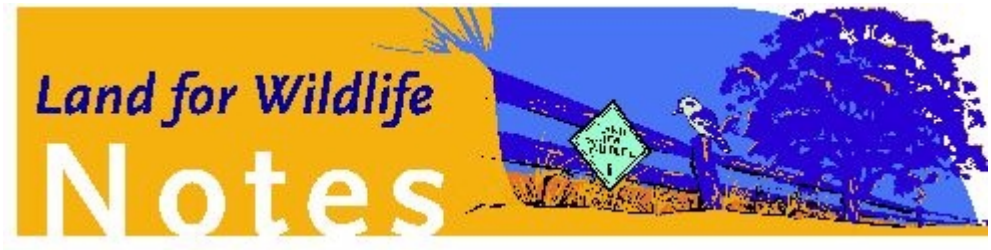

Shelterbelts and Wildlife

Stephen Platt, Melbourne

January, 1993
LW0020
ISSN 1440-2106

The value of shelterbelts in protecting crops and livestock is widely acknowledged. Reduced livestock death rates and higher birth rates, improved liveweight and wool gains, reduced heat and cold stress and higher crop yields have all been noted as potential economic gains (see Land for Wildlife Note 10). Environmental advantages include natural pest control, a more pleasant and visually appealing place in which to live, recreational opportunities and protection from the sun.

Less well known are the potential advantages afforded by shelterbelts, appropriately located and managed, in fire safety. A shelterbelt can reduce windspeed, the major weather factor in the rate of fire spread, deflect burning debris around the home and filter out sparks (Petris, 1992).

Suitably designed shelterbelts can also assist nature conservation and attract wildlife to a property. This Note considers those aspects of a shelterbelt that are most important to wildlife and includes some general information on design, location and management of shelterbelts.

Why select local native species?

The choice of local native species in preference to alternatives is a major factor in providing habitat for wildlife. Local native species offer a range of qualities that exotics and non-local natives do not. These are examined below and provide strong arguments for the use of local native species as opposed to traditional favourites such as cypresses and sugar gums *Eucalyptus cladocalyx*.

- **Adapted to local conditions.** Local native plants are precisely 'tuned', through natural selection, to the soil types, seasons, climate and pests in the area of natural occurrence. Although conditions will have changed in some areas, as a result of overclearing and its consequences, local species should be tried before resorting to the nearest suitable alternative. Whilst introduced plant species may be free of natural diseases of their country of origin at present, they are susceptible to dramatic declines if a disease is introduced.
- **Permeability**. Shelterbelts need to be semi-permeable to wind such that wind speed is reduced significantly but that turbulence is not created. Some cypress trees are virtually impermeable to wind. Impermeable barriers can create substantial turbulence on the lee side which reduces the windbreak effectiveness and can even enhance wind effects. The chance of windthrow also increases with increasing impermeability to wind. In addition, mature cypress and pine trees usually exclude understorey plants. The gap between ground and lowest branches can be sufficient to allow wind to pass through unabated, or be channelled at higher speed, thus increasing the wind effects. In contrast, many natural plant communities include understorey shrubs which can be used to fill the gap that develops as trees age. Multiple-row native shelterbelts, using trees and shrubs of varying heights and ages, have been used to overcome this problem.
- **Evergreen/landscape character.** The vast majority of native species are evergreen. This is essential for a shelterbelt to provide wind resistance in all seasons. Use of local species helps to maintain the character of the local natural landscape giving each region its unique signature.
- **Durability/self-perpetuating**. Local species are able to survive most of the natural hazards, including fire, frost and drought, in their area of natural occurrence. Unlike conifers, which are easily killed by fire, many native species can resprout from buds, rootstock or seed after fire. Natural regeneration can maintain a native shelterbelt, if properly managed, and avoid re-establishment costs and long periods without shelter (see LFW Note 16).
- **Cost**. Newly developed techniques for establishing native plants, such as direct-seeding, permit native shelterbelts to be established at a fraction of the cost of nursery-grown plants (see LFW News Vol. 1, No. 9). Conifers are expensive to purchase. They are thus often planted as single row shelterbelts. This can result in shelterbelt failure when mature plants die leaving a large gap. A replacement specimen usually cannot be established due to competition from the mature conifers.
- **Labour**. Native plants usually require less follow up management during establishment. Supplementary watering is usually not necessary.

State Government Victoria
Department of Natural Resources and Environment

Victoria The Place To Be

- **Wildlife and natural pest control**. Wildlife will be attracted to local native species and can provide natural pest control of agricultural pest species. For example, ibis feed on crickets, grasshoppers, beetle larvae and caterpillars, consuming about 200 grams of insects each per day. Bats may eat up to two thirds of their body weight in insects per night. Magpies consume scarabs, weevils and other pasture pests. Hence, wildlife and native invertebrates protect the shelterbelt by providing biological control of problem species (e.g. Christmas beetles, psyllids) directly through predation and by spreading parasites and diseases. Local native species can supplement the existing nature reserve network and attract wildlife to a property. Cypress and pine trees have value as habitat for very few native species. Local species provide the diversity of flowering times and continuous litterfall to which native wildlife is adapted. Native vegetation has a much higher diversity of invertebrate fauna than pine plantations (Ahern and Yen 1977)
- **Weed potential**. Many plants introduced from outside their natural range (e.g. *Pinus radiata*) may respond by rapidly colonising areas, such as natural bushland, in which they are not wanted. There are suitable local species that are non-invasive and can be used in place of potentially dangerous weeds. For example, Kurrajong *Brachychiton populneus* or Blackwood *Acacia melanoxylon* provide the same dense foliage and height as Sweet Pittosporum *Pittosporum undulatum* or Monterey pine *Pinus radiata* which are very serious environmental weeds (Carr et al 1992).
- **Wood**. Many Victorian eucalypts, and some other native species, produce excellent timber and firewood (Land for Wildlife Note 19, 1992). In comparison, cypress and many other exotic trees sometimes used in shelterbelts do not have the same utility.
- **Fire** "Traditionally, many shelterbelts have been planted with cypress trees. However, multiple rows of indigenous trees will often perform better as shelterbelt species. Many indigenous trees are often taller than cypresses, and subsequently provide more protection. Furthermore, most indigenous trees will also recover from fire, while cypresses are extremely susceptible to fire" (Petris, 1992).

