

Protecting and enhancing remnant native vegetation

A guide to help you identify and care for remnant vegetation on your property

Revegetation using planted seedlings in a public reserve that has an overstorey of Eucalypts, but no midstorey.

Typical remnant vegetation on rural properties

Remnant areas of vegetation are patches of native bush, woodland, native grass pastures, vegetation along waterways and road reserves, paddock trees and wetlands. These areas may have escaped earlier clearing, or have regrown and re-established over time. Remnant vegetation on your property maybe quite modified - large old trees in pasture paddocks, or more natural - a bush area with a range of different aged trees, shrubs and native grasses.

Most remnant vegetation in Victoria occurs on privately-owned land. Private landholders therefore have an important role in protecting and enhancing remaining remnants on their farm.

Native grass pastures

Most local native grass areas or paddocks were originally woodlands or forest, and the native grasses are now all that remains because of clearing, grazing and other land use pressures.

Native grass pastures are often on hill slopes and/or in paddocks that have not been cultivated or fertilised. Native grass pastures may also have a range of herbs, wildflowers and smaller shrubs amongst the native grasses that may appear at certain times of the year. Parts of these upper slopes may have been used as stock camps (stock like camping on warmer upper slopes at night). Stock camping concentrates manure and weed seeds, hence areas of native grass paddocks are sometimes very weedy.

Paddocks and other areas with native grasses are important as they are often the last patches of our agricultural areas where native grasses and grassland plants still exist. Habitat loss has contributed to the

decline of many species that are now listed as rare or endangered.

The majority of our local native grass species are perennial (plants that grow for a number of seasons) and grow actively in summer (summer active). Native pastures require resting from grazing, usually over summer and into autumn to set and drop seed. Every native grass area will be different. Refer to the *Grazing Tool for Managing Grassy Woodlands and Grasslands of Northern Victoria* (Davidson, 2014) in the *Other Resources* section of this booklet for more information on the management of grasslands through grazing.

Find out the history of your area and how it has been grazed. If you have a site with a high cover of native grass, it is likely that you will be able to maintain the area in good condition by continuing the same sort of grazing patterns used in the past.

Native bush

Native bush is often 'up the back' on hilly and/or less productive sites. Native bush might be natural and not grazed, with good tree cover, some large old trees, shrubs and native grasses. Very few bush areas have never been cleared, or had some logging at a time in their history. Bush on lower sites tends to be more open, grazed and generally more disturbed. Some bush areas can be very thick, with many smaller trees close together, with little if any understorey. These areas are usually regrowth from past clearing or natural events such as fire or floods, for example: really dense River Red Gum stands along our waterways, or Stringybark forest on some of our hills.

There are many different types of bush areas on different soils, slopes and aspects. Different types of vegetation can be classified into groups that describe their characteristics, these vegetation types are called Ecological Vegetation Classes and will be referred to as EVCs in this section. Some EVCs will have shrubby understories (e.g. Heathy Dry Forest), others will be grassy (e.g. Grassy Dry Forest), while still others will be pretty sparse.

Woodlands

Woodlands are characterised by more widely spaced trees, sometimes with native grasses and some newer young trees in the understorey. These areas may be naturally more open (one of the Woodland EVCs), or have become more open through past clearing and/or grazing. Many Grassy Woodland EVCs are now endangered, as these vegetation types are typical of better, more fertile country that was historically cleared for agriculture.

Common trees in our local woodlands include River Red Gum, Blakely's Red Gum (or Hill Gum), Red Box, Yellow Box, Apple Box, Grey Box and less commonly White Box and Ironbark.

Remnant areas can contain different types of vegetation such as these Grass Trees (Xanthorrhoea australis).





Including large old remnant trees into your revegetation sites increases the diversity of habitat for wildlife and protects these trees from impacts of stock grazing and cropping.

Paddock trees

Single trees or groups of paddock trees are usually isolated trees within typical grazing or cropping paddocks. These trees are often remnants from the different types of woodlands that existed prior to European settlement and can be hundreds of years old. Think of the view south from the Hume Freeway at Glenrowan as you look across to Mt Buffalo. Paddock trees are impacted by many pressures including:

- **Stock camping** – which can cause the concentration of nutrients under trees and compaction of soils leading to less aeration, increased water runoff and changes in soil biology.
- **Chewing, rubbing and stripping protective bark** – e.g. cattle damage to Stringybarks.
- **Pest insects** - fewer shrubs, logs and other vegetation leading to less habitat and fewer insects, birds, bats and mammals to control outbreaks of pest insects and Mistletoe.
- **Edge affect and isolation** – exposed paddock trees are more affected by wind, extremes in temperature, storms, browsing insects, and are obvious spots for Mistletoe birds to leave their seed and dropping packages. Mistletoe is a favourite food of Brush-tailed Possums, but possums will not cross large open paddocks to get to paddock trees. Isolated trees are more exposed to pasture and crop management activities such as spraying, fertilising, cultivating and burning. Protective fallen logs are often also removed to make these activities easier.

