



# Wildlife Notes



DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT

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Information Notes for the *Land for Wildlife* Scheme in Western Australia

## Biodiversity and Farm Forestry

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### INTRODUCTION

Farm forestry as an option to diversify farm income has been developing steadily in the south-west of Western Australia (WA) over the last fifteen years. The total rate of tree crop planting in WA is now the fastest in Australia and it is estimated that by 2020, some 800,000 ha of tree crops will be established on locally-owned farms. Plantations of all shapes, sizes and compositions are springing up across the rural landscape. Species include eucalypts for pulp and/or sawlogs, oil mallees, WA sandalwood, maritime pine, and radiata pine. Big hopes are pinned on the ability of farm forestry to provide both economic benefits to landholders as well as ameliorating some of the broad-scale environmental problems of rising salinity and soil erosion. Can farm forestry also have the added benefit of providing additional habitat for native animals and plants?



Bluegum plantation and remnant vegetation in an agricultural landscape. Photo: T. Mitchell, FPC.

### WHAT DO WE KNOW?

Many land owners notice that after changing open pasture to a closed canopy farm forestry site, there is an increase in large native mammals (kangaroos) and larger birds such as currawongs and magpies. Smaller birds like golden whistlers, thornbills, fly catchers and the ground-foraging bronzewing pigeons have been observed on the edges of the farm forestry plots. In addition, a large variety of mosses and fungi grow on the plantation floor that may attract other animal species. However, the central area of large plantations appears to be seldom used by native fauna.

Researchers have concluded that plantation style farm forestry as it is currently managed delivers a biodiversity

benefit that represents a 15 - 25% improvement over open pasture. Some groups of animals are largely missing from farm forestry areas, for example hollow-using marsupials. This is not surprising given that hollows in eucalypts that are suitable for use by arboreal marsupials can take several hundred years to develop – far longer than the rotation times of plantations. Birds that use tree hollows are sometimes found in plantations, but they are not usually nesting there. It is notable that when artificial hollows have been added to plantations, some cavity-dependent fauna including arboreal marsupials and bats will use them.

Comparison of the physical and chemical structure of leaf litter produced under eucalyptus plantations and under native bushland found that they are quite different, posing a range of problems for the native decomposer fauna – mostly microarthropods. If their diversity is reduced, the nutrient cycling that is so important for soil fertility could be less efficient under eucalypt plantations.

In Birds Australia's 'Birds on Farms' survey it was found that where understorey shrubs were present in vegetation there was a 31% increase in diversity of woodland-dependent birds. Small woodland-dependent foliage-gleaners (birds that forage for insects) increased by 24%. Problem birds such as the Noisy Miners (data from the eastern states of Australia) were 78% less likely to occur in sites where understorey shrubs were present. Ground-nesting birds were almost three times as diverse where understorey was present. Similarly just adding three habitat features to the farm dam that might be situated in or near the tree plantation, resulted in a 42% increase in waterbird diversity. These features include dense shrubby vegetation around the dam margins, shallow areas for birds to feed, islands or dead trees for birds to roost, or fencing to exclude livestock.

A comparison of the biodiversity values of farm forestry and quality bushland

Farm Forestry	Quality Bushland
• exotic species or non-local species	• local native species
• usually composed of one or a few species	• many species
• few vegetation layers	• layers of vegetation - trees, shrubs and ground covers
• even spacing - not patchy	• patchiness
• even aged trees	• vegetation of different ages
• no hollows	• dead trees with hollows, logs on the ground
<b>Low biodiversity value</b>	<b>High biodiversity value</b>

Some questions for landholders concerning farm forestry and biodiversity

- What is the most important biodiversity step prior to establishing some farm forestry on my property?
- Where should I site my farm forestry plots, keeping biodiversity in mind?
- What is the best shape for a farm forestry plot to enhance my existing biodiversity?
- What are the best species to plant for biodiversity?
- Is it better to have a simple, even-aged stand, or a complex one?
- What structures could I add to my farm forestry to improve its biodiversity value?
- What should I do if I have already an established woodlot of native trees and I would like to do something to improve its biodiversity value?
- How should I manage and harvest my farm forestry trees so as to cause the least disturbance to my biodiversity?

