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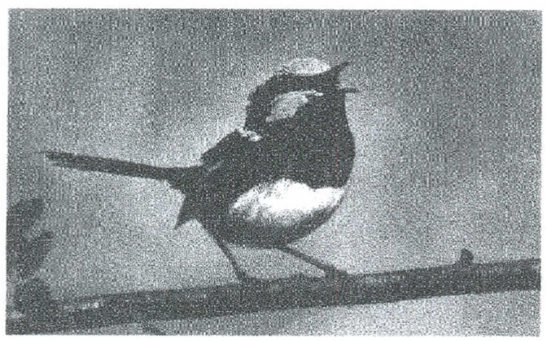
Planting *for* Wildlife

A Practical Guide to Restoring Native Woodlands



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6

How a planting changes over time

Summary box

- The structural complexity of vegetation increases rapidly for the first 20 to 30 years after establishment.
- Slow but important changes in a planting include the development of a leaf litter layer, the accumulation of large logs on the ground and the development of tree hollows.
- The diversity of plants in a planting is unlikely to increase of its own accord – enhancement plantings may be required to increase the habitat value for biodiversity.
- Many different animals can colonise a planting over time. The species richness and composition of animals in a planting will depend on its size and shape, total area, surrounding native vegetation, distance from other vegetation, structural complexity and floristic diversity, and the presence of features such as tree hollows and logs.

In this chapter we explore the changes that can be expected in a planting over time, such as the development of structural complexity in the vegetation, the development of a leaf litter layer, and colonisation by animals, such as native birds.

Development of structural complexity

The structural complexity of plantings increases rapidly for the first 20–30 years after establishment, after which it develops more slowly. Plant species grow at

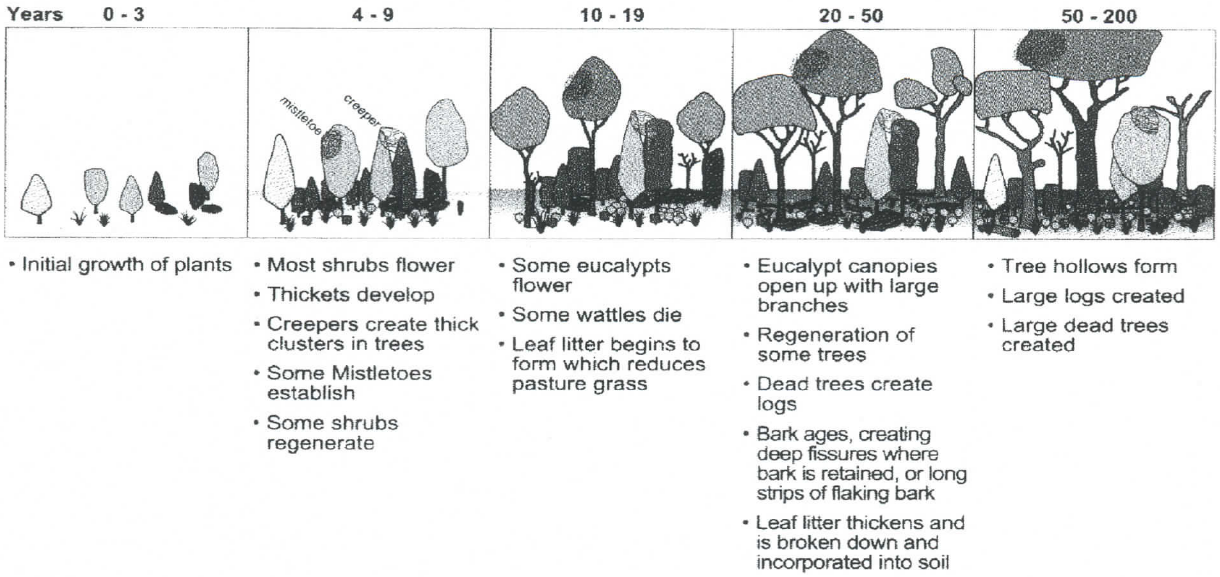

Figure 6.1. Changes in the structural complexity of planted vegetation over time. (Figure by Clive Hilliker)