Wetlands

- Wetlands in our local area include billabongs, spring soaks, and simple rush areas within paddocks. Wetlands can be dominated by rushes and sedges, shrubs, native grass, herbs and trees, but are more commonly different combinations of these. Wetlands occur on permanently or seasonally wet sites. Seasonally or periodically wet wetlands can be dry for many years, and are easily overlooked and inadvertently sown to pasture or crops. These wetlands often have no or few trees, and when dry, have few obvious wetland plants. Examples in our local area include Seasonal Herbaceous Wetlands.
- Wetlands with more permanent water or that stay wetter for longer, such as billabongs, permanent soaks and rush areas in paddocks, are much

easier to see and identify. Most wetlands on farms have been modified as a result of land management practices such as drainage works, clearing, grazing and run-off of nutrients, manure and soil from surrounding agricultural areas which may drain to your wetland.

- Farm dams can act as wetlands when grazing is managed using appropriate fencing and native vegetation is encouraged or planted. Many dams on low to mid slopes were built on springs or soaks (some on EVCs previously mapped as Spring Soak Woodland). Some of these spring-fed dams retain examples of their original features including large old trees, shrubs such as prickly Tea-tree and seasonal herb-rich areas with plants such as Fairies Aprons, Narrow Goodenia and Poison Pratia.

Corridors along waterways

Corridors along waterways are strips of vegetation that usually contain a mix of older and younger trees. More natural sites will also have shrubs, rushes or sedges and some native grasses. The width of the corridor often depends on the size of the waterway, with larger waterways like the King River generally having a greater width of vegetation along each bank. On some waterways willows and poplars were historically planted to control bank erosion and some of these trees may remain today.

On more major waterways, there may also be a strip of land known as a Crown Frontage, that can be leased with a grazing or conservation licence by the adjoining landholder. These parcels of land were retained by the Crown in 1881 to allow public and stock access to 280 waterways across Victoria and are a very important part of our landscape.

Remnant native corridors on waterways are particularly important as:

- These sites are more fertile and usually wetter, so tend to grow vegetation more easily and can support more diverse plant species.
- They provide water and shelter for our wildlife.
- Being more fertile and wetter, there are often greater food sources available for more species.
- Minor waterways that drain from hillslopes can form important links between bush 'up the back' and larger corridors on the floodplain, providing natural linkages from hillslope areas to the flats.
- These corridors form important drought refuges for animals and plants during hot summer months. Major waterways like the King River retain water during summer where smaller more minor waterways, wetlands and farm dams may dry out.
- They provide an important buffer to filter sediment and nutrients from adjacent agricultural land that may be cropped or grazed, which helps to maintain and protect water quality in our rivers.

Refer to the publication *Managing grazing on riparian land* (DELWP, 2016) in the *Other Resources* section of this booklet for guidance on the use of grazing as a management tool for a variety of different vegetation types along our waterways.

An unused road reserve at Hansonville, typical of many in North East Victoria. Trees at this reserve include a mix of Apple Box, Yellow Box and Grey Box.

Unused road reserves

Unused road reserves are linear property parcels laid out for roads in the 1800s on which roads were never properly constructed. These reserves are public land that can generally be leased by an adjoining landholder on a 99-year perpetual lease, with some restrictions on what can be undertaken within these areas. Some reserves were sold in the past and are now privately owned. Historically many of these reserves were not cleared, and so the remnant vegetation along these reserves can be easily seen traversing many cleared agricultural areas.

Adjoining landholders typically used these areas for grazing and collecting firewood and managed them like their own private land. Some unused road reserves are fenced separately from adjoining paddocks, but many are not. These unused road reserves can provide valuable shade and shelter for adjacent paddocks.





Stock under a large old paddock tree can have serious impacts on tree health over time.

Why is remnant vegetation important?

Remnant vegetation presents a **glimpse into the past** of what our vegetation might have looked like prior to European settlement and tells a story of the history of land use within your area. This vegetation has important benefits for biodiversity and farm productivity.

