Best Practice Management of the

Leigh River Escarpment

Leigh Catchment Group

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State Government Victoria Department of Primary Industries

Australian Government
Department of Agriculture, Fisheries and Forestry
National Landcare Program

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Background

The Leigh Catchment Group identified management of the Leigh River escarpment as a key sustainability issue for the health of the River and for the highly significant flora that grows along it. In 2004 landholders adjoining the river created a new focus group for strategic tackling of issues directly related to owning part of this significant waterway.

By working together and sharing their knowledge and experience the farmers came up with ways to better manage the escarpment. The main motivation for the group is the recognition that weeds, including Serrated Tussock, Paterson's Curse and Bridal Creeper are invading the escarpment country and that the ruggedness and non arable nature of the land is going to make them difficult to remove.

The farmers recognise that the escarpment is an area of their farms where there is very little economic return for the monies spent. The focus group aims to manage the escarpment in a way that will minimise weed invasion and leave the flora value intact whilst still providing opportunities for strategic grazing.

Farm walks gave the landholders an opportunity to view and discuss the results of how they had managed their piece of the escarpment and became the basis of the notes featured in this brochure.

The key questions that farmers wanted to explore in managing the escarpment were:

"If I no longer graze the escarpment, what will happen to the weeds?"

"What is the best way of grazing the escarpment to minimise weeds?"

"If I stop grazing will areas of native vegetation regenerate?"

"Can the steep areas of the escarpment where nothing grows be revegetated?"

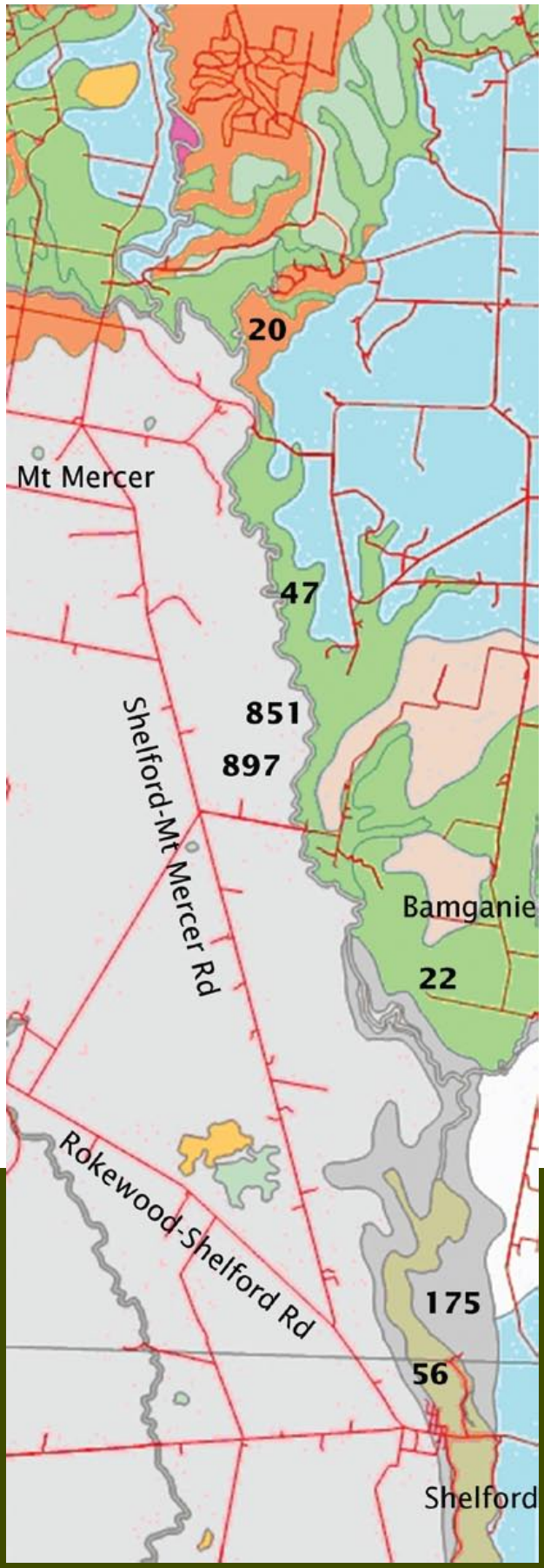
"What used to grow in the escarpment before settlement?"

