



Can't see the forest for the trees? Improving tree density for habitat

Ecological impact of high tree density

Across Victoria, many naturally treed areas contain dense eucalypt regrowth thickets. These thickets can establish when there is enough seed, water and light, and there is a trigger event, such as the end of a drought, cessation of grazing, flood, or fire. Land clearing, particularly the removal of large old trees, creates conditions for thickets to establish—a natural response to an unnatural event.

Where eucalypt thickets dominate it can threaten woodland ecosystems. Trees are thin and even aged, limited understorey regeneration occurs, there is poor structural diversity and logs are rare.

Having a large number of trees competing for limited resources (moisture, sunlight and nutrients) results in smaller trees with poor growth rates. These dense, even aged stands reduce the cover of understorey species, alter resource availability and cause declines in the species richness of faunal communities.

Eucalypt thickets reduce the development of large old hollow-bearing trees through competition for resources, which has implications for hollow-dependent fauna. In Victoria, 16 mammal species and 44 bird species depend on hollows, including 14 threatened species. A healthy ecosystem needs 3-10 hollow-bearing trees per hectare with up to 30 hollows per tree.



An example of a Grey Box thicket in Box-Ironbark Forest near Chiltern. There are many small trees, no large trees, no shrubs and no ground layer vegetation.

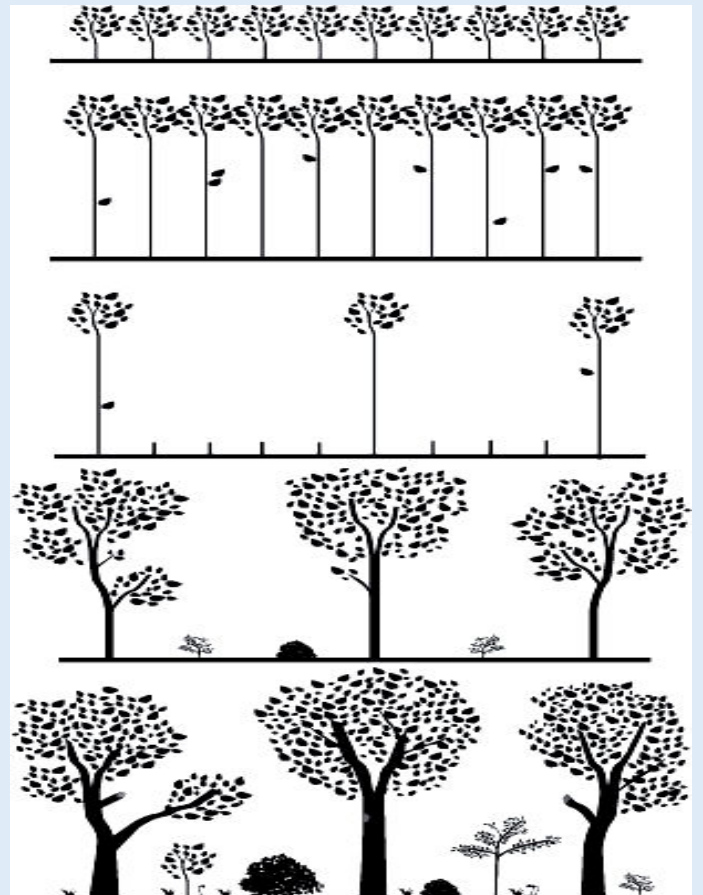
Ecological thinning for habitat

Ecological thinning is the removal of a proportion of trees within a thicket to increase resource availability and achieve conservation goals.

Thinning increases the resources available to remaining trees, which allows them to develop into ecologically important large trees. It can also stimulate growth and germination of understorey and ground cover vegetation.

Thinning has been shown to improve habitat value by producing 20 hollow-bearing trees per hectare after 42 years compared with un-thinned sites which produced none.

Research has also found an increase in the biomass of both ground cover vegetation and remaining stems in areas subject to thinning treatment. Increased levels of ground cover has proven benefits for soil conservation and water retention.



A simple depiction of how thinning may be used to improve plant density, supporting the development of large old trees, understorey and ground cover vegetation.

To thin or not to thin?

Tree density and its effects are the indicators used to determine when ecological thinning is an appropriate management action.

