

Sustainable Land Management in the Ellen Brook Catchment

Water harvesting

It is ironic that we have developed a drainage network designed to remove rainfall run-off as quickly as possible. We effectively curse the rainfall for two months and spend the rest of the year wishing it would rain. Dams, detention basins and artificial wetlands can be used to retain water long after the winter rains have finished. This provides you with a valuable source of water, alleviates flooding by controlling the input of run-off water into our local waterways, provides an opportunity to clean rainfall run-off and offers a new potential habitat for wildlife.

Further information

General information on waterway management can be found in a wide range of sources and include the following:

Publications

Managing Our Rivers: A guide to the nature and management of streams of the southwest Western Australia, by Dr Luke J. Pen.

Streamlining: An environmentally sustainable drainage network for the Swan Coastal Plain (Peel Harvey Catchment), by G. Heady and N. Guise.

Living Streams: A guide to bringing watercourses back to life in south-west Western Australia, by Dr Luke Pen and Karen Majer.

Waternote Series: Advisory notes for land managers on river and wetland restoration, by the Water and Rivers Commission. Also available on Internet site: www.wrc.wa.gov.au/public/WaterNotes.

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VEGETATION AND REMNANTS

Western Australia is one of the most biologically diverse areas on the planet. It boasts a unique suite of flora and fauna found nowhere else on earth. The Ellen Brook Catchment, with its diverse range of habitats is certainly one of the jewels in this crown. It contains a wide range of natural environments starting with the Jarrah forests of the Darling Plateau, to the *Banksia* woodlands of the Dandaragan Plateau and several others on the Swan Coastal Plain.

Did you know?

The humble Jarrah tree (*Eucalyptus marginata*) plays home and host to over 600 species of insects, more than 300 of which are found on no other plant anywhere in the world!

Sadly, much of this biodiversity has been lost through inappropriate land use activities such as clearing, overgrazing, draining and filling wetlands. This has left a mere patchwork of vegetation remnants, islands of biological richness in a sea of farms, roads, towns and other 'hostile' human activities.

This legacy of natural wealth must be protected and enhanced so that we can retain our vital natural heritage and ensure its place in our future landscapes.

The Federal Government, with the support of the WA Government, has embarked on an ambitious program to protect at least 10% of all ecosystems found in the state prior to European settlement. As much of this is now found on private properties this means assisting landholders to manage and restore the bush area.

Managing your bushland

Before you start any work it will be important to take stock of just what is in your bushland. This information will help you to better plan any work and so be more effective. The key things to look for are:

- Has it been recorded as a Bush Forever site?
- How big is the bush area? (an aerial photo may help with this)
- What is the level of disturbance? (e.g. grazing, dieback, weeds)
- Where are the closest bush sites? (to see if they can be linked)
- What are the soil types and their distribution? (this will help in choosing species)
- What species are found in your bush? (including rare and endangered ones)
- Are there any perceived threats to your bush? (e.g. grazing, rising watertable)

Armed with this information you will be in an excellent position to plan any management activities. You will be able to plan what areas are a priority for action (e.g. start with areas of that are of the highest value, protection is always more effective than restoration), which species to use in revegetation, what weeds to tackle and so on. Typically fencing is a first step if you have stock, as their presence will continue to degrade the bush and bring in weeds. Once the bushland is protected you may begin thinking about revegetation work. This will typically start with a thorough weed control program, seed collecting, followed by planting or direct seeding and then control of any vermin such as rabbits and grasshoppers. Your local Agriculture Western Australia office can provide advice on vermin control techniques.

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A good plan should consider fire threats and include provision for suitable firebreaks to ensure emergency access is available for fire fighting crews. The bush will need to be carefully managed, in many cases as dieback is a real threat, capable of wiping out up to 25% of species found in WA bushland. Plans should include strategies to treat dieback affected areas (e.g. stem injection with preventative chemicals) and reduce the threat of spread (e.g. create defined paths, restrict access of animals and machinery).

Did you know?

Many landholders are working together to improve the bushland in their local area - they may agree for instance, to pool resources and join forces to tackle weeds, put up fences and do revegetation work. Working as a group means that they can also be in a better position than an individual landholder to access funds and advice to help with this work.

Above all else don't forget to enjoy your bush. Create defined paths through the bush and marvel at its beauty as it begins to recover under your sympathetic management. Take plenty of photos so you can compare progress and setbacks. In the end, with careful management your bush can become a unique and spectacular feature on your property and as such a valuable link in the chain of bushland that stretches across the Catchment.