Environmental benefits

Remnant patches are **habitat for native wildlife** – homes, shelter and food sources for mammals, bats, birds, amphibians, reptiles and insects. Without remnant vegetation, there are fewer opportunities for these native species to survive in our landscape.

Remnant vegetation often includes **large old trees** – many older trees pre-date European settlement and are irreplaceable once lost. Old remnant trees, whether standing alone in the paddock or standing in a patch of bush, provide a range of important benefits to local wildlife. **Hollows only occur in large old trees (typically over 80-100 years old)** and provide vital habitat and breeding sites for many species including possums and gliders, bats and a range of birds. Hollows occur in living and dead trees.

Fallen trees and logs in areas of remnant vegetation offer habitat, refuge, food sources and perching sites for animals. As fallen trees and logs slowly rot over a long period, their decomposing timber returns stored nutrients to the soil, for the benefit of nearby plant and animal life.

Ground litter is the “stuff” which falls from native vegetation, being made up of leaves, twigs and bark. Lying on the ground, it provides shelter and food to a vast array of life (fungi, lichens, macro-invertebrates, insects, birds, mammals, frogs and reptiles). As it breaks down, it provides nutrients into the soil which feeds nearby vegetation. It softens the impact of heavy rainfall and reduces soil erosion.

Healthy remnant vegetation is a **natural carbon store** – carbon is stored within the vegetation, in bark, in timber and in leaves. Carbon is also stored in soil in organic matter.

Productivity benefits

Trees within paddocks offer shade to stock. Native bush adjoining paddocks, offers **shade and shelter** from wind and wind-driven rain to stock, pastures and crops. Remnant areas can provide good shelter for stock during extreme weather.

The presence of remnant vegetation can **improve soil health** by increasing organic matter within the soil, moderating ambient soil temperature and buffering temperature extremes through shading, increasing numbers of soil organisms, and improving soil water-holding and drainage capacity.

The positive benefits of a healthy ecosystem extend beyond the remnant stand out into the broader farmland through **biological control of pest insects**. Birds, bats, possums and insects living in remnant vegetation will predate damaging insects in crops, pastures, tree plantations, orchards and home gardens.

Essential pollination services are supplied by a range of birds, bats, mammals and insects that live in these remnant areas, which extend to other parts of your property.

Well managed native vegetation can **improve water quality on and off your farm**. Fenced dams and waterways with protected native vegetation and good ground cover, will reduce nutrients, effluent and soil particles from entering waterbodies. Good ground cover will also **prevent or reduce wind and water erosion**.

Natural regeneration will often pop up around old paddock trees when paddocks are rested and environmental conditions are right.



Managing your remnant vegetation

Step 1 - Get to know what you have

- Observe the different types of remnant vegetation across your property. Look for signs of wildlife and native plants – birds arriving at different times of the year, animals feeding in different areas, insect activity, trees flowering and new plants.
- Map the different remnant vegetation areas across your property (e.g. bush, waterways, native grass paddocks, scattered paddock trees, etc). Develop a mud map, get a large format aerial photo to work on, or complete a Whole Farm Planning Course through Agriculture Victoria.
- Determine what vegetation types characterise each of the remnant vegetation areas on your property (e.g. do you have EVCs such as Heathy Dry Forest, Creekline Grassy Woodland or Plains Grassy Woodland). Use the *North East Revegetation Guides* to help you. Knowing what EVCs you have (or would have had) will give you a list of the trees, shrubs and groundlayer plants you are likely to find in these areas, which can form the basis of what you may want to replant in the future.
- Think about the threats, or things that negatively impact the different remnant areas on your property. Typical threats include stock browsing new tree seedlings or shrubs, weeds smothering native vegetation within gullies and along waterways and large old paddock trees being affected by dieback.
- Seek assistance from your local Landcare group or Natural Resource agency to help you identify flora and fauna, different remnant areas and their values and different EVCs. Knowing what you have will guide how you manage these areas.

Remnant vegetation plays an important role in our landscape, linking the hills to the rivers across our agricultural areas.



Step 2 - Protect and manage your remnant vegetation

To protect your remnant vegetation, you will need to develop a plan for the management of your remnant area. Important things to consider will include:

- **The type of vegetation you are protecting.** Different vegetation types will need different types of management. All areas will benefit from some management.
- **Fencing** will be crucial in managing many of your areas and this is further detailed below.
- **Encouraging natural regeneration or revegetation.** Think about what plants are missing and how it might be feasible to encourage regeneration and/or revegetate your site.
- **Grazing.** Native grass pastures will benefit from grazing and resting at different times. Resting these areas over summer and into early autumn, allows native grasses to set and drop seed.

