16

Natural Regeneration - Case studies on the farm.

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LAND FOR WILDLIFE

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This Note should be used in conjunction with Note 13. The advantages of natural regeneration over the alternatives of direct seeding or planting are considerable. The principal advantage to the farmer is the low cost, both in terms of labour and cash, of establishing large numbers of suitable plants. It is also ideal for wildlife.

Other advantages include:

Natural regeneration

* can usually be accomplished with little additional equipment than that normally found on a farm.
* is suitable for broadscale or localised areas.
* maintains the local character of an area.
* can produce massive numbers of plants e.g. 170 000 stems/ha (White Cypress Pine, in Venning, 1986); damage due to insects/rabbits etc. is likely to affect a smaller percentage of the plants; expensive individual plant guards can often be avoided; large numbers of plants closely spaced can shelter each other.
* ensures that the plants that are established are genetically related to other natural remnants and will not become environmental weeds.
* produces plants that are adapted to local conditions and more likely to survive, not only during establishment but over the years ahead.

Natural regeneration can be quite a simple process, as many of the examples provided here will show.

In priority order, the most likely obstacles to natural regeneration occurring on a farm are the absence of remnant vegetation from which native seeds will spread, grazing, weeds and lack of fire. Other factors may prevent regeneration. These are discussed in detail in Note 13. Hence the most common solutions involve fencing or grazing restriction, various forms of weed control and controlled burning.

Natural regeneration may not occur for a considerable time. Even when it does occur the resulting plants may appear to be slow growing and subject to attack by pest species. This is frequently observed in the drier climates where one might presume that the newly established plants are spending more effort on establishing a root system than on above ground growth of stems and foliage. However, the ecological strategies and pest resistant qualities of local species of plants are properties, unrivalled by alternatives, that assist the landholder in the long term.

This Note looks at some successful examples of natural regeneration on private farmland in Victoria.

Regeneration from rootstocks

Case 1: Graeme and Frankie MacLennan - Woodside Plain, Gippsland (coastal, near Wilson's Prom.).

Method: Fence to exclude stock and promote Swamp Paperbark regeneration from existing rootstocks. Follow up planting to increase diversity.

The area is flat, overcleared and any remnants are in severe decline. Prevailing winds are from the south-west. The native vegetation, especially in the low-lying areas, was Swamp Paperbark (*Melaleuca ericifolia*) with Drooping She-Oak (*Allocasuarina verticillata*) and Coastal Manna Gum (*Eucalyptus pryoriana*).

In 1978, Graeme put a central laneway, running east-west, through the sheep grazing property.

A few dying sticks of Swamp Paperbark remained along the fence line; over the years, the cattle had destroyed most of the plants and any regeneration had been grazed. The laneway is 15 metres wide. It was double fenced on the southern side, leaving seven metres for natural regeneration of Swamp Paperbark. Regrowth has been rapid and dense, particularly in areas without phalaris grass (*Phalaris sp.*). Slower areas have been given some encouragement by spraying with glyphosate but this was generally unnecessary. After five or six years, good shelter was achieved.

Note in the photograph the new shoots in the laneway which are pruned by the sheep eliminating any woody weed problems in the pasture.

The laneway (1991) can be used for emergency off-shears shelter for sheep. On a cold windy day, when using the laneway, the MacLennans can appreciate the shelter it provides!

Resident reptiles also find the northern edge an ideal spot on a sunny day. There is a Red-Bellied Black Snake which Graeme sees nearly every day! The dense ti-tree is good habitat for small insectivorous birds like the Superb Fairy-wren.

With trends to wider shelterbelts, Graeme has decided to move the fence out into the southern paddock another two metres. The four wire electric fence is stock-proof although the odd lamb finds a way in. Frankie has planted some She-Oaks where there are gaps in the ti-tree. As the ti-tree grows older and taller, gaps will appear at ground level. This may necessitate some chainsaw pruning in the future. It would be impossible to achieve the same density of shelter by planting. There would be at least 20 plants to the square metre.