different rates, which continuously alters the vegetation structure until all plants are mature. The plants may produce successful germinants, creating different age classes. As plants drop leaves and twigs, a leaf litter layer is formed. Some plants self-prune by dropping branches and others die and collapse creating logs and gaps in the canopy. These processes of development, self-thinning, mortality and reproduction lead to structurally complex vegetation comprising ground cover, understorey, shrub and tree layer plants of different condition, size and age (Fig. 6.1). A structurally complex planting usually attracts and supports more species of animals than a structurally simple planting (Fig. 6.2).

Colonisation of plantings by plants

Restoration practitioners may expect that when overstorey plants are established in a planting, the understorey will naturally be formed with no further management intervention, perhaps by wind or animal dispersed seed. However, research has shown that even after many years, there is almost no recruitment of non-planted native plants into revegetated areas. Therefore, if the objective is to create a planting with a wide variety of plant species, these species need to be planted deliberately at the outset (i.e. an ecosystem restoration planting) or subsequently established (i.e. an enhancement planting, see Box 4.1).

Most plantings are established with overstorey trees and understorey plants in the same seed or seedling mix. Some restorationists advocate putting the overstorey in first, and then planting the understorey several years later when conditions for understorey plants may have improved (for example, when there is more shade, less competition with pasture grasses, and more nutrients in the soil

Figure 6.2. A structurally complex planting. (Photo by Nicola Munro)

due to the presence of a leaf litter layer). However, there has been no research to date to determine which is the better approach to establishing an understorey.

Development of leaf litter, logs, hollows and mistletoe

The features that take the longest to develop in a planting are large logs, leaf litter, tree hollows and mistletoe. A layer of leaf litter can develop within a decade of a planting being established. Many Australian terrestrial ecosystems have a large amount of leaf litter, which can reduce competition with pasture grasses and weeds as well as provide habitat for many birds, mammals and reptiles.

Logs can only be as big as the trees they came from. Big old logs – critical habitat features for many birds, mammals, reptiles and invertebrates – derive from big old trees. It can take 50 to 100 years for a tree to be large enough to produce big logs through branch shedding or the collapse of a main trunk. The presence of large logs in a planting can be fast-tracked by establishing a planting around an old paddock tree or areas with scattered big logs, or by bringing them from elsewhere (Fig. 6.3). For example, old fence posts, fallen trees, or trees that need to be removed elsewhere on the property can be usefully translocated to a planting.

Figure 6.3. Paddocks with scattered logs can be good areas around which to establish a planting. (Photo by Jenny Newport)

Tree hollows are a critical resource for many Australian animals, but they are probably the slowest feature to develop in a planting. It can take 120 to 180 years for hollows to develop in eucalypts that are suitable for use by cavity-dependent animals, such as possums, gliders, cockatoos and large owls. A number of studies have demonstrated the biodiversity benefits of establishing revegetated areas around existing paddock trees. For example, bird species richness is significantly higher in plantings with paddock trees than in plantings without such large and important trees.

Erecting nest boxes is another way to provide cavities for hollow-dependent animals (Fig. 6.4). Nest boxes of different sizes and shapes placed at different heights can provide valuable nesting sites for a range of birds, possums and bats. However, artificial cavities have a limited lifespan and may need to be replaced at regular intervals (e.g. every 5–20 years). In addition, certain kinds of nest boxes can be occupied by introduced birds, such as the Common Starling and Indian Myna, or by European Honeybees. Special design features are needed to exclude these nest box pests; for example attaching carpet to the roof of a nest box prevents bees from establishing a hive. Several books and guides on how to build nest boxes for a range of Australian animals are listed at the end of this chapter.