Who can help me?

Your local landcare officer will be able to assist you to effectively protect and manage valuable remnant vegetation areas on your property. CALM, through its '*Land for Wildlife*' program, as well as Greening Western Australia, can assist in surveying, mapping and providing detailed management plans for your bushland. There are conditions to this help, but they encourage landholders to contact them to see if they can be assisted.

Revegetation techniques

Additional vegetation and trees can usually be readily included in farm plans without significant loss of productive land. The existing layout of paddock fences, access tracks, water supplies, and contour banks should be examined when you are considering where to revegetate or plant trees on a farm. Vegetation establishment in the Ellen Brook Catchment can have many benefits to individual properties, and the environment.

To have maximum impact, planning for establishment should ensure revegetation areas are located:

- where they have greatest effect in combating wind and water erosion or salinity;
- where they provide stock shelter or add to the landscape aesthetics;
- where they connect with other vegetation areas (remnant vegetation) to provide corridors and buffers of protection;
- where they conflict least with farm operation or productivity; and
- where they will grow quickly into healthy long-lived trees.

Vegetation belts need to be fenced to avoid stock damage. Fencing costs can be minimised by locating new plantings near existing fences, proposed new fence lines, near or between existing remnant vegetation areas and along formed farm tracks, laneways and contour banks. As fencing is a significant cost component of vegetation establishment, the investment needs to be worthwhile. In addition to the on farm benefits above, planning revegetation areas should also consider the medium and longer term commercial potential to the farm.

For large landholdings, Government and private schemes are available that provide a commercial return for little outlay by the landowner. For medium sized and smaller landholdings various tree species suited to the 'boutique' timber markets are worthy of investigation on how they may be fitted best into the farm plan.

State & Federal Government support is also available for landowners with plans to establish revegetation areas on a sub-catchment scale (that is, across a group of properties in a defined catchment area). Opportunities for funding support are available from:

- State Revegetation Scheme;
- Commonwealth Natural Heritage Trust;
- Gordon Reid Foundation (Lotteries Commission of Western Australia); and
- Swan Catchment Urban Landcare Program (Contact the Swan Catchment Centre).

Tree planting

Table 13 outlines the key activities, and timing, for revegetation using tubestock and direct seeding methods. Direct seeding provides the best opportunities for introducing a greater diversity of plants but in order to be successful, particular attention should be given to weed control.

Table 13. Key activities and timing for revegetation

Activity	Timing	Comments
Weed control	September/October prior to planned revegetation.	Revegetated area should be sprayed with knock-down herbicide (Roundup Biactive) to reduce seed set.
Ripping	November/December prior to planned revegetation (i.e. as the soil begins to dry out). Avoid ripping when soils contain a lot of moisture, especially heavy soils.	To shatter any hardpan to allow infiltration of water and roots deep into the soil profile. Ripping 8 months prior to revegetation gives time for air pockets, which may be created by the ripper, to settle out. A mounder creates a raised bed or waterlogged free zone to aid root development in the first season. <i>Tubestock planting</i> - Rip lines should be around 2 to 3 metres apart, and a ripper mounder should be used in waterlogged and saline sites. <i>Direct seeding</i> - Rip lines as close as possible.

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Table 13 continued ...

Activity	Timing	Comments
Seedling and seed order	Order seed the winter prior to planned revegetation; tubestock the December prior.	Seed suppliers collect in spring/early summer. Nurseries require at least six months to grow most species.
Weed control using herbicide (Tubestock)	Late autumn/early winter	Spray germinating weeds after opening rains.
Weed control using scalping (preferred method for direct seeding)	Late autumn/early winter	Scalp the area, using grader blade or similar, to remove top 5 cm of soil. Rows of mounded soil created from this process will need to be sprayed with both a knockdown and residual herbicide.
Planting	Early winter	Tubestock - Trees and shrubs should be planted into rip (and mounded) lines. <i>Direct seeding</i> - May be done by hand or by a mechanical seeder. Tubestock should be planted on the rows of mounded top soil.
Weed control	Early spring	Grass selective herbicide may be used to control subsequent germination of weeds. Broad leaved weeds may be controlled using selective herbicides (e.g. Lontrel), or even a knockdown herbicide at a low rate (e.g. Ally) but expert advice should be sought.
In-fill planting	During the next winter	May be necessary depending on survival and germination success. Further weed control may also be required in future years.