Tree density can be estimated by undertaking stem counts using the method described opposite. Estimates are then compared with the benchmark tree density for the vegetation type on the site. Benchmark or ideal density varies based on vegetation type, but is generally 200–400 stems/ha. For example a Grey Box woodland has a lower tree density than a River Red Gum forest.

Thickets with poor understorey and densities of more than 1,000 stems/ha are considered a high priority for ecological thinning. They are often associated with a lack of large old trees, lack of shrubs, lack of grass cover and poor soil health.



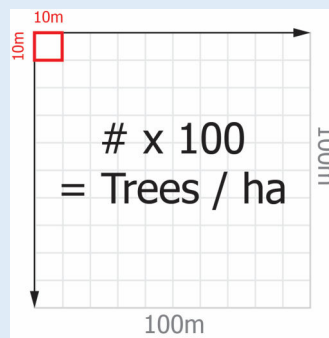
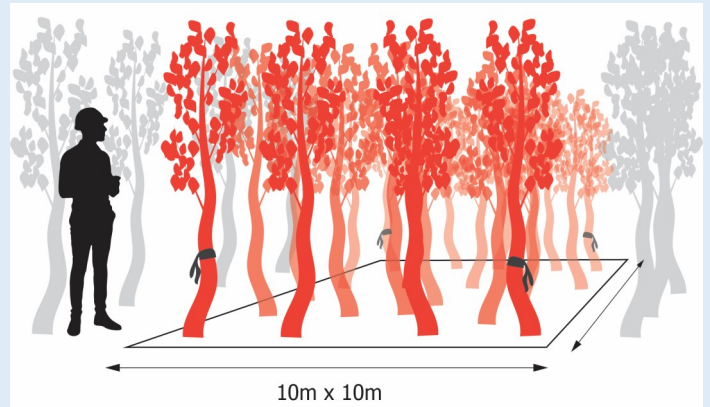
An example of a Blakely's Red Gum thicket near Eldorado which contains more than 4,000 stems/ha - a good candidate for thinning.

Other considerations

Landholders need to carefully consider other implications of ecological thinning before deciding to proceed with this activity, including:

- Ecological thinning generally involves the removal of more than 90% of trees within a thicket. The change is dramatic and can be confronting.
- In terms of fire management, manual thinning alters the fuel arrangement by reducing canopy and increasing surface fuel. This can be a cause for concern and fuel reduction works such as mulching can be labour intensive.
- Thickets can provide amenity value as a visual screen or may reduce noise from a nearby road. This could be compromised by reducing tree density.
- Ecological thinning requires the use of Glyphosate herbicide to ensure trees do not resprout. This can conflict with some activities such as organic farming.
- Thinning is labour intensive and can be costly if contractors are engaged to undertake the work.

Stem count



1. Measure out a 10 x 10 metre area and mark/ note the corners.
2. Count the number of trees within this area.
3. Multiply this number by 100. The result is a density estimate for the site.

This simple method can be replicated across multiple sites and the results averaged to improve the accuracy of the density estimate.



An example of a thinned forest at Gooramadda that had a tree density of approximately 1,000 stems/ha.

Navigating regulations

Under Victoria's native vegetation removal regulations, a planning permit is usually required to remove, destroy or lop native vegetation. A permit may not be required when an exemption exists under Clause 52.17 of the Victorian planning scheme.

Conservation work exemption

The conservation work exemption allows for the removal of native vegetation for the purpose of achieving conservation outcomes without the requirement to obtain a permit. Works relying on the conservation work exemption must demonstrate that losses to biodiversity from the removal of native vegetation are outweighed by the expected gains or improvements to biodiversity, and require a written agreement from the Secretary before commencement.

For more information on the conservation work exemption, including application guidance and an application template, visit https://www.environment.vic.gov.au/_data/assets/pdf_file/0026/525581/ConservationApplicationGuidance_June21.pdf

Planted vegetation exemption

The planted vegetation exemption allows for the removal of native vegetation that was either planted or grown as a result of direct seeding. It does not apply to native vegetation planted with public funding, unless written permission is provided by the funding body. This exemption may be used to thin a revegetation area or a woodlot with a high density of Eucalypts.



An example of planted vegetation that would benefit from thinning, with current tree density limiting growth rates and ground cover.

Planning overlays

Planning overlays can place additional restrictions on native vegetation removal and may require a permit from local council to undertake ecological thinning.