Although very few plant species will naturally establish themselves in plantings, there are some that might. For example, after about 10–40 years, mistletoe may become established in a planting. Mistletoe is parasitic on tree hosts and is spread by birds, in particular, the Mistletoebird (Figs. 6.5 and 6.6). Mistletoe

Figure 6.4. A natural tree hollow and a nest box. (Photos by Nicola Munro)

Figure 6.5. Mistletoe, a key feature of native vegetation which can develop in a planting after 10–40 years. (Photo by Nicola Munro)

Figure 6.6. A Mistletoebird. (Photo by Julian Robinson)

can be a valuable part of forest and woodland ecosystems, as a source of nectar and fruit for birds, and dense foliage for nesting and cover from predators. Possums, gliders and insects eat the foliage of mistletoe.

While extensive mistletoe infestations can weaken or kill trees, they usually do so only in landscapes that are degraded or under severe ecological stress. In these cases, mistletoe can be cut from branches of a host tree, but this is rarely necessary.

Colonisation of plantings by animals

All plantings, no matter how small, provide habitat for some species of native animals. Even very young plantings (a year or so old) can support several species of birds (Fig. 6.7). Generalist bird species that prefer dense vegetation, such as the Superb Fairy-wren, are among the first to colonise new plantings (Fig. 6.8).

The extent of animal colonisation of a planting will depend on a number of factors. If a planting is structurally complex and has many plant species (e.g. an ecosystem restoration planting) then a range of bird species are likely to colonise it within five to ten years, including bird species of conservation concern, such as the Rufous Whistler and Red-capped Robin (Figs. 6.9 and 6.10).

Plantings established around old paddock trees are colonised by a greater diversity of birds and mammals than those without paddock trees. Plantings that

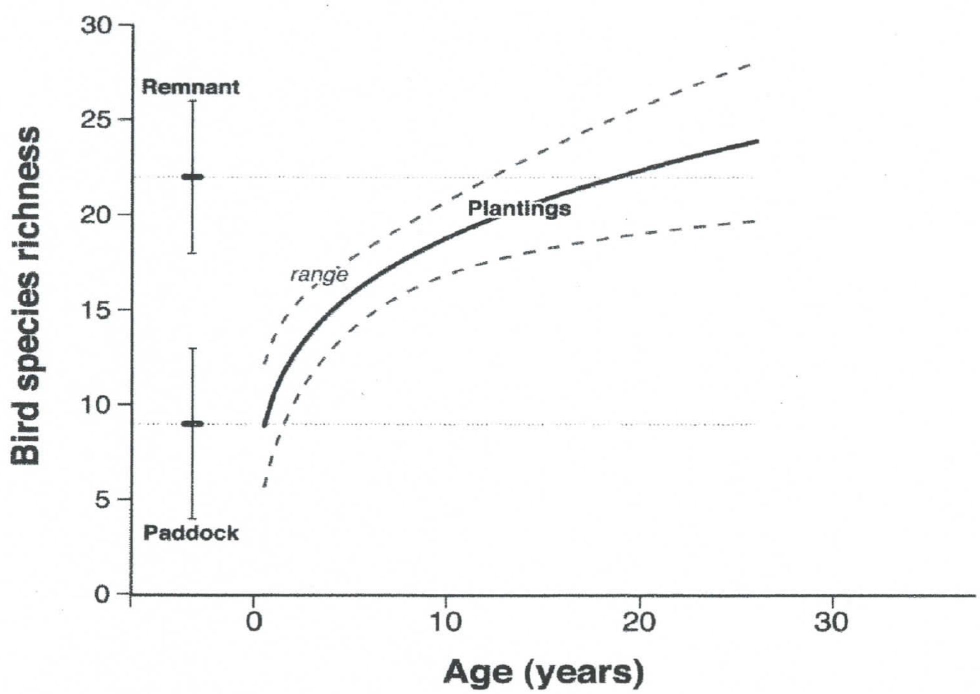

Figure 6.7. Plot from a study of birds in revegetation in Gippsland, showing how bird species richness increases over time. In this case, it took about 20 years for the average bird species richness in the revegetation to reach similar levels to remnant vegetation. The vertical lines show the range of, and average, bird species richness found in paddocks and remnants. (Figure by Clive Hilliker, adapted from Munro *et al.* 2011)