The Leigh River escarpment before settlement

The original vegetation along the escarpment is quite variable reflecting the different soil types. Grey basalt soils formed from volcanic activity tend to be west of the river and support grasslands. Soils formed on sedimentary rocks east of the river support shrublands and woodlands.

The Ecological Vegetation Class (EVC) map helps to answer questions about what the original vegetation was like so that farmers can look at restoring the natural environment. Within each EVC there are plant species lists available from the Leigh Catchment Group coordinators.

Leigh River Escarpment Pre 1750 Ecological Vegetation Classes



Grazing the Escarpment

Native grasslands across South West Victoria are now estimated to have fallen to levels of 0.01%. Native grasslands are rarer than rainforest! They exist in areas along the escarpment for the main reasons that they are too steep to cultivate and awkward to stock. In more arable areas of the escarpment, fertilisers and heavy stocking have seen them replaced with annual grasses.

Today these native grasslands are not only valued as a grazing resource but for their biodiversity values, their rarity and their adaptation to the soil and rainfall conditions of the escarpment. Unsuitable grazing strategies threaten native grasslands.

The greatest threat to native grasslands and pastures is serrated tussock invasion, as has occurred in the nearby Moorabool gorge. Landholders will be forced to spend more time and money in controlling weeds in an area of the farm that returns little income. What is driving landholder decisions on whether or not to graze areas of the escarpment is the fear of further weed invasion. Farmers said, "If I don't graze, blackberries will take over, as the sheep help to control them." Or, "I won't be able to find serrated tussock amongst all the grass." Both are valid concerns influencing the need for strategic grazing and follow up weed control strategies.

EVC Key

20	Heathy Dry Forest
22	Grassy Dry Forest
47	Valley Grassy Forest
56	Floodplain Riparian Woodland
175	Grassy Woodland
851	Stream-bank Shrubland
897	Plains Grassy Woodland

Weed invasion in the escarpment

Blackberries

Blackberries are well entrenched in the escarpment. They are mainly found along the river's edge where the soil fertility and ground moisture is higher, as opposed to the drier slopes where serrated tussock threatens. Blackberries have not invaded along the river where the natural vegetation is healthy and competitive. These tend to be areas which have had little or no grazing.

It is thought that sheep may help reduce the spread of blackberries by nipping off the tips of the runner shoots preventing them from taking root. The runner shoots will try to take root in autumn and it is this process that produces their rapid vegetative expansion.

Blackberry seedlings germinate mainly in spring but are susceptible to shading. Any control program should aim to maintain a high degree of competition for light and nutrient resources when the blackberry is in the seedling stage.

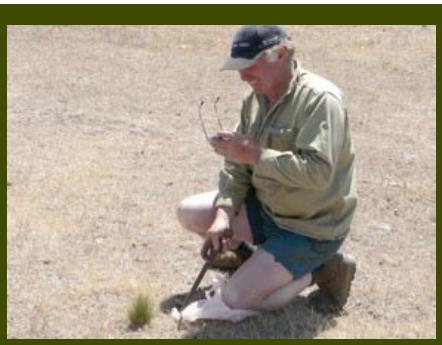
Halting the spread of blackberries cannot be achieved by grazing management alone, but requires an integrated control program that also involves herbicide usage, burning and establishment of competition. Burning can help remove dead canes and stimulate the germination of fast growing colonising plants such as Acacia species, which can be useful in providing a high degree of competition to blackberry. If the seed of desirable competitive native vegetation is not present then it may be introduced. Thickly planted Poa tussock, which is used in gorse control, may help stop establishment of new blackberry seedlings and allow selective herbicide follow up.

Serrated tussock

Currently only isolated plants or patches of serrated tussock plants are found throughout the escarpment. There was much farmer discussion about where the source of serrated tussock seed was coming from. It was thought to be spread by wind along the river corridor, establishing in most cases on the ridge top. Serrated tussock is native to South America and grows best in fertile soils, which could explain why the plants are establishing more readily on the top of the ridge than the less fertile slopes. Once a seed source has established on the ridge, serrated tussock then spreads down the slope. From farmer reports, serrated tussock has been found on just about every property along the escarpment. It was also suggested that farmers on the opposite side of the escarpment can sometimes have a better view of their neighbour's boundaries and could help identify serrated new serrated tussock outbreaks particularly in inaccessible areas.