Around Woodside, this has been a very successful and inexpensive way to achieve a self-sustaining shelterbelt.

When horse and cattle grazing was removed from this bushland, native tussock grasses returned from rootstocks. The resulting understorey is excellent wildlife habitat and visually attractive.

Regeneration from seedfall

Green's Pinch, north of Kilmore. Eucalyptus obliqua (Messmate Stringybark) regeneration following removal of stock.

Case 2: Jack Frewin, Violet Town

Method: Burn off stubble, scarify lightly, remove stock (2 years). Seed source - a roadside remnant of native vegetation adjacent to the property.

Jack Frewin observed that, following an autumn stubble burn (& light soil disturbance), young native seedlings were regenerating in his paddock. The regeneration was adjacent to a remnant of native vegetation that had persisted along a narrow track bordering the property. Grey Box *Eucalyptus microcarpa* was the predominant species. Jack excluded stock (sheep) from the area for two years to allow the plants, which grew vigorously, to get well above browsing height.

To achieve a self-maintaining community, additional diversity will be necessary including a range of understorey and ground-cover plants. Total exclusion of stock is preferable.

Thousands of eight year old Grey Box trees produced at minimum cost. These have provided habitat for Bush Thick-knee and Grey-crowned Babbler, two threatened species. Native understorey species may spread from the adjacent roadside, be brought in by birds or mammals, or could be sown or planted from native seed gathered nearby.

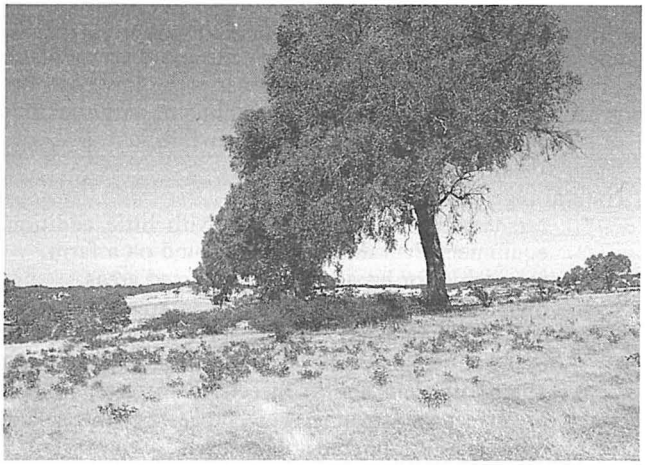
Case 3: Glenn Wilkin, Sedgwick (near Bendigo)

Method: Rabbit control, perhaps combined with a particularly good season. Seed source - an isolated remnant tree on the property.

Glenn found that a remnant native tree had successfully regenerated in a paddock that is subject to sheep grazing. He believes that a particularly successful rabbit control program combined with a 'good' year were the key factors responsible.

The fastidious nature of stock may also be important. Some flocks appear to prefer the 'taste' of seedlings whilst others will leave them alone. In a good season stock may select alternative feed to young seedlings.

A range of fencing options are available for small patches in paddocks. Fencing combined with supplementary planting of local shrubs and ground covers are recommended to achieve a self-maintaining patch of vegetation that has high farm and wildlife value.



Natural regeneration in a paddock subject to grazing.

Case 4: Peter Hamilton - Mt Camel Range, Toolleen.

Method: Soil scalping.

The Mt Camel Range, 40 km west of Bendigo, has largely been cleared of its original Drooping She Oak *Allocasuarina verticillata* and White Box *Eucalyptus albens* vegetation association. The range is grazed and there is no natural regeneration except along roadsides. Pasture/weed growth is vigorous and is dominated by wild oats, variegated thistle, brome grasses, subterranean clover and sorrel. Soils are of Cambrian greenstone (very old altered basalt), a red-chocolate colour and loamy. Annual rainfall is about 550mm.