Mapshare is an online mapping tool that allows you to produce a property report and identify planning overlays that may affect your property - <https://mapshare.vic.gov.au>

Site assessment & planning

Before works commence it is important to undertake a site assessment to identify ecological and cultural assets for management. This involves noting trees for retention including culturally significant trees, large dead trees, all trees over 30 cm DBH (diameter at breast height), all hollow-bearing trees and any trees containing active nests.

Determine the target tree density based on the vegetation type and local knowledge. 400 stems per hectare (5 m spacing) can be used as a conservative proxy if a target density cannot be determined. This figure can be reviewed and revised down based on observation of the outcomes of thinning over time.

Identify the different tree species on the site and determine the proportion of each species to retain. As a general rule aim to thin for diversity by removing a higher proportion of the more dominant species.

Experienced operators will thin by eye based on specifications provided; trees will not be marked or flagged for retention. Tree marking is a time-consuming process in itself and spacing can be difficult to judge in dense thickets. However it can be helpful to achieve the desired outcomes, especially if less experienced operators are undertaking the work.

Multiple coppice stems, small or stunted stems are to be prioritised for removal. Robust, healthy trees are to be prioritised for retention. Aim to achieve a patchy tree distribution with variability in density across the site to support faunal diversity.

Photo points can also be established during the site assessment and are a useful method for monitoring change over time.

Ecological thinning methods

Manual thinning

Trees are felled using a chainsaw and herbicide is applied to the cut stump immediately to prevent regrowth. Herbicide must be applied within 20 seconds of cutting the stump to ensure proper absorption.

Mechanical thinning

A rubber tracked posi-track loader with a mulching head may be used in sites where high stem density and narrow stem diameter (<10 cm DBH) make chainsaw use hazardous or inefficient.

The mulch remains in situ which can minimise soil erosion and reduce the germination of annual weeds. This machine is less suitable on very rocky or steep country.

After mulching, follow up spot spraying with an appropriate selective herbicide is required when stem regrowth reaches a height of approximately 30 cm.

Tree spacing

When it comes to selecting trees for removal, working out tree spacing based on the desired density can be helpful. Here are some estimates:

400 trees/ha = 5 m spacing

300 trees/ha = 6 m spacing

200 trees/ha = 7 m spacing

150 trees/ha = 8 m spacing

100 trees/ha = 10 m spacing

Looking after yourself and the environment

There are risks associated with ecological thinning and it is important these are assessed before works commence.

Anyone undertaking manual thinning requires accredited training and relevant experience in chainsaw operations and tree felling.

Suitable personal protective equipment must be worn by chainsaw operators. Chainsaws must be fit for purpose - battery and homeowner chainsaws are not suitable for most thinning projects.

Where contractors are engaged to undertake thinning, landholders must respect work areas and exclusion zones for their own safety.

Care must be taken to minimise the impact on native vegetation that is not subject to ecological thinning. Works are generally undertaken in autumn when the ground is firm to reduce soil disturbance. This also minimises the impact on native herbs which mostly flower in spring.

Always ensure herbicide application is undertaken in accordance with the manufacturer's directions and be mindful of potential off-target impacts on native species.

Avoid undertaking works in high fire danger periods due to the risk of sparks from machinery igniting a fire. Chainsaw operators are also at increased risk of heat-related illness when working in hot conditions.

More information

For more information please contact Trust for Nature trustfornature@tfn.org.au or NECMA necma@necma.vic.gov.au

Post thinning

Following manual thinning, retain logs and cut stems (>10 cm diameter) in situ to a benchmark level of at least 200 lineal metres per hectare (20 lineal metres per 10 x 10 metre block). These provide important habitat for reptiles and invertebrates.

Where benchmark levels are exceeded, excess may be removed for personal use e.g. firewood.

In areas with soil erosion cut stems can be placed across the slope to act as a sediment barrier, retain debris and increase organic litter.

Follow up

Following thinning works, the release of competitive space makes light, moisture and nutrients more available.

This can trigger many tree species to either coppice or regenerate as seedlings from the surrounding soil-stored seedbank.

The rate of regrowth can vary depending on the light, moisture and soil conditions available at the site, but be aware that regrowth can happen quickly.

Monitor the site closely for at least two seasons. Regrowth from coppicing should be managed through application of a suitable herbicide or seedlings can be physically removed.



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