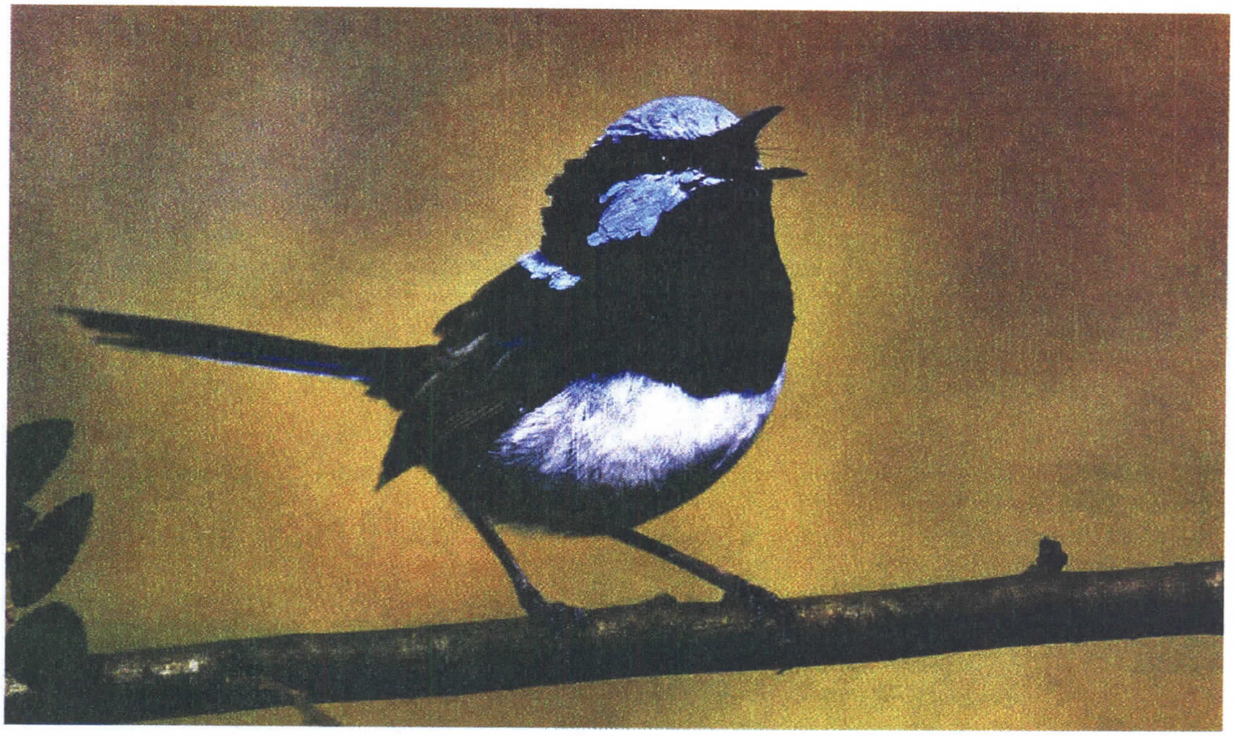

Figure 6.8. A Superb Fairy-wren, a bird often found in ungrazed young plantings. (Photo by Julian Robinson)

Figure 6.9. Red-capped Robins, spectacular birds of conservation concern that often occur in plantings. (Photo by Julian Robinson)