Use local species

Generally this principle applies to any project, especially when remnant bushland is being rehabilitated. Local species are best adapted to the soil and climate, they won't become weeds, and they will be a favoured habitat by the local fauna. Look at the species in remnant patches of bushland on or near your property. Any local catchment group in your area would also be worth talking to for advice.

However, when revegetating cleared farmland, where land use has resulted in severely altered soil and water conditions, local species may not be suited. In this case other species should be used which will tolerate the changed conditions. As a general rule try to select Western Australian plants from a region which is relatively close (say within 200 km).

There is a need to be careful, because some Australian species have become weeds if they are not indigenous to the area. *Acacia* species are one such group. Some acacias to avoid are Early Black Wattle, Flinders Range Wattle, Queensland Silver Wattle, Sydney Golden Wattle, and Golden Wattle. There are also lots of others, including some *Eucalyptus* species.

Seed collection

The most valuable seed sources are from local remnant patches. CALM's *Wildlife Note No. 4: Seed collecting from native plants* provides detail on how to collect seed. Most native seed can be collected between November and January. You'll need a permit from CALM if you are collecting seed from public land. Seeds with hard coats will need to be treated by heating, or scarifying. Smoke treatment has also been found to enhance native seed germination (contact Kings Park for information).

To collect seed from ground cover species, find a site with healthy ground covers during August-October. Return in late January and carefully sweep up the loose surface material (stones and leaf litter) where the seed will be. Use your seed directly on your site for direct seeding, or dry and store until you need it. You might use the seed to grow seedlings.

Prepare the area

If the area is degraded, you'll need to address the problem - control weeds and rabbits, fencing, control water flow, and so on. For seeds or seedlings, you need the soil to be soft, bare, and free of weeds. Deep ripping and ploughing softens the soil for easy root penetration. Waiting 6 to 12 months before planting seedlings is recommended (see above table).

Direct seeding

Seed may simply be thrown by hand over the site, sprayed onto larger areas with a hydro-mulcher or seeded using a combine (fertiliser box with a suitable material to bulk out the seed mix). Experiment a little. A specialist seeder can rip and sow seed and spread slow release fertiliser at the same time. Brush matting is useful to spread seed, and prevent erosion - lay branches of the plant across the area, and the seed will drop off as the branch dries out. Cover the seed, to improve germination, by dragging sacks over the site, or applying a thin layer of soil. Greening WA has published a useful book called *Direct Seeding of Trees and Shrubs*.

Planting

Planting can be done by hand or you can use a tree planter for large numbers. Tree planters are generally most efficient when the area is large and clear of obstacles such as remnant trees, fences, stumps etc. Use the occasion as a social get together for your catchment group. Follow the guide provided in **Table 13**. When ripping and mounding try to introduce meanders or curves, or if possible plant in groups and clusters - bush doesn't grow in straight lines!

Have a look at *Bush Regeneration* (Buchanan, 1989), *Managing your Bushland* (Hussey and Wallace, 1992), the *Farm Monitoring Handbook* (Hunt and Gilkes, 1992), and *Managing Perth's Bushland* (Scheltema and Harris, 1995) to begin with. Talk to local agencies and organisations, such as Greening WA and Agriculture Western Australia for advice and information.

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Season

The site should be moist several weeks before planting, and for months after, so in this region May-July is generally the best time to plant and seed. Prolonged soil moisture is less critical for planting tubestock. If you're propagating seedlings from seed, seeds should be germinated in August-January, depending on the plant species, to be ready for planting in May-July.

Maintenance

Remember that weed control is essential! Weeds will compete for light, nutrients, water and soil space. Mulching can help control weeds, and also improves soil moisture and temperature. Local leaf litter is best, but newspaper, hay or straw is fine. Plant guards for seedlings can be useful to protect from grazing animals, children, frost and wind. Fencing is required to exclude grazing animals (feral, native and domestic). For projects in and around waterways, surround the area with a buffer of vegetation to reduce sedimentation and nutrients entering the waterway. This buffer should include trees, shrubs, sedges and rushes to provide the maximum possible vegetative cover on the soil surface and root development below the surface.

Vegetation buffers and tree belts may be located at the break of slope, perhaps in conjunction with grade banks, to maximise water use and reduce catchment recharge.

Fencing remnants

There is little point in trying to improve your bushland if grazing animals will continue to have free and open access to it. Stock will trample and destroy the understorey plants, reduce regeneration, bring in weeds and ring bark larger trees. Put simply, good management of bushland will require effective protection from all grazing animals. Usually that involves fencing, though individual tree guards may also be effective in some cases.