The practice of grazing heavily so that serrated tussock can be spotted more easily will, unfortunately, also encourage seedling survival. Extensive grazing trials by the NSW Agriculture Department found that serrated tussock seedling recruitment was influenced not by the amount of seed present or numbers of germinating seedlings, but by the amount of pasture mass maintained throughout the year. They found that through rotational grazing they were able to maintain a total pasture mass at greater than 2000 kg DM/ha and 100% ground cover over spring and this prevented any new serrated tussock seedling recruitment. This level of competition kept the seedlings that germinated earlier in

If left uncontrolled, a few scattered serrated tussock plants will become many and will require major resources to eradicate.



Brian Parker removes serrated tussock plants on his annual inspection.

autumn, winter and spring small and weak so that they were unable to survive the dry conditions through the summer. In summer the level of desirable native pasture mass needed to kill serrated tussock seedlings had to be greater than 500 kg DM/ha. In the escarpment 2000 kg DM/ha is equivalent to an average pasture height of approximately 9 cm of moderately grazed green pasture.

Paterson's Curse

Paterson's Curse can completely dominate a paddock resulting in the endless fields of purple often seen in spring each year. It is increasingly being found throughout the escarpment. Already one landholder has had to regularly use a helicopter to spray out large patches.

The seeds are spread by animals and can be carried by water runoff. They attach to wool, fur and clothing and can be viably passed by animals that have been feeding on the weed. But the most common and important means of dispersal is through feeding out contaminated hay and grain. Any preventative management to avoid the spread of the weed is a good investment as it requires fewer resources and minimises the chances that large expenses will later be required for control works.

Paterson's Curse has the potential to become a major weed in the escarpment, but if outbreaks are spotted early, control and eradication can be achieved by using an integrated approach.

The most important aims of a control program are to:

- Target the rosette growth stage (when the plant grows flat to the ground before it starts to produce stems) with a selective broadleaf herbicide so that some pasture competition is maintained.
- Ensure there is competition from other plants that can replace the weed.
- Maintain persistent follow-up which is essential to a long-term management plan.

Eradication will only occur when the supply of soil-stored seed is exhausted. Because small numbers of seeds can remain viable in the soil for a long period (at least 5 years), eradication will require repeated follow up.

Bridal Creeper

Bridal Creeper is a highly invasive environmental weed that was originally an introduced garden plant. But unlike most environmental weeds Bridal Creeper can establish in undisturbed native vegetation. The climbing stems of bridal creeper form a dense canopy, which smothers other vegetation and its masses of underground roots can extend to form a thick, dense mat which destroys understorey plants.

It is found in a number of locations in the escarpment and along roadsides. Effective treatment of bridal creeper with herbicides or manual removal is expensive and labour intensive. These control methods are not feasible in some areas of the escarpment because of the plant size and its inaccessibility. Biological control is viewed as the preferred management option for bridal creeper infestations of this type. The Australian Quarantine and Inspection Service and Environment Australia have approved the

Patersons Curse is becoming an increasing problem in the escarpment

Meredith Primary School students releasing leaf hoppers onto Bridal Creeper.

Students from the Shelford Primary School breeding up leaf hoppers in the classroom.

release of the leafhopper as the first biological control agent for bridal creeper.

Through the Department of Primary Industries (DPI) Weed Warrior Program, school children from Shelford and Meredith Primary schools bred leaf hoppers that feed exclusively on Bridal Creeper. With the help of Leigh Catchment Landcare co-ordinators, Andrea Mason and Jenny Sedgwick the school children released the hoppers at two locations.

To graze or not to graze – some considerations

The landscape of the escarpment varies considerably from gentle rolling areas to steep cliffs. In steeper areas where the decision to graze is not clear, an assessment of the area of grazeable land is needed. It may be that there is only a small percentage of easily accessible pasture.

Another indicator may be if it is too steep for humans to easily walk around then are stock going to fare much better? Resulting stock tracks create bare areas and invite weeds to invade. Can the grazing be controlled and kept uniform? Or is it uneven, with some areas being overgrazed and some areas not grazed at all? The penalty for overgrazing will be weed invasion.

Although sheep can be excluded from the escarpment, there will still be some beneficial grazing from wallabies and kangaroos. Some form of pest plant and animal control will be necessary in any case.