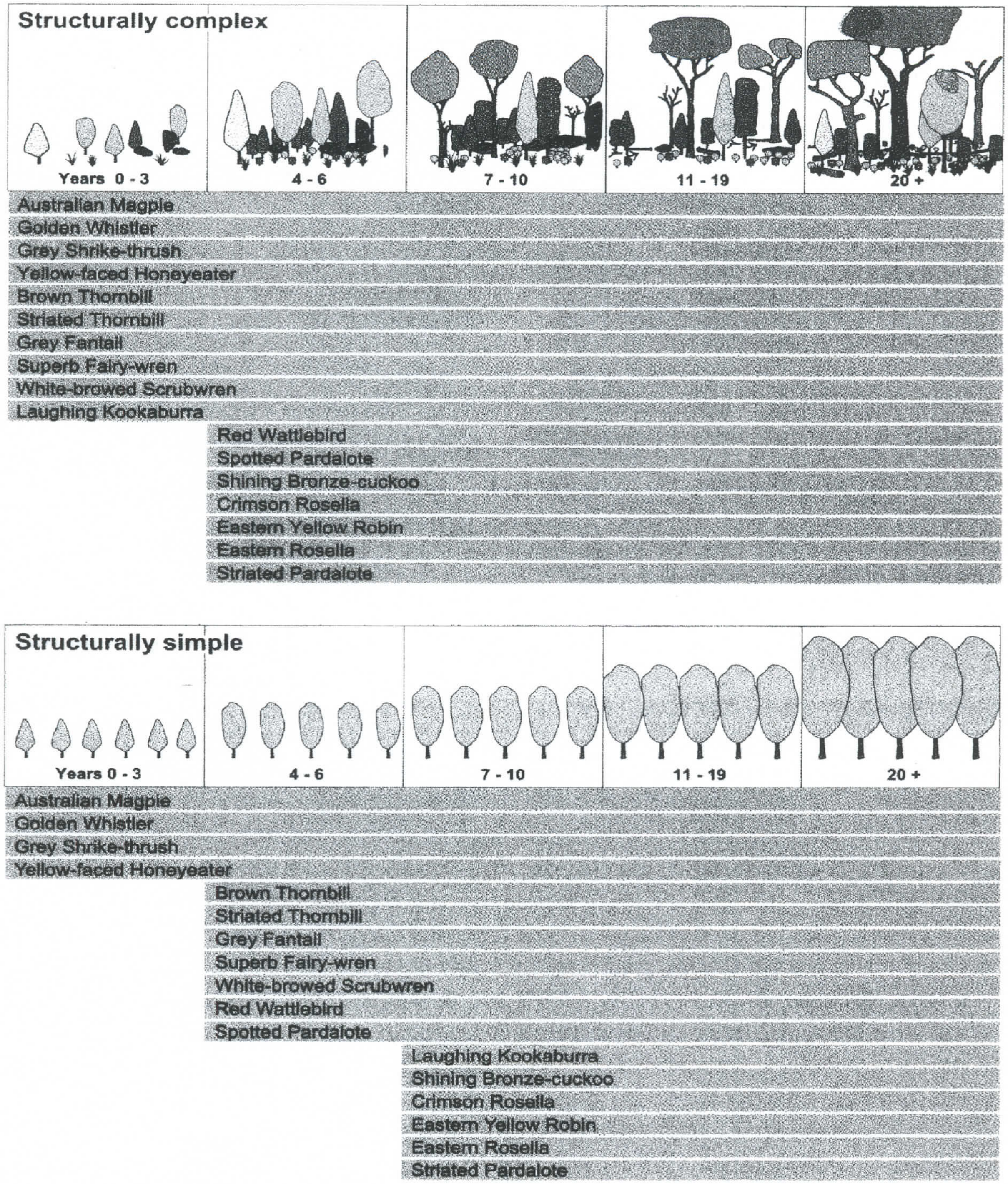

Figure 6.10. Bird species that colonised plantings in western Gippsland in the first ten years. Several species colonised structurally complex ecosystem restoration plantings sooner than structurally simple woodlot plantings. (Figure by Clive Hilliker)

