

Forest Regeneration in Farm Forestry

This factsheet provides guidance for landholders and forest managers on encouraging forest regeneration under the Private Native Forestry (PNF) Codes of Practice.



What is Forest Regeneration?

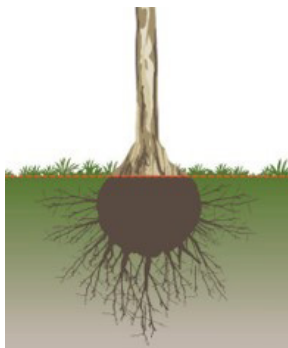
Forest regeneration occurs when a forest grows back following disturbance. This can include natural disturbances (such as bushfires and floods) and artificial disturbances including harvest operations.

There are three main ways that forest regeneration occurs. These include:

Seed production and seedling establishment



Resprouting from underground structures, such as lignotubers



Resprouting from epicormic buds, such as coppicing



Figures 1-3: Types of regeneration



The regeneration of forests following harvest events is important to ensure the sustainability of farm forestry and maintaining the ecological services that forests provide to landholders and the community in the long term. Regeneration is a process that often occurs naturally, however depending on the species, site conditions and type of harvesting (silvicultural system) undertaken, regeneration may need to be assisted through forest management actions.

What are forest regeneration management actions?

Regeneration management actions are techniques that promote forest regeneration after forestry operations and can include applying seed, replanting with tube-stock, minimising or removing grazing pressure, weed management, fire management and mechanical soil disturbance. These management actions promote regeneration by:

- directly introducing seed or plants back onto the site
- removing competition, and
- producing conditions that are favourable for regeneration of desired species.

Regeneration management actions will likely be required where there is a risk of regeneration failure, for example resulting from insufficient natural seed on site (in the case of species that rely on seed for regeneration), the presence of weeds that may outcompete regenerating tree species, or high grazing pressure that suppress regeneration. As such, it is important to understand the characteristics of your site and the species present when deciding whether regeneration management actions may be needed

What are the regeneration requirements under the PNF Codes of Practice?

Farm Forestry supports the maintenance of forest health and regeneration at site and bioregional scales. The Private Native Forestry Codes of Practice (PNF Codes) outline the requirements for forest regeneration (Section 5.4, or for the Cypress and Western Hardwood Forests PNF Code, Section 5.3) and provide guidance for measuring forest regeneration (Appendix C).

Under the PNF Codes, a variety of techniques can be used to promote forest regeneration. These include a range of silvicultural approaches that can encourage optimal regeneration outcomes for the forest type and forest condition.

The PNF Codes outline minimum stocking standards following a regeneration (harvesting) event. Landholders must monitor forest regeneration, composition, and condition at 2, 6 and 10 years after harvesting has occurred. Landholders may also monitor forest regeneration following a natural disturbance. Where an area is not regenerating along a trajectory that maintains (or improves on) preharvest forest conditions, landholders must implement regeneration management actions.

How can I improve forest regeneration?

Each forest will benefit from different approaches to regeneration management, and the best outcomes may even be achieved by a combination of approaches. The silvicultural system used, and subsequent regeneration management should be tailored to your forest type and composition, the disturbance history of the forest, ecological characteristics, and the desired forest management outcomes.

Species evolve and adapt to local environmental conditions (including rainfall, temperature, and fire regime). Some species are further specialised to local conditions including topography, slope, and shade tolerance. Trees compete for resources including light, nutrients, and water. Tolerance to competition for resources varies between tree species.

Shade tolerance refers to the ability of a species to continue growing, albeit slowly when exposed to limited sunlight and in presence of competition with surrounding canopy trees. Therefore, it is important to understand the environmental requirements for the species in your forest.

In some cases, the landholder's regeneration objectives may be to maintain the current structure and species composition within a forest. In other cases, such as where a forest has been subject to inappropriate management regimes or significant disturbance in the past, objectives may focus on improving the structure, health, and composition of the forest's future-state to improve productive and environmental values.

Thinking about forest regeneration objectives and requirements starts with selecting which silviculture method/s will be used within your forest.

One, or a combination of silvicultural systems, may be used depending on your forest management objectives and regeneration requirements. For further information about silviculture systems please refer to the [Forest Management Guidelines](#).