Peter has a ridgetop paddock which has had trees planted and stock excluded for the last 5-6 years. During this period there has been some favourable rainy springs, however there is no regeneration of any of the remnant White Box, Long-leaved Box *E. goniocalyx* or Yellow Box *E. melliodora* except adjacent to a roadside where works have stripped off the topsoil and cut into the gravelly subsoil and underlying rock. Here, some Long-leaved Box has established, and the reason why there is no regeneration elsewhere becomes evident. The pasture/weed growth on the graded portion, although still present, has been dramatically reduced in density and height by the removal of surface soil. Elsewhere, the weed growth is very dense and up to six foot high in early summer.

This site demonstrates that, on fertile ground in dry areas, fencing alone is unlikely to bring about regeneration due to competition for moisture by weeds. However, weed growth can be reduced in the long term by topsoil removal. This means the treatment does not have to be tied to a heavy seeding year.

WARNING: Removal of topsoil is inappropriate where native ground flora exists. It may be detrimental to plant root systems if carried out too close to the plant. Where there is a risk of erosion, precautions should be taken or this technique avoided. Advice can be obtained from the Department of Conservation and Environment.

Fence location. Corryong

Innovative fence designs and locations can be used to exclude stock from areas at minimum cost. Fence location can be very important. Prevailing winds should be taken into account. Chemical inhibition and other forms of competition by parent plants must also be considered. Double fencing along boundaries, moving a roadside fence that is bordered by remnant vegetation further into the property or fencing a corner are all possibilities that may be appropriate.

Fencing should be placed beyond the dripline and downwind of seed plants, such as in this example from near Corryong in north-east Victoria, to avoid competition from mature plants.

Case 5: Ross Pogue, Toolamba

Method: exclude stock, in this case with permanent fencing, following flooding.

Some species of plants require natural events, such as flooding, a fire or a cold period, to break seed dormancy or activate seed release and initiate germination.

Ross Pogue's property is adjacent to the Goulburn River and includes a number of large depressions. These fill with water overflowing from the river during floods. Ross observed River Red Gums regenerating in these seasonal swamps following a flood and decided to fence the area to exclude cattle. A dense stand of valuable Red Gum *Eucalyptus camaldulensis* was created, providing excellent wildlife habitat. Ross could selectively thin the stand as it matured for timber without much disruption to the vegetation.

Regeneration of Red Gums following flooding. Note that the depression is fenced to exclude stock and further regeneration is now occurring.

Observation of natural regeneration in a paddock south-east of Rochester, in north-central Victoria, indicates that natural regeneration has been inhibited near to the parent plants. Chemical inhibition (allelopathy) or other forms of competition may be involved. To avoid this effect, fence areas to be regenerated beyond the dripline, whether or not they include the parent plants.

In this series, the first two photographs are of properties south-east of Rochester where removal of grazing has allowed remnant vegetation, mainly Grey Box *Eucalyptus microcarpa*, bordering the property to be established within each property. The photograph on the right shows twelve year old Red Gums at Warndoo (Western District) regenerating after the house dam flooded extensively. Stock were excluded by a permanent fence. The barren paddock clearly illustrates the effect of grazing.

Case 6: Jim Kilpatrick, Great Western

Method: Rabbit-proof fencing, knock-down herbicide treatment.

Jim has been regenerating Red Gum *Eucalyptus camaldulensis* for 5-6 years mainly to produce very cheap bare-rooted seedlings for transplanting to other parts of the farm. The property receives around 530mm of rain annually and Red Gum occurs on the lower parts of creek flats with some Yellow Box *E. melliodora* grading to Yellow Box-Yellow Gum *E. leucoxylon* on the higher portions of the flats. Soils are duplex clay but fairly silty. Pastures consist of rye, bromes, barley grasses and silver grasses *Vulpia* spp., capeweed and sub clover i.e. predominantly annual species.

Jim selects trees with a large seed crop in early winter. He then sprays glyphosate herbicide (e.g. Round Up) at the appropriate rate during the first warm days at the end of winter (usually mid-August). If the pasture/weed growth is more substantial than usual he would spray four weeks earlier than this and respray in mid-late August.