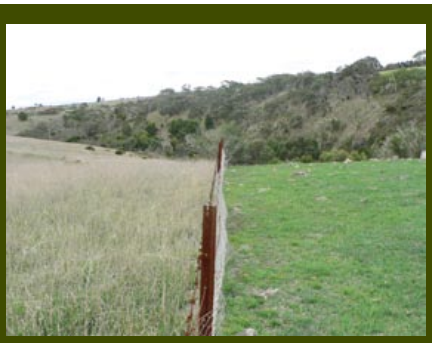
How to best manage Native Grasslands

Like any pasture, native grasslands require some form of management to maintain their quality. They require either occasional opportunistic grazing, or burning every 2 to 3 years to remove the dead material that can block the growth of new shoots. The most opportunistic time of the year for grazing of native grasslands from a farm management perspective is in autumn and winter. This removes some of the grazing pressure on the rest of the farm so that improved pastures have a chance to build up leaf area and in doing so lift winter growth rates. The escarpment also provides a protected and warm area of the farm for off shears sheep.

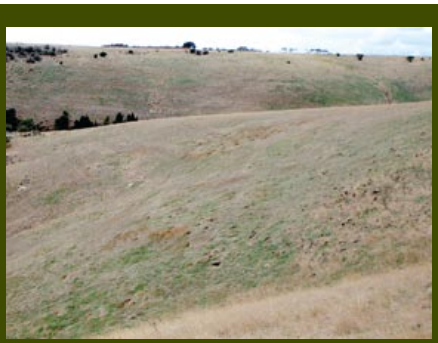
The management strategies will depend on the objectives for use of the escarpment. The farmer's objectives have been quite varied ranging from creating conservation areas to encourage native grasslands and wildflowers, to using burning strategies and heavy grazing for the purpose of managing weeds.

Everyone tends to manage the native grasslands on the escarpment differently. If the native grasslands are in good condition then it may be assumed that the current management must be working and so shouldn't be altered too much. Indicators for making adjustments to the grazing system are:

- if the content of weeds such as annual grasses or serrated tussock is increasing.
- less than 25% of the pasture composition is made up of native grasses and herbs.



Grazing native grasslands in winter prevents the build of dead material, which smothers new shoots and provides a much needed rest for introduced pastures.



Grazing the escarpment over summer and reducing groundcover to less than 90% makes it susceptible to erosion from thunderstorms.

- there is more than 10% bare ground in spring and summer.
- there is greater than 30% dead material in winter.

The best grazing method for native grasslands are low input systems that maintain good groundcover levels. Grazing methods which can maintain optimum groundcover levels are:

- Spring deferred grazing strategies (see Steep Hills Project Results).
- Rotational grazing aimed at maintaining about 1000 kg DM/ha in winter and summer and 2000 kg DM/ha in spring using medium stocking rates (20-30 DSE/ha).
- Low set stocking numbers (1 DSE/ha of grazeable land) with mid spring to summer deferments.
- Crash grazing with high stock numbers (200 DSE/ha) over a short time frame (1 to 3 days) one or two times per year – this strategy would need to be carefully monitored to avoid overgrazing as it can quickly occur.

The benefits of not grazing native grasslands between spring and the autumn break are:

- Increases in the native grass population density.
- Improvements to pasture cover, providing shading and competition to serrated tussock and blackberry seedlings, which germinate in spring.
- Promotion of good cover that will help prevent any soil erosion from summer thunderstorms.
- Encouragement of wild flowers and forbs to flower, set seed and spread.
- Stock are then available for spring pasture control on other improved areas of the farm.

Revegetating difficult areas

The areas of the escarpment best suited to revegetation are those that can achieve multiple outcomes. Sites should not only provide valuable habitat but will help to control weeds, stop weed invasion or stabilise erosion areas. Parts of the escarpment are naturally treeless native grasslands and these should not be removed or planted to trees and shrubs. Often preferred revegetation sites have unhealthy soils which are usually bare, compacted and have very little topsoil making establishment more difficult.

If trees and shrubs are to be planted in these areas then the soil conditions have to be improved to increase the likely chance of success. Some measures include:

- breaking up the compacted soil in the spots to be planted with a crow bar to increase water penetration and aeration.
- planting appropriate native grasses can provide a cover for later tree and shrub plantings.
- mulching with kangaroo grass hay to add organic matter back into the soil, aid water retention, lessen soil exposure and establish Themeda triandra.
- consider planting a short lived pioneer species such as dogwood (Cassinia aculeata) in the mix which can, over time, re-condition the soil and protect other seedlings as they establish. This species can be direct seeded or planted as tubestock.

Deferred grazing in spring/summer lets native grasses seed and builds up plant density.