There are a wide variety of local species from which to choose for establishing in a shelterbelt. Understorey species are also important.

General points on shelterbelt design

A shelterbelt should present a semi-permeable barrier to wind. Dense shelterbelts can be used near but not adjacent to buildings to provide maximum protection from wind and airborne debris (Petris 1992, Simpfendorfer 1989). Open shelterbelts are usually recommended for protection of fields and crops.

A shelterbelt should be long and continuous, as turbulence occurs around ends, and preferably joined to other shelterbelts, woodlots or areas of natural vegetation. This avoids turbulence and 'funnels'.

It should be sloped or contoured to reduce turbulence. This can be achieved by placing smaller growing shrubs in front or species that will naturally contour, such as Melaleuca sp (subject to location). Continuous green foliage is required on the windward side of the shelterbelt extending from the ground level upwards.

Straight shelterbelts are not necessarily the best design. A shelterbelt along a meandering watercourse offers many pockets in which livestock can shelter, despite changes in wind direction. Refer to the references for more detail on shelterbelt design.

Wildlife aspects of shelterbelt design

Wider shelterbelts of mixed local native species, and shelterbelts that connect with larger areas of bushland, will be of greater benefit to wildlife than narrow strips of few species.

Shelterbelts need to be fenced to exclude livestock (other herbivores may also require exclusion, including rabbits, goats, horses, kangaroos and rabbits) but with optional access should the need arise for fire control or to allow livestock to shelter during extreme weather.

Tall eucalypts and other trees can provide perches and nest sites for birds including birds of prey and magpies that attack agricultural pests. Dense or prickly shrubs offer refuge to many species. Leaf litter, rocks and logs provide habitat for reptiles, echidnas, antechinus, thick-knees, etc. Nectar-producing trees and shrubs provide food for many birds and some mammals.

Warning: avoid using environmental weeds in shelterbelts. Carr et al. (1992) list 584 plant taxa that have been recorded as weeds of native vegetation. Environmental weeds can reduce the habitat value of bushland areas for wildlife and pose a long-term threat to native vegetation. Some also pose a risk to cleared pasture.

The same wildlife principles apply to shelterbelts as to woodlots. These principles are outlined in Land for Wildlife Note 19 'Woodlots and wildlife' and include: use of a diverse range of local native species, avoidance of pesticides and fertilizers, leaving some trees to reach old age and develop hollows, retention of ground litter except near buildings, and minimal disturbance by noise, vehicle movement or cultivation. Harvesting is undesirable in shelterbelts if it creates gaps in the vegetation. Selective logging may be suitable in some situations.

'Simple' shelterbelts of few species may attract Noisy Miners or other problem species.

Shelterbelt location - General points

Suitable sites for shelterbelts should be chosen as part of the development of a Whole Farm Plan for the property (see Garrett, 1991, Land for Wildlife Note 21).

Take advantage of naturally occurring shelterbelts, such as native vegetation along roadsides and streams. Protect these areas as a priority. They can provide excellent habitat for wildlife.

Shelterbelts on level ground should be oriented at right angles to prevailing winds.

On undulating sites, wind flows parallel with the ground rather than from one particular direction (Simpfendorfer 1989). Shelterbelts on ridgetops give greatest deflection of wind in these situations but may be exposed to extreme winds. In windy situations, such as exposed hilltops, wider shelterbelts are preferable. Wide belts provide greater protection and allow species, protected deeper within the shelterbelt, to reach greater heights.

In gullies, shelterbelts can trap cold air drainage.

For fire protection, buildings should be sited more than 1.5 and less than 5 times the shelterbelt height from a dense shelterbelt (Simpfendorfer, 1989).

Open shelterbelts can reduce wind speed for a distance of up to 25 times their own height and are suitable for protecting stock and crops. To protect a large property a number of shelterbelts are needed. Multiple shelterbelts can significantly reduce windspeed compared to single shelterbelts (Simpfendorfer, 1989). Dense shelterbelts reduce wind speed on the windward side (by 2 to 3 heights) as well as on the leeward side (7 to 8 heights).

Crop yields may be decreased in the area adjacent to a shelterbelt due to competition between plants. This area can be used for a firebreak or lane-way.

Shelterbelt location and wildlife

Shelterbelts can act as corridors for wildlife movement if they connect with other areas of local native vegetation (see LFW Note 3). Consider the options for the property, discuss plans with neighbours and consult maps and aerial photographs to determine appropriate sites.

Plants within shelterbelts located on high quality, fertile sites may attain superior nectar flows and greater height than those on poor sites. This will benefit some species of wildlife.

Shelterbelts near noise or other forms of disturbance may be avoided by timid species.

Shelterbelt management

- Shelterbelts need to be managed to prevent weed infestation and to control pest animals such as rabbits, cats and foxes (see LFW Note 4 for other threats).
- Fences will need to be kept in good condition to prevent access by grazing animals.
- Leaf and twig litter (fine fuels) will need removal near