Crash grazing during late winter and early spring, can assist in controlling introduced grasses and weeds. Many other remnant areas may benefit from crash grazing to control grass loads. Sites should only be grazed when dry and some sensitive sites may be better not grazed at all.

- **Weeds** can smother native vegetation and/or out compete native plants, reducing the diversity of your remnant area. Not all weeds have the same impact. Concentrate on those weeds which have the greatest impact (current or potential), on both the health of your remnant vegetation and farm productivity. Control methods include herbicide spraying, mechanical removal, managed grazing and strategic burning. Consult your local Landcare group or Natural Resource agency for help identifying problem weeds and to determine which control methods are most successful.
- **Pest animals.** It is well understood that pest animals such as foxes and rabbits impact farm productivity and threaten healthy ecosystems. They often live in remnant areas and use linear corridors as ways to move across your property. Consult your local Landcare group on which pest control methods work best in your district.
- **Strategic burning** can be used as a tool to manage remnant vegetation. It can be useful in controlling weeds and promoting regeneration of native plant species. However, some species and vegetation types do not respond well to fire, causing more



Nest boxes can be used to provide homes for birds and other hollow dependant fauna for breeding and shelter in sites that may have few large old trees.

harm than good. Consult your local Landcare group, CFA or Natural Resource agency, for advice and to draw on local experiences with safe, strategic burning.

- Use **photo points** to capture the impacts of management changes at your site over time. Photo points are locations such as a gatepost or specially placed star picket, from which you can take regular photos of your remnant area. A photo record can tell a great story of changes at your site in a visual sense.
- Don't forget to consider **your own capacity and how busy you are**. Completing and maintaining a revegetation or restoration project takes time, effort and dollars. It is better to do a small area well and always start with something small if you have never done any revegetation projects before.

Fencing remnant areas

Stock-proof fencing, with farm gates to allow access, can be a very simple first step to managing a remnant area. Things to consider include:

- **The type, size and shape or extent of the remnant vegetation** will influence how a site is fenced. Can you fence the whole wetland, bush area, or native grass pasture? Fencing entire remnant vegetation areas into separate units, will allow you to undertake different management in the different areas. Some remnant areas may not be practical to fence.
- **Incorporating other assets** when you fence remnants (e.g. dams, tracks or buildings).
- Use the fencing of a remnant area as an opportunity to **improve farm functioning and management**. Examples include: subdividing a large paddock into two by fencing a waterway on each side; creating a new boundary fence by coming in at least 20m and buffering remnant vegetation on an adjoining unused road reserve or existing road; and improving water quality for stock by fencing a dam and connecting wetland area and providing a trough for stock watering.
- Make fenced remnant areas along waterway corridors and around wetlands and paddock trees, **bigger not smaller**. Very narrow linear corridors make access difficult for weed control, planting native seedlings, or when crash grazing to control grass levels. Allow enough room between the edges of the waterway and your new fence (minimum of 10m from the top of the bank to your fence). See the *Managing erosion* section of this booklet for more information.
- Think about how you might be able to **link remnant areas** and consider this in your planning. Linked, rather than isolated remnants are much more useful for the movement of native animals and plants. Consider for example, fencing a group of nearby paddock trees, rather than individual trees and joining them with revegetation to existing vegetation on a roadside.

This patch of remnant vegetation exists at the top of a steep road cutting adjacent to private farm land in Greta West. Until stock were excluded using fencing in the 1970's, this patch was like the grazing land over the fence. Native ground and shrub species regenerated naturally at the site and today the site is a diverse and interesting area for exploration.



Step 3 - Enhancing your remnant area

Encouraging natural regeneration involves artificially triggering the germination of seeds held in the soil seedbank. In sites with trees and shrubs, burning the ground layer, spraying patches, or disturbing the soil (e.g. with a tractor and cultivator, or with a hand tool such as a rakehoe), can encourage native seed germination. To be successful, these methods require a viable seedbank in the soil and specific environmental and seasonal conditions to be right. Long-term grazed and/or cropped sites with only trees, are likely to produce only tree seedlings using these methods, as the shrub and ground layer seedbanks are likely to be depleted or non-existent.