**WHAT IS THE MOST IMPORTANT BIODIVERSITY STEP PRIOR TO ESTABLISHING SOME FARM FORESTRY ON MY PROPERTY?**

Consider the needs of native flora and fauna at the planning stage.

The factors that need to be considered when designing and managing a farm forest in order to maximise its biodiversity value will vary according to the aim and context of the planting. There is no single answer or approach. However, a set of principles can assist a land owner or farm forester to understand some of the elements that might be considered if they hope to enhance biodiversity within the planting, unique to their particular situation. These principles can be grouped into five themes:

- location,
- configuration,
- composition,
- complexity and management.

Landholders should keep in mind that their property is part of a whole catchment and landscape that extends beyond the property boundaries, and planning decisions should be complementary with natural resource management projects in the catchment.



A landscape where farm forestry has been integrated with remnant vegetation and pasture/cropping activities. Photo: T. Mitchell, FPC.

You might consider, in addition to the forestry species, establishing patches and/or strips of vegetation specifically to enhance wildlife habitat.

**WHERE SHOULD I SITE MY FARM FORESTRY PLOT, KEEPING BIODIVERSITY IN MIND?**

The **location** of a forestry plot can make a great difference to its wildlife value. Using your catchment map and property plan, decide where are the areas of high biodiversity value (patches of remnant native vegetation, rocky outcrops, wetlands and watercourses, etc.). These areas are unlikely to be suitable for most tree crops, which means there are opportunities for the plantation to fit around them.

**WHERE COULD YOU LOCATE A FORESTRY PLOT THAT BEST COMPLEMENTS THESE AREAS?**

- Site the plantation to complement the existing vegetation, eg protect or connect patches of native vegetation, or simply use the plantation to extend them.
- Incorporate patches of native vegetation within your plantation.
- Give priority to new habitat patches that will link the largest existing ones. In this way the smallest investment will give the highest conservation outcome.

- Establish the plantation around a riparian zone so as to protect this area.
- Be aware of the shading effect that tall farm forestry species has on indigenous vegetation, so plant the forestry plot on the south side of the native habitat patches.

## WHAT IS THE BEST SHAPE FOR A FARM FORESTRY PLOT TO ENHANCE MY EXISTING BIODIVERSITY?

**Configuration** is the term for the size and shape of a forestry plot. Larger plantings may provide more resources for wildlife. Feral predators such as foxes often hunt along edges, so consolidated shapes (squares or circles) that have less edge to area may provide better habitat than long narrow rectangles. On broad acre agricultural properties the design for the tree crop must also be compatible with other commercial production needs; tree belts may be more suitable.

## WHAT ARE THE BEST SPECIES TO PLANT FOR BIODIVERSITY?

**Composition** relates to the species being planted. What species do you intend to grow? A mixture of natives is more likely to fulfil the habitat needs of more animal species. Where possible:

- select native species rather than exotic ones;
- select species native to the local area, rather than ones from other Australian regions;
- use more than one tree crop species; and
- establish areas of understorey using local native shrubs.

## IS IT BETTER TO HAVE A SIMPLE, EVEN-AGED STAND, OR A COMPLEX ONE?

## WHAT STRUCTURES COULD I ADD TO MY FARM FORESTRY TO IMPROVE ITS BIODIVERSITY VALUE?

## WHAT SHOULD I DO IF I HAVE ALREADY AN ESTABLISHED WOODLOT OF NATIVE TREES AND I WOULD LIKE TO DO SOMETHING TO IMPROVE ITS BIODIVERSITY VALUE?

**Complexity** refers to a range of factors that introduce variety into a planting. It relates to layers of vegetation (groundcover, shrub layer, middle and upper canopies), structures such as rocks and logs, the presence of older trees (especially those with hollows) and patchiness to provide variation within the area.

- Establish understorey with local native shrubs.
- Retain existing physical structures (logs, stumps, boulders, windrows etc).
- Include patches of remnant vegetation within the

plantation.

- Retain mature trees in or near the area being planted.
- Plant trees with variable spacings and leave gaps.
- Leave prunings on the ground.
- Add complexity to the stand by opening up irregular spaces when thinning.
- Add nest boxes and artificial features such as wood or rock piles.

**Management** for biodiversity involves recording the changes in flora and fauna over time, reviewing what works and what doesn't, and changing practice accordingly.