Forest regeneration management actions

Additional management actions may be used to help drive regeneration and sustainable forest outcomes. Some techniques to manage and improve forest regeneration are outlined below.

Reducing grazing and browsing pressures

Grazing by stock, kangaroos/wallabies or pest species can kill or impact the growth of new seedlings, resprouts and or young trees. Grazing exclusion by fencing, using tree guards and rotational or tactical stock grazing (to exclude stock during early stages of regeneration) can assist the forest to regenerate by removing additional pressure for early-stage regenerating forests. Effective management of pest species such as deer, rabbits and goats may also help reduce browsing pressures.

Weed management

Forests can be particularly prone to weed invasion following disturbances including harvest operations, mechanical disturbance, fire, and floods. Weeds compete for resources with native species and can hinder regeneration and so it is important to be aware of common weeds in your forest or adjacent land and how to treat them effectively. Proactively planning weed control and ensuring appropriate biosecurity measures are undertaken during machinery operations is important to reduce the negative impacts of weeds.

Fire management

Fire is a natural part of forest ecology in Australia, and many native forest species have adapted to be fire dependent - meaning they rely on fire to initiate regeneration. Plants that regenerate after fire can be broken into three main categories based on the mechanisms used to regenerate, these include:

- Obligate resprouters: plants that grow new shoots from dormant buds after fire, these buds may be located above or below ground.
- Obligate seeders: plants that have fire resistant seed banks which germinate after fire, these seeds may be stored in the trees canopy or in the soil.
- Facultative seeders: plants that exhibit both postfire resprouting and postfire seeding.

For forest that includes species that rely on disturbance such as fire to regenerate, fire management through controlled regeneration burning may be used as a regeneration tool in line with the fire regime suited to the species in your forest. Prescribed fire may be considered following a harvest event to prepare the seed bed and promote seed fall. Fire may also be a suitable tool to manage weeds, which can also help regeneration.

When planning a prescribed fire, you should also consider how impacts to retained trees and habitat features can be managed. This can include removing harvest residues and slash from around the base of retained trees and wetting potentially vulnerable areas to reduce burn intensity before commencing fire management.

Mechanical disturbance

Mechanical disturbance is used to disturb the soil and reduce understory competition which creates a favorable seedbed for regeneration. Mechanical disturbance may be used in place of fire to stimulate seedling regeneration of obligate seeder species, where burning is not desirable or is likely to pose management issues. If undertaking mechanical disturbance, ensure the topsoil is disturbed but not removed.

Reseeding and replanting

If canopy openings are unlikely to be successfully regenerated by natural means (due to invasion by weeds or a poor natural seed crop) or monitoring over time reveals that regeneration has been unsuccessful, regeneration can be enhanced by direct seeding or planting. If you plan to undertake reseeded or replanting talk to your local commercial nursery and consider the use of local provenance stock (stock that is genetically adapted to your local area). Reseeding and replanting will depend on understanding the reasons for regeneration failure and may require reducing grazing and browsing pressures and weed management.



What to consider when planning your forest regeneration activities

Whilst regeneration may naturally occur following a harvest operation, you must also monitor regeneration and consider whether additional forest regeneration management actions are required.

Forest regeneration objectives should be one of the first things you think about when developing your Forest Management Plan. When planning and undertaking forest regeneration activities:

- Understand the regeneration requirements of the species in your forest in terms of for example, climate, fire and shade tolerance;
- Identify the site conditions, opportunities and challenges that may influence regeneration, including topography and slope, weeds and grazing pressures;
- Outline details of the activities planned to promote regeneration in the written component of your Forest Management Plan;
- Plan out your monitoring to keep track of whether or not further management techniques are required. Regeneration must be monitored to track composition and condition at 2, 6 and 10 years following harvesting operations.
- In the event that natural or assisted regeneration has failed, further regeneration management actions must be implemented. If you are unsure which regeneration management actions are suitable for your forest, contact LLS or engage a professional forester.

Further resources

www.lls.nsw.gov.au/farm-forestry-resources

We're here to help

Find us online: www.lls.nsw.gov.au

Call us: 1300 795 299 and ask for an officer to advise you on Private Native Forestry

Email us: pnf.info@nsw.gov.au

See us: drop into your nearest Local Land Services office

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