Burning

Burning paddocks with native grasses at the correct time and intensity can be a successful process for encouraging natural regeneration. The timing will depend on the seasonal conditions and desired outcome, but burning is usually appropriate from late autumn through to early spring. Cool burns are usually recommended and are normally carried out in winter. Cool burns should be small, slow moving and lower in heat. Burns done earlier, in late autumn, will be hotter and better at killing weeds and weed seeds. Autumn burns will also be more difficult to control. **Advice should always be sought when planning a burn.**

Managed incorrectly, native grass paddocks can become dominated by a few native species or introduced grasses. Correctly done, burning can open up the grass sward, allowing light and space for smaller herbs, lilies, wildflowers and other grass species to germinate. It is recommended that any burning is done cautiously, in small manageable patches, to see what the outcome is going to be. Patch burning also provides a mosaic of burnt and unburnt areas, maintaining and creating different habitat for a variety of animal species.

Burning can be equally useful in woodland areas. The same recommendations apply. Care is needed to prevent trees and logs from burning. This can be done by raking litter and dry grass away from the base of trees and around large logs and/or wetting these areas down. Alternatively burning can be avoided around trees, or burning can be done with the right conditions in winter as very small and slow moving cool burns.



*Large patches of Hoary Sunrays (*Leucochrysum albicans*) in a grassy woodland remnant at Gapsted.*

Grazing Management

Strategic grazing of very grassy, long un-grazed sites, can also be a tool to encourage natural regeneration. Grazing will allow light and space for seed germination. This will only be effective if there is viable seed remaining in the seedbank. Grazing of grasslands and grassy woodlands in late winter-early spring can reduce exotic grasses and weeds, opening up the sward for natural regeneration.

Revegetation

Revegetation involves introducing indigenous (locally native) species to complement the species already present, either by planting seedlings or direct-seeding (machine sowing native seed). Revegetation is a good way to increase the diversity and abundance of plant species already present at your site.

Ideally, revegetation is completed a few years after fencing your site, managing grazing and controlling other threats such as weeds and rabbits. This gives you time to see whether natural recruitment may occur, what native species are present and also what are likely to be your problem weeds. More often, project funding dictates that sites be fenced and planted within the same year. Get in as early as you can (ideally before Christmas for planting the following autumn-winter), to order plants or seed, and to book contractors for direct seeding.

Blue Finger-flower (Cheiranthra cyanea var. cyanea)



Enhancing your patch through revegetation

The planning for your earlier steps will have guided you in determining **the type of remnant and vegetation types (EVCs) you have**. Comparing what is growing at your site, with what used to grow, will tell you what is missing. This section will guide you on how to get these species re-established at your site.

Plant selection

Selecting the species, type (e.g. trees, shrubs, grasses) and numbers of plants for your site. This can be tricky for the novice and it is important to get help and advice.

It is important to consider individual site characteristics such as:

- What parts of your site are wet or dry?
- Do areas have good drainage or remain wet?
- What is the soil type, aspect and slope?
- How natural or weedy is the site? and
- How much area is actually available for planting?

These factors will influence the type of plants and how many seedlings or how much seed you will need for your site. If you were planting a completely bare site (no trees or shrubs), a rule of thumb is 600 stems per hectare with 80-90% shrubs and the remainder trees.

Woodlands with some native grasses and scattered trees can be planted much more lightly to maintain open patches of native grasses. At woodland sites, or sites with existing tree cover only, consider spacing any additional trees that may be required 20-30m apart and then placing clumps of shrubs in between your trees. This maintains open areas for foraging which are preferred by some birds, and also provides protection, nesting areas and food in the clumps of shrubs.

Around a farm dam, it may be more suitable to have denser patches of shrubs, closer together, providing habitat and cover for small birds, and helping to out-compete any dominant introduced grasses.

Getting started

Start simply, get the basic plants going first. These will be trees and the common larger shrubs (mainly wattles) that are hardy species that can help create more suitable conditions for planting other shrubs and ground layer plants in the future. Space trees up to 20-30m apart, with clumps of shrubs (3-5 plants of the same species) and open spaces between.

If **direct seeding**, advise your contractor that you want a low number of trees (10-20% of total plants), spread within the site. An option when direct seeding, is to seed your understorey plants (also in well spaced clumps) and manually plant your tree seedlings. Don't be tempted to put trees closer than 20-30m. There are many examples of older plantings in the local area, where closely planted trees have out competed shrubs and now there is just bare ground under these trees. This monoculture of trees provides less habitat value and reduces their effectiveness as a wind break.

If you have **established large trees** within or near your remnant area, only plant shrubs or particular tree species that may be missing. Once fenced, tree seedlings will generally appear naturally near parent trees within a few years.