Fencing is often cited as the most expensive component of any bushland management strategy, but with some careful design, this need not be the case, particularly when viewed in the light of the benefits it will bring for your bushland. For the most effective fencing project it may well be useful to follow the steps set out below.

1. Use an aerial photo to plan the fence

This will give you an overall perspective on the project and with a plastic overlay you should be able to do some 'mock' fence layouts to come up with the best fencing design. Remember too, that it is the 'kinks' and bends in the fence layout that add the most to your costs, as these require strainer 'assemblies' which are time consuming and require more materials to make. Try to strike a balance between fence shape and cost. Sometimes it might be more useful, for instance, to have a straight section of fence, include more paddock and not put in the extra fencing needed to 'hug' an odd shaped bush area. This extra land may be used to create a vegetation buffer, grow fodder shrubs or maybe even locally native timber trees and fence posts.

2. Remember crossings and water access points

In many cases you will still need to put stock through bush areas to adjoining paddocks or perhaps give them access to water supplies. Your aerial photo can help decide the best location for these structures. As a general rule, locate crossings through the narrowest point and on the most stable areas of the bushland to reduce damage. If stock must have access to waterways in your bushland, restrict it to narrow points to reduce damage to vegetation and banks.

3. Fencing type

With a preferred layout in place, you can then decide which fencing system is best for you. It usually comes down to a choice between some kind of permanent fence (usually non-electric) and electric fencing. The benefits and disadvantages of each should be weighed up before you make your choice. Some things to consider when making this choice are out below in **Table 14**.

Table 14. Comparisons between different fence types

	Cost	Flexibility	Weaknesses	Maintenance	Use in rocky areas
Electric	Cheapest type, expect to pay \$600-\$1000/km.	Can accommodate 'odd' shaped areas easily.	Relies on electricity to deter animals. If supply is lost or circuit fails through 'short out' animals will easily get through.	Relatively high, need weekly checks to prevent 'shorting out' from branches, weeds, etc.	Suitable as uses less posts of smaller diameter so less digging.
Permanent	More expensive. Post/wire \$1500-\$3000/km. Post/rail at least \$6000 km.	Needs expensive 'strainer assemblies' to accommodate 'odd' shaped areas.	Can be attacked by termites.	Little; once established, 1 or 2 check ups a year is sufficient.	Often very expensive as many holes must be dug for fence posts.

Who can help me?

Most rural hardware suppliers will have good ideas on both styles of fencing that suit the local conditions and who are the best fencing contractors and material suppliers. In many cases companies that produce fencing materials put out excellent (and usually free) fencing manuals to show fencing designs and things to consider.

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The following points are well worth considering.

1. *Who and what exactly are you keeping out?*

It is vital at this stage to work out which animals you are up against. Is it sheep or cattle or maybe horses and kangaroos? Whatever the case your design will no doubt vary depending on your foe!

2. *Do you want to let anyone in or out?*

Sometimes it may be wise to let resident kangaroos in and out of your bush areas. After all, it is usually their home and if penned in or out they can damage your fence and themselves. They are notoriously territorial and will stubbornly try to use their existing paths, even if you've put a fence across it.

3. *Don't be stingy*

Allow plenty of room between your bushland and the fence to accommodate for the growth of young plants and may be even access tracks. Remember it can be costly and damaging if vegetation is actively growing and pushed up against your fence.

Assistance

If you are fencing off your bushland, there are a range of bodies that may be able to help. Your local landcare group may have Natural Heritage Funding (NHT) to assist fencing projects. They will usually need to see a plan of proposed works, but can provide useful subsidies. The State Government offers some fencing grants through its Remnant Vegetation Protection Scheme. Your local landcare officer should be able to fill you in on any opportunities that exist.

Weed control in remnants

With a fencing program in place it is time to look at the state of your bushland and, in particular the weeds present. Weeds are a major threat to your bushland, as they will silently and steadily overtake your bushland, smothering understorey and reducing the habitat for local animals. In many cases they can make the bush far less attractive, more of a fire risk and even less accessible.

Weed control strategy

Before you rush head long into a 'weed war' it will be wise to base your plan of attack on a well designed weed control strategy. This can be created following the steps set out below:

1. *Start with a weed map*

This should link into your original assessment of the bushland and should aim to identify the weeds present and their distribution over the site. You will find through such a process that the level of weed invasion will vary over the site. Areas near the edge of the bush and near tracks will have much higher numbers of weeds than more remote areas say within the heart of the bushland. This becomes a 'weed map' and it is an excellent tool to target weed actions.