Jim has observed that most of his Red Gums start dropping their seed with the first warm days of late winter (this may not be the case elsewhere). Seedlings are first visible in mid-late September and Jim points out that soil moisture over this two week period is critical, with good results depending on adequate rainfall.

Areas of poorer soil (e.g. gravels) should be avoided in favour of more moisture-retentive ground and he suggests that microclimatic effects are very important (e.g. avoid exposed windy areas, north facing slopes, etc.). Jim avoids ripping as he believes it would reduce surface moisture.

Top dressing pasture with superphosphate will increase the weed growth in the following year(s) and should therefore be avoided in areas where revegetation is contemplated. Jim uses an undercutting blade 'plough' to cut the seedling's tap roots and produce healthy bare-rooted seedlings.

Problems: Apart from unreliable spring rains the main problem is grasshoppers which can destroy Red Gum seedlings in their first season. Jim considers rabbit netting vital to success in his area, even though rabbits are not in large numbers. Successful regeneration has also occurred through fencing alone, although it may take a few years for weeds to become less dominant and regeneration is more dependent on good spring rains.

When stock-proof fencing isn't sufficient

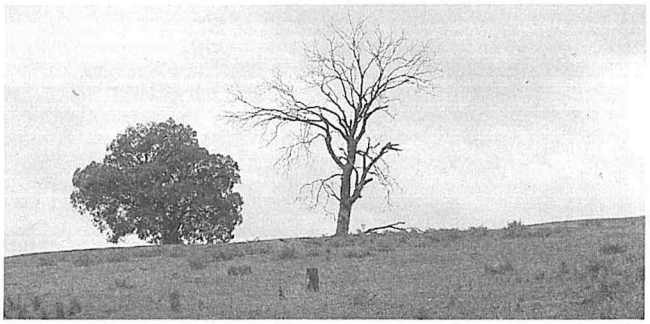
Simple stock-proof fencing is not always sufficient to enable natural regeneration. For example, Native Pine *Callitris* spp. is readily killed by fire, unlike many eucalypts, and so is a prolific seed producer, relying on regeneration from seed to survive fires. White Cypress Pine may produce over one million seeds per tree per year, and produce good falls every three years (Venning, 1986). Its seedlings are palatable, not only to stock but to other herbivores, such as rabbits. Hence, to allow for regeneration of native pines rabbit/hare/kangaroo-proof fencing is usually required, depending on local conditions, in addition to the exclusion of stock. Venning (1986) notes that preparation of a seedbed by ploughing may not be ideal as disturbed ground and succulent regrowth of grasses can attract rabbits which browse pine seedlings. Exclusion of stock allows grasses to return and produce some shade that can be beneficial to seedling establishment.

There are no young White Cypress-pine Callitris glaucophylla in this paddock near Rochester due to grazing by sheep and other herbivores.

Callitris preissii is regenerating in this plot in northern Wyperfeld due to exclusion of rabbits, kangaroos and sheep.

Regeneration from soil-stored seed.

Soil-stored seed or seed brought in by wind and water, or by the feathers, fur, pellets or faeces of wildlife, can enable natural regeneration to occur. This may add to the diversity of species present on the property. Areas that have been recently cleared may respond particularly well. Exclusion of stock, weed control and a controlled burn may assist regeneration.



Young eucalypts have established in this paddock following the removal of grazing, even though the parent tree has died.

These examples show that there are opportunities to establish vegetation through natural regeneration on many properties. It is always advisable to seek local advice from experienced people prior to embarking on a revegetation project. Further information is available from the Department of Conservation and Environment.

Ian Higgins (DCE Bendigo), Frankie MacLennan (Land for Wildlife-Yarram) and Jim Robinson (Greening Australia-Victoria) contributed to this Note.

Further reading:

Land for Wildlife Note No. 13.
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