Spidermites helping to control gorse

Results from the "Steep Hills" Project

The "Steep Hills" project at Ararat looked at developing grazing management strategies for steep hill country from 2002 to 2007. In an environment not unlike that faced by farmers managing the escarpment, researchers trialled different grazing management strategies including:

- Short-term deferred grazing (no grazing from October to January).
- Long-term deferred grazing (October to autumn break).
- Late-start deferred grazing (late October/November to autumn break).
- Set stocking.
- No grazing

The deferred grazing treatments in comparison to set stocking:

- Increased native perennial grass population density by 30%
- Decreased annual grasses by 25%.
- Increased herbage yield by 10-30%.
- Increased groundcover in autumn by 30-50%.

The deferment strategy chosen will depend on the objectives.

The researchers suggest using the Long term deferred grazing strategy if the paddock is degraded and there is a low percentage of the desirable species. Both the Long and Short term deferred grazing strategies aim to build up seed reserves and restore ground cover, but short term deferred grazing could be used at times when there are feed shortages in mid summer. Late start deferred grazing is used to alter pasture composition, where the level of perennials can be increased whilst suppressing the annual grasses. This strategy is best applied to areas that already have a reasonable amount of desirable species (more than 20%). Heavy grazing is critical (October to November) just before the seedheads of most annual grasses emerge so that the growing points can be removed. For this to occur, adequate subdivision and the availability of high stock numbers is required.

Two of the Ararat farms where the trials were held are now applying the trial results over all their hill country. They defer grazing from October to April and rotationally graze over a number of hill paddocks through autumn and winter. Their pastures now consist of a greater proportion of perennial native species (30-40%) and they have been able to lift their stocking rates by 2.5 DSE/ha.

Wallaby grass

Wallaby grass

Spear grass

Spear grass

Tree planting using tube stock will be the preferred method of establishment in light soils. Mulching with clean straw and careful use of water crystals may help with moisture retention. Direct seeding is an option if access and preparation is suitable. Establishment of trees and shrubs may require effort over a few seasons in poorer parts of the escarpment.

Encouraging Regeneration

How much impact is grazing making on the trees and shrubs? If there are no new plants coming through then the health and survival of the tree stand is at risk. Consider regeneration as a relatively easy way to revegetate and make sure the vegetation is there for the next generation.

The areas of the escarpment most likely to naturally regenerate are those closest to the river and where there is a source of seed from existing trees and shrubs, especially downhill and downwind. Generally the time regeneration will occur is in early autumn. Be aware that some trees will have alleopathic effects that stops establishment of other plant species within its leaf drop and so be sure to place any fences or management works outside this area.

Some strategies that are recommended for regeneration include:

1. Fence or exclude stock.

Usually the first step. Patience is required as it can take up to 5 years. Planting tubestock of 'missing' indigenous species eg understorey or ground layer may be undertaken.

2. Fence or exclude stock and scarify compacted soils.

Lightly scarify soils that are compacted but watch out for any weed germination that's caused by soil disturbance and may need further control.

3. Fence or exclude stock, apply weed control and/or fire.

Apply weed control just prior to seed fall in late summer (for most species) and/or burn off any dry fuel in autumn if fire restrictions permit. Fire can promote seed release by woody-fruited species (eg Banksia, Hakea) and seed germination of others (eg Acacia spp). Smoke has also been found to help break seed dormancy and increase germination uniformity of many plant species.

4. Control pests

Small numbers of rabbits and hares can destroy all your seedlings very quickly. Good control is essential.

Watch for red legged earth mites at germination. Some pesticide control may be necessary.

Wallabies can be devastating – see notes on the following page for management ideas.

Kangaroo grass

Kangaroo grass

Direct seeding on Julie and Sandy Cameron's property.

Escarpment management in action

Brian Parker manages 5 km of the Leigh R. escarpment on the west side. In 1995 an area of tunnel erosion collapsed forming a gully on the escarpment. This prompted Brian to remove stock from the paddock in 2001 and try to establish trees and shrubs over the land slip. He had little success due to trampling and browsing by wallabies, but regeneration occurred close to the river. Just by removing stock, an existing group of 20 self seeded Eucalypts started to grow. "These trees were 50 cm struggling specimens and now they have grown up to 4 to 5 metres tall," said Brian. Additionally another area of the river had regenerated with tree and shrub species growing in the adjacent streamside. In this situation removing stock had been the only management practice.