- Establish a routine that allows you to periodically assess biodiversity on and around your plantations. It is important to be realistic about what you can achieve and still be consistent over time. For example, record birds along a set walk four times a year.
- Establish photo-points to monitor a range of factors.
- Include in your management plan a review process to assess how effective one management approach is over another.



A three-year-old bluegum plantation with very little leaf litter or other habitat structures on the ground. Photo: S. Leighton.

## HOW SHOULD I MANAGE AND HARVEST MY FARM FORESTRY TREES SO AS TO CAUSE THE LEAST DISTURBANCE TO MY BIODIVERSITY?

### Managing the woodlot or plantation

- Leave prunings and thinnings on the ground.
- Add complexity to the stand by randomly culling trees.
- Add complexity by opening up irregular spaces when thinning.
- Add nest boxes and wood or rock piles.
- Establish an understorey of local native plants (indigenous species installed under a closed canopy forestry plot need to be shade tolerant).
- Establish one or more habitat plantings of mixed local native species, if possible so that it helps connect the plantation with nearby patches of remnant vegetation.

- Keep stock out of these biodiversity areas.
- If pesticide spraying needs to be undertaken, ensure that the pesticide spray does not drift into biodiversity areas, both on your property and adjacent to it (eg road reserves).

### Harvesting

- Leave some trees standing to allow for the presence of older and larger trees through successive rotations, that will form roosts, nest sites, hollows and other structures that serve as habitat. Alternatively you can plant some native species such as wandoo or salmon gum that are designated as habitat trees and will not be disturbed during the harvesting process.
- Leave debris, branches and some trunks to add structural complexity in successive rotations.
- Plan your harvesting to create a forest mosaic of patches of varying ages by harvesting trees at staggered intervals.
- Do not clearfell or harvest a plantation around a patch of remnant vegetation in one operation. Stagger the harvesting over several years. Besides retaining forest around some of the remnant, this also serves to create a mix of uneven-aged trees.
- Take care not to damage habitat patches when using heavy machinery.

Most large-scale plantations are established with commercial outcomes in mind, and this limits options in respect of biodiversity. While it is better from a biodiversity standpoint to go for a mix of local native species planted with irregular spacings and long rotations, this is rarely compatible with a commercial outcome. Therefore, an alternative approach might be to set aside an area of the plantation and use it for a biodiversity planting while leaving the remainder of the plantation for the commercial crop.

These biodiversity plantings would normally be designed to complement the remnant vegetation already existing within or adjacent to the plantation area. They might be in the form of a wetland or stream buffer, a central block, corner plantings or perimeter rows. These plantings would be left intact when the plantation was harvested. Another option is to plant belts of local native species throughout the plantation, for example three rows in every 40. Once again, these areas would be left intact during and after harvesting.

An important take-away message is that the degree to which farm forestry provides biodiversity values depends on how it is done and 'doing it well' is a difficult process to precisely define. Each farm situation is unique; each action inevitably produces different results. However, knowing some of the basic principles and being able to identify the important needs of wildlife enables the farm forester to more effectively consider his or her options.



A wildlife corridor planted on the northern side of a bluegum plantation (plants get more sunlight). Photo: S. Leighton

### Helpful hints

Try to leave some wattles (small species, less than 2 metres tall) and indigenous pea plants in areas of planted trees; they fix nitrogen and can contribute to stand growth and productivity. They also add complexity to the plantation.

Plant nectar-producing shrubs as understorey or within the habitat patch. Make sure that you plant a range of local native plant species that flower at different times of the year so that there is a supply of nectar for the native fauna for the twelve months of the year.

Find out the nesting period of the birds in your area (consult local ornithologists if you're uncertain), and where possible avoid carrying out pruning during these times of the year

When you prune or thin planted trees, leave the cut material to rot on the ground. Rotting trees and branches can provide habitat for invertebrates (including some endangered ones) as well as good places for birds to forage.

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## REFERENCE

For detailed references and further discussion of these points, read: *Trees And Biodiversity: A Guide For Australian Farm Forestry* Agroforestry Design Guideline Series No. 3, 2004. To order the book contact: Rural Industries Research and Development Corp.; PO Box 4776, Kingston ACT 2604, tel. (02) 62724819

## ABOUT THE AUTHOR

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