2. *Know your weeds well*

Before you start your weeding program make sure you know about the weeds present on-site in your bushland. For example, you will have better success with weed control if you know:

- what they look like when they are young, (this is the best time to attack them);
- when they will flower and set seed (you want to have weeded them out before this time); and
- whether they can regenerate from bulbs or their roots or whether they rely on seed.

For best results all weeding should be done when the plants are young and actively growing.

Who can help me?

Your local landcare officer, Agriculture Western Australia office or CALM can help with weed identification and the best control strategies. They may even be able to provide a list of weed control contractors.

3. *Tackle the better areas first*

Believe it or not, it is the areas where weeds are at their *fewest* that should be tackled first. These areas will be the easiest to improve and through such work you can then systematically peg back the weeds on the site, moving eventually to the areas where the weeds are at their worst. Always try to ensure that weeded areas can actively regenerate themselves (through seeding by local plants), or that you can plant seedlings or scatter seed once the weeding is done.

Chemical versus non-chemical control?

There are wide range of weed control methods that you can use in your bushland. What you use will depend on your budget, the time you have available, the weeds involved and your own particular preferences. If you are going to use chemical control measures, remember safety and watch for the effect of sprays on nearby native plants in your bushland as well as waterways. Non-chemical methods such as hand weeding, smothering or scalping are fine but time consuming. Whichever system you use don't forget that follow up weeding is usually required to remove a weed once and for all.

Corridors to link bushland

Your bushland will benefit greatly by linking it to nearby bushland areas with a strip of new vegetation. Our bushland is fragmented and isolated therefore these vegetation links will provide valuable 'wildlife corridors' through which animals can move safely from one bushland patch to the next. They can also help the animals to escape from catastrophic events such as fire and floods etc. The corridors will allow animal populations from different bush areas to mix and breed, thereby expanding the 'gene pools' and so improving the whole integrity of the environment.

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To be effective however, a 'wildlife corridor' should have the following design principles included:

1. *Chose the right target*

In the Ellen Brook Catchment there are many patches of bush that can be linked up. Check with your local landcare officer and LCDC group to find out what plans they have for corridor creation in your local area. They may have details on appropriate designs, species to use and even access to funds to help with this work.

2. *Make it wide*

The best corridors are as wide as you can allow. This will make them more resilient against weed invasions and more likely to be a continuous planting. As a minimum aim for a corridor 10-15 m wide.

3. *Make it diverse!*

Try to incorporate a wide range of *locally* occurring native species including trees, shrubs and even ground covers. This will ensure that a whole range of animals will find it safe to 'use' your corridor.

4. *Make it safe*

Ensure that your newly formed corridor is fenced off from stock so that it remains healthy and vigorous.

5. *Talk to your neighbours*

The best corridors will have cooperation between landholders to make them work. Often this will mean sharing ideas and the workload.

6. *Make it work*

Often this means keeping track of the project, doing ongoing weed and vermin control within the area and infill replanting as required. Keep records of what grows and is found there naturally. Soon you could be witnessing the first animal migration through your corridors.

Don't forget too, that a well designed corridor will not only link bush areas but it will provide shelter and shade in your paddocks, potentially feed for stock and even colour and beauty for the property. As such make your corridors a valuable and productive part of your property plan.

Dieback control

Phytophthora cinnomomi (dieback) is a serious fungal threat to our native bush. Dieback spreads quite easily through the movement of water, soil, machines and people. Particular native plants like some Eucalyptus, *Banksia* and *Dryandra* are at most risk. If you have dieback-affected vegetation on or near your property, then try to use hygiene measures to limit the spread.

Hygiene measures include:

- clean all the soil off your shoes after walking in the area;
- visit known dieback areas last;
- do any earthworks in drier months;
- limit soil disturbance;
- keep the area well drained;
- walk instead of using a vehicle (it's easier to clean your shoes than a vehicle);
- ensure machinery is clean before and after construction and maintenance of firebreaks and roads;
- try to limit stock access;
- protect the vegetation by injecting trees with Phosphite, and spraying all other vegetation; and
- let your neighbours know.

Phosphite can help vegetation fight off the disease for 3 to 5 years. Refer to *Managing Dieback in Bushland* prepared by the Dieback Working Group. Edition 2 of this publication is currently in preparation.