$500 - \$1000/km, while a single hot wire fence may be well under \$500/km. For conventional prefabricated fencing the cost of materials is generally slightly more expensive ranging from \$500 - \$1500. Conventional wire fences can be up to \$2000/km (Agriculture WA 1999). Part funding may be available through several funding bodies. Enquiries and applications should be made through your local LCDC and community groups. Fencing location advice is freely available from the Water and Rivers Commission.

The Natural Heritage Trust (NHT) is one source of fencing subsidies. National rates for fencing for the purposes of revegetation, remnant vegetation protection and/or riparian zone management are set out below. The Trust will not fund costs associated with standard boundary fencing that,

in the opinion of assessment panels, would usually fall within the landholder's normal responsibilities. NHT may fund:

- up to \$600 per km where the area is not being protected under a management agreement;
- up to \$1200 per km where the area is, or will be, under a voluntary management agreement or fixed term covenant; and
- up to the reasonable full cost of fencing, including paid labour, where the area is, or will be, protected in perpetuity by a binding covenant on title.

Further details on NHT fencing subsidies and covenants are available from the Western Australian NHT Secretariat or local Agriculture WA office.

## References and further reading

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Water and Rivers Commission Water Note WN10, “Protecting riparian vegetation”

Water and Rivers Commission Water Note WN12, “The values of the riparian zone”

Water and Rivers Commission Water Note WN19, “Flood proof fencing for waterways”.

Water and Rivers Commission Water Note WN11, “Identifying the riparian zone”

## Further information and technical assistance

Supervising Engineer  
Protection and Enhancement Section  
Water and Rivers Commission  
Telephone: (08) 9278 0561  
Facsimile: (08) 9278 0587  
E-mail: [bill.till@wrc.wa.gov.au](mailto:bill.till@wrc.wa.gov.au)

Rivercare Officers  
Water and Rivers Commission  
Regional Offices

### Other contacts:

Kondinin Group, Head Office  
PO Box 913  
Cloverdale Western Australia 6105  
Telephone: (08) 9478 3343  
Facsimile: (08) 9478 3353  
E-mail: [publishing@kondinin.com.au](mailto:publishing@kondinin.com.au)

Agriculture Western Australia, Head Office  
Baron-Hay Court  
South Perth  
Telephone: (08) 9368 3333  
Facsimile: (08) 9368 1205

Natural Heritage Trust  
Western Australian Secretariat  
PO Box Y3455,  
East St Georges Tce, Perth WA 6832.  
freecall 1800 198 231  
Telephone: (08) 9325 0000  
Facsimile: (08) 9225 4970



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>



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