Many remnant sites on farmland will be **missing native groundlayer species** such as native grasses, herbs, lilies and wildflowers. This is the most difficult, time consuming and expensive layer to try and re-establish. Unless your site already has a mainly native grass groundlayer, trying to recreate this layer is not usually feasible. Be content with patches of shrubs and well-spaced trees. In time, some ground layer plants may be able to be planted if introduced grass and weed cover reduces, and shelter is provided by trees and shrubs.

Not all sites will require planting. A bush area with established trees and shrubs and groundlayer plants will have enough diversity of native species. Equally, certain wetlands on your property may be naturally treeless and have no shrubs. Mistakenly, and with the best intentions, some of these wetland types have been revegetated with trees and shrubs in the past.

Native grass pastures and woodlands may not need any, or only limited planting or seeding. Native pastures and woodlands often occur as a result of clearing and land use activities occurring on the site over time. These open native grass areas provide important habitat for many grassland dependant plants, mammals, reptiles, insects and birds.



Cat's Claws Grevillea (Grevillea alpine)

Patches of shrubs with large spaces between plantings (more than 50 metres) may be suitable. Some good quality natural grass pastures/paddocks may be best left as they are.

Not all species in the NE Revegetation Guide lists are available from nurseries. Those often unavailable are the smaller and more difficult to propagate understorey plants, that are best planted in very natural sites only. Our local nurseries carry a great range of seedlings (tube stock and hiko) to assist you with your revegetation projects.

Choosing the type of revegetation technique

Both direct seeding and planting seedlings can provide great outcomes for your remnant site. Below are some of the pros and cons for each method.

Direct Seeding	
Pros	Cons
<ul style="list-style-type: none"> • Can be cheaper, after counting the cost of labour and buying plants and guards. • Direct seeding is much less labour intensive than planting. Large areas can be sown very quickly and can look more natural in terms of structure and site layout. • Seed can continue to germinate for a number of years (up to 5 years and beyond). If poor or drought conditions occur at or after seeding, seeds will either not germinate or some will germinate later, meaning there is likely to be some plants that establish within the site. • Sites do not need to be ripped prior to planting. • Direct seeding usually means more seedlings establish initially. Accounting for losses for whatever reason, you will usually end up with some plants in your site. High densities after germination can more quickly reduce the cover of weeds at your site. • Direct seeding can be done by hand in areas that are hard for machinery to access or for seedling planting. Examples are on steep slopes. A rakehoe is a useful tool for doing this. 	<ul style="list-style-type: none"> • It is site and season dependant and can have varied results. • Seedlings may not be seen for a number of seasons and seed can continue to germinate for a number of years (up to 5 years and beyond). This can be frustrating as for a long time it can look like nothing is growing and the temptation to graze the site will be high. • Seeded sites in some cases, may not be able to be grazed for up to 5 years or more, as new plants may still be germinating. • Direct seeding is not suitable for sites that have been cropped either recently or for long periods in the past. • It is also not suitable for sites with very dominant introduced grasses such as Phalaris and Paspalum – these need to be controlled first. • Machine direct seeding can only be undertaken in sites that are accessible to vehicles and needs to be done by a contractor. This is also highly weather dependent. • Not all species germinate successfully from seed, so there may be some species that might need to be planted as seedlings at your site in the future.
Planting Seedlings (Tube stock or Hiko)	
Pros	Cons
<ul style="list-style-type: none"> • Can be seen instantly, especially if guarded. Plants can then be easily checked, watered and sprayed around if needed. • The site can be grazed once plants are established which is typically between 4-5 years after planting. • Sites that are inaccessible to machinery and vehicles can still be planted with seedlings, although more slowly than hand seeding. • A greater range of plants are available as seedlings - some plants cannot be direct seeded. • Planting can be done in sites that have been cropped. 	<ul style="list-style-type: none"> • Can be more expensive after counting labour or time spent, and buying plants and guards. • Is labour intensive – sites ideally need to be ripped, and seedlings planted and guarded. Planting and guarding can be a slow process. • Is also site and season dependant and can have a varied result. • If poor or drought conditions occur at or after seedlings are planted, many and sometimes all plants can be lost. • Accessible sites benefit from being ripped prior to planting – increasing the equipment or contractors required and the costs.



A recently fenced shelterbelt, ripped and sprayed ready for planting.

Site preparation

Depending on the method of revegetation, planting or seeding and site factors such as weediness, different site preparation will be required. The main preparation activities will be spraying and ripping.