Figure 6.11. The Koala (left) is known to move large distances across open paddocks, and the Squirrel Glider (above) is a species that is restricted in its movements in treeless areas. (Photos by Nicola Munro and Katherine Tuft)

Figure 6.12. An Eastern Whipbird, one of the species that has colonised the plantings in the Archies Creek region where an extensive revegetation program is underway (see Box 6.1). (Photo by Julian Robinson)

Box 6.1. Archies Creek restoration, Gippsland

The small farming region of Archies Creek in western Gippsland was long ago cleared of its majestic forests, leaving only a few mature trees. Forest clearing resulted in the loss of most forest animals. About 30 years ago, two families new to the area set about transforming the landscape. Today, there are extensive areas of revegetation running virtually the entire length of the Archies Creek watercourse with most local farmers contributing to this large-scale restoration effort.

The oldest plantings at Archies Creek (30 years old) are ecosystem restoration plantings that have been supplemented with enhancement plantings as new species became available from nurseries. By 2006, these plantings had begun to self-thin and were characterised by large logs and a thick layer of leaf litter interspersed with ground cover vegetation. Many of the plants had begun to self-propagate.

Despite there being around 7 km between the plantings and the nearest patch of remnant vegetation, the revegetated areas in the Archies Creek region now support populations of the Common Brushtail Possum, Common Ringtail Possum, Koala, Bush Rat, Agile Antechinus, Dusky Antechinus, Red-necked Wallaby, and Echidna as well as numerous birds, such as the Eastern Yellow Robin, Shining Bronze-cuckoo, Grey Fantail, Golden Whistler, White-browed Scrubwren, Leaden Flycatcher, Eastern Whipbird, Crested Shrike-tit and Brown Thornbill (Fig. 6.12). Most species of birds were found to be breeding in the revegetated areas.

More plantings are being established in the Archies Creek region every year, and the goal is to eventually link Archies Creek with the Powlett River, which is also being extensively revegetated (Fig. 6.13).

are wide or large are also likely to be colonised by more species than small or narrow plantings (see Chapter 3). In addition, plantings located close to other vegetation (remnants or other plantings) will be colonised by more species of birds than isolated plantings (see Chapter 2).

Bird colonisation of plantings has been studied quite widely; however, we know much less about rates of colonisation by other types of animals. Possums and gliders have specific requirements, such as tree hollows and particular kinds of food; reptiles require open spaces, rocks and logs; bats often prefer open canopies; and frogs need trees with water bodies nearby. The presence of these kinds of features within a planting is likely to accelerate their rate of colonisation by species in these groups.

Some species of birds are quick to colonise plantings because they are highly mobile. However, other species may be slow to colonise plantings; for example the Brown Treecreeper has specialised dispersal behaviour in which only one sex moves and the other remains where they were fledged and the species has rarely been found in plantings. Many mammals can cross surprisingly large areas of open farmland. The Koala has been known to cross up to 500 m of treeless paddocks

Figure 6.13. The Archies Creek revegetation project. (Photo by Nicola Munro)

(Fig. 6.11). Small vertebrates, such as reptiles, frogs, and small mammals may take a long time to colonise plantings even if habitat conditions are suitable because of difficulties in moving across areas of open farmland.

References

Casey K (1996) *Attracting Frogs to Your Garden*. Envirobook, Canterbury, NSW.

Franks A and Franks S (2004) *Nest Boxes for Wildlife*. Bloomings Books, Melbourne.

Grant J and The Gould Group (1997) *The Nestbox Book*. Wilkinson Publishing, Melbourne.

Munro NT, Fischer J, Barrett G, Wood J, Leavesley A and Lindenmayer DB (2011) Bird's response to revegetation of different structure and floristics – are 'restoration plantings' restoring bird communities? *Restoration Ecology* **19**: 223–235.

Munro NT, Fischer J, Wood J and Lindenmayer DB (2009) Revegetation in agricultural areas: the development of structural complexity and floristic diversity. *Ecological Applications* **19**: 1197–1210.