Although the trees were struggling in the erosion gully, the head of the erosion had stabilised. In Brian's case a number of wet years and some rabbit holes started the whole erosion process. Shari Wallis, DPI Soil extension officer said, "With gullies you need to make sure the head of the gully is no longer active. In steep country where you can't batter the gully, fencing it off from stock, controlling rabbits and planting it with trees or grasses to help hold it together are the main management tools."

Having removed stock from the site for 6 years, it was also interesting to see changes in the blackberry population. A thicket of blackberries had previously bordered one side of the escarpment with clumps located along the river. Although it was reasonable to expect that existing plants would have increased in size, the only obvious spread had been about 3 plants that had established within the disturbed soil of the land slip.

Brian also actively controls serrated tussock. "Whenever I visit the escarpment I take a hoe and dig them out. If they are flowering, I put them in a bag for burning later, so that I kill all the seed," said Brian. He also carries out regular patrols in mid spring to previous areas where serrated tussock plants have been found. "The plants are easier to find when they are in flower," said Brian. In the area where stock had been removed Brian has found scattered serrated tussock plants every year for five years.

Bridal creeper is another introduced weed that Brian has discovered growing in an area difficult to access. Brian believes birds and foxes, which feed on its berries, have carried it into the escarpment. Lack of chemical control options, its inaccessible location and its vigour make it virtually impossible to eradicate. It is hoped that the introduction of the leaf hopper will help with control.

Brian's paddocks...

...maintain healthy native grasslands. Paddocks he deems suitable for grazing are stocked with sheep in accordance to the Victorian Volcanic Plains tender. His paddocks are deferred from grazing from August until February. This allows reseeding of the native grasses and for the wildflowers to reproduce. At other times, Brian grazes the native pastures with stocking rates of 10 wethers/ hectare for up to 2 weeks at a time before resting the paddock. Brian does not graze all his escarpment country. "If there is only a small amount of arable land in the paddock then I don't bother," said Brian.

Brian Parker surveys the spread of blackberries in Rabbiter's Hut paddock since grazing was ceased.

Ideas for establishing trees with hungry wallabies

Wallabies have caused havoc on some new plantations. Strategies to help reduce their impacts include:

Use heavy 12 inch mesh guards that can be reused.

Use vine tubes - narrow 1.5 m high plastic guards (for further information visit www.mtg.unimelb.edu.au then select AgroNews and Agroforestry News Issue 52).

Use a gritty and sticky repellent applied to tree seedlings called "Sen-tree" developed by the Victorian DPI to reduce browsing by wallabies.

Apply blood and bone around the seedling (effectiveness can be hit and miss).

Plant indigenous tree species that wallabies seem to avoid browsing: *Acacia verticillata* (Prickly moses), *Solanum lacianatum* (Kangaroo apple), *Bursaria spinosa* (Sweet Bursaria).

Useful farm management web sites

Victorian Landcare Gateway: A Gateway to finding news and events on the Leigh Catchment Group. **Website:** http://landcarevic.net.au/

Department of Primary Industries Information Notes: Find easy to read Information Notes on a range of topics relating to Agriculture, Flora and Fauna, Forests, Landcare and Land for Wildlife. **Website:** http://www.dpi.vic.gov.au

Corangamite Catchment Management Authority - Victorian Volcanic Plains project. **Website:** http://www.ccma.vic.gov.au/home/vicvolcanicplains.htm

Victorian Resources Online (VRO): A gateway to a wide range of natural resources information and associated maps. You can access this information at both Statewide and Regional levels across Victoria. **Website:** http://www.dpi.vic.gov.au/dpi/vro/vrosite.nsf/pages/vrohome

EverGraze: An AWI, MLA and Future Farm Industries CRC research website that reports on the latest results of trials in Southern Australia that aim to increase profits of sheep and cattle enterprises by up to 50%. **Website:** http://www.evergraze.com.au

Meat and Livestock Australia (MLA): Contains an information centre which provides practical tools and targeted information for building and sustaining successful on-farm and off-farm businesses. **Website:** http://www.mla.com.au

Pest Genie: A database specializing in information about plant protection and animal health products. **Website:** http://www.pestgenie.com.au/

Western District Rainfall Forecast: Contains a useful 28 day forecast on the probability of rainfall occurring on each day. Follow links from the Home page selecting Forecasts > Victoria>Vic districts>Western>Western 28 day rainfall forecast. **Website:** http://www.eldersweather.com.au

Resting the paddock from grazing allowed Eucalypt regeneration and native grasses to set seed and increase in density on Brian Parker's property.

Where to go for more information

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