Ripping

Deep ripping is used when planting seedlings. A ripper is pulled by a tractor which creates a rip line shattering the soil and allowing water to infiltrate prior to planting. Some guidelines for the successful use of ripping as a technique are provided:

- Ripping is best undertaken when soils are dry, from summer through to just before the autumn break. Dry soils shatter, creating places for plant roots to explore. Ripping wet soils, particularly clays, is not recommended. Ripping wet clay soils will be like pulling a knife through butter - a distinct trench with smooth sides will be formed, which can hold water (drowning plants) and prevent roots growing out beyond the trench. The same rules apply if using a hand auger to make individual planting holes. Hand augers can also smooth the sides of dry clay soils and will need to be roughed up using a shovel or crowbar.
- Ripping well before planting is a good idea. Driving over your riplines with your tractor wheel can be a good idea, particularly if your ripping has turned up large clods. The VIP treatment, if you have time and equipment, is to go over your riplines with a cultivator. This is not recommended where you have a native grass ground layer.
- Ripping should always be done along contours and not down slope, reducing the potential for erosion.
- Ripping is not suitable for some sites including in erosive soils (top soil or sub soil) (see the Erosion section of this guide), near gullies and waterway banks. In very weedy sites, ripping can encourage mass germination of weeds and minimal soil disturbance at these sites is recommended.
- Always rip outside of the drip line of trees (the extent of the canopy) and away from shrubs to prevent damaging roots. Ripping near trees often encourages natural regeneration of tree seedlings, which can be a good thing if you are trying to encourage more natural recruitment at your site.
- Traditionally riplines in revegetation areas are done parallel to each other about 5m apart. In revegetation and remnant areas, consider doing wavy and crossing lines to create a more natural planting effect. Well-spaced circle riplines with crossing lines like a simple spider web, can be a good way to prepare for planting scattered clumps of shrubs.
- More natural areas that may be characterised by mainly trees with an understorey of native grasses or shrubs, with spaces between plants, will need less site preparation. If planting, these sites may or may not be ripped and are unlikely to need to be sprayed.

Reducing competition from weeds

Weed spraying and/or crash grazing will be needed at many sites to reduce competition from introduced grasses and weeds for new seedlings and seeding.

- Sites to be planted can be spot sprayed (1m diameter circles for trees and 3-4m diameter circles for clumps of shrubs) or if ripping, spraying can be done along riplines (also 1m wide). It is not normally needed or recommended to spray out entire areas as this will only encourage weeds.
- Wavy spray lines can be done where direct seeding is to occur. When creating these lines, remember to allow room for a vehicle and trailer to turn easily, navigate logs, etc. and keep out from under tree canopies. Some seeding contractors can also complete a second spray at the time of seeding. Talk to your local Landcare group or Natural Resource agency for seeding contractor contacts.
- Three sprays prior to seeding or planting is recommended as best practice. This can be crucial when planting in dry times and/or lighter soil types. This requires good planning and assumes a number of rainfall events to germinate grass/weed seeds. Realistically, many sites will only receive one and if we are lucky two sprays. Spraying will be critical where there are dominant grassy weeds such as Phalaris and Paspalum, commonly along waterways and around dams and wetlands. These type of weeds need to be controlled for successful revegetation and ease of management down the track. For tough weeds, a number of sprays

combined with grazing will be needed.

Start controlling these types of weeds early – don't wait for project funding to get started.

- Woody weeds, in particular Blackberries, will quickly smother seedlings and need to be controlled before planting or seeding occurs. Dead canes might need to be burnt to allow access for planting. Equally, they may provide protection from grazing animals for new plants.
- Controlling many common herbaceous weeds such as Patterson's Curse, St John's Wort and Thistles before planting is the easiest and best option. Plan your projects early and get started on weed control – again, don't wait for project funding.
- Spraying with a knock-down and pre-emergent herbicide combination, can provide weed control for up to 6 months. Pre-emergent herbicides should be used with care at sites that are going to be direct seeded, as the action of this chemical is to kill seeds. If unskilled in the use of this type of chemical, stick to using a knock-down herbicide such as Glyphosate.
- Care should be taken using any herbicides and follow label rates and use recommended personal protective equipment. Frog-friendly Glyphosate is available for use around waterways, dams and wetland areas.
- Weed matting may be needed to reduce competition for seedlings in some very weedy sites.

A site freshly direct seeded around a farm dam at Moyhu in 2015.





Planting and guarding of shrubs amongst patches of native grass to provide midstorey habitat for birds.

Controlling pest animals

Pest animals and over abundant wildlife can decimate revegetation areas. Consider methods of control both before the project commences and during the establishment of your revegetation:

- Rabbit burrows need to be ripped if possible (using a tractor with a deep ripper) or hand collapsed and burrows fumigated. Rabbits will eat out in a radius from burrows and can follow along riplines or seeding lines eating all plants found.
- Hares camp in grass tussocks and need to be controlled via shooting.
- Different tree guards are available to protect seedlings from browsing animals. If you have any rabbits or hares, it is usually recommended to guard seedlings. Obviously, direct seeding cannot be guarded. Guards range in price and longevity from cheap single season cardboard milk carton guards, to plastic and corflute guards, and heavier duty mesh and wire tree guards. Anecdotally, people report different guards attracting, rather than deterring different wildlife. Cockatoos can destroy seedlings and seem attracted to white milk carton guards. If you are in an area with many cockies, it may be worth using an alternative type of guard. Experiment with small plantings to see what works on your property in different areas, with different animals.
- It is often difficult to protect seedlings from native animals (wallabies, kangaroos and wombats) and it is a really important consideration if you have large numbers. Kangaroos can be culled, either by yourself or a professional shooter, with an Authority to Control Wildlife (ATCW) issued by the Department of Environment, Land, Water and Planning (DELWP). Wombats and wallabies can also be controlled with an ATCW, but are not normally in high enough numbers to require this. Native wildlife can be discouraged from entering areas with a low electric wire to stop pushing under fences, combined with a higher electric wire or wires.
- Deer are more difficult to manage and a combination of shooting, large wire guards and electric fencing might be required. Deer can be shot on your property either by yourself or a third party (if you provide written permission). For more information on deer management and control contact the Game Management Authority.

Enhancing your revegetation site for wildlife

Including fallen timber and logs within your remnant is a great way to increase habitat:

- Move timber into the site from areas where it may be in the way of farm activities. Do this after you have ripped your site and sprayed, if logs are going to limit access. A log will provide more benefit for wildlife in your fenced revegetation site, than being left on its own out in a paddock.
- Strategically placing or leaving timber around paddock trees can improve many localised conditions for the tree and its surrounding environment. Logs and timber can prevent or limit stock camping (and the negative impacts including excess manure, compaction, increased run-off and changes in soil biology). Timber around trees can also provide protected places for new tree seedlings or other native plants to establish. Decomposing timber will also encourage insect life, attracting insectivorous birds, lizards and mammals, which in turn will help to control pest species that can affect the tree.
- Moving timber into wetlands, farm dam areas and along waterways is equally important and will lead to similar outcomes as above. See the section on Enhancing Your Farm Dam for more information.

Installing nest boxes will supplement areas with few or no large old trees with hollows, and attract animals to your area:

- Nest boxes are designed for different species of birds, mammals and bats, with different size entry holes, and different size and shape boxes.
- Careful location and installation of boxes is required. Place boxes on the cooler south east side of trees. Consider all-day shading from the trees canopy or from surrounding trees. Check your nest boxes and complete regular maintenance. For more information refer to your local Landcare group or Natural Resource agency.

*Make use of fallen timber at your property when planting your revegetation. Consider targeting shrubs around the timber and using recycled fencing wire or mesh to create a trellis for climbing plants like Purple coral pea (*Hardenbergia violacea*).*



Maintenance of your revegetation

All revegetation will require maintenance. Maintenance can include watering, spraying weeds and replacing, or later removing guards. Typical maintenance activities include:

- Replacing lost plants or seedlings, or adding missing/additional species over subsequent seasons. With seeded sites, this might be adding species that cannot be successfully direct seeded.
- Controlling weeds through spot spraying or hand chipping in your revegetation site. If competition around young plants is high with introduced grasses, you may like to place a bucket upside down over plants and spot spray around them to further control grasses.
- Once plants are established (i.e. 4-5 years, allowing extra time in direct seeded sites), sites can be crash grazed to manage grass loads, control weeds and open up the grass sward in native pastures and woodlands to encourage natural regeneration.
- Maintaining fences, including electric systems, to control stock and browsing wildlife.
- Continue to control pest animals such as rabbits, hares and deer, and monitor the damage from native animals. Consider continuing to periodically cull native animals if they are damaging your revegetation areas. Keep an eye out for browsing, particularly in drier times and during drought.
- In the future, thinning might be needed if trees have grown too close together. Any clearing of trees over 10 centimetres in diameter or 10 years old, will require a permit from your local Council. Regulations are constantly changing, so check with your Council first.

References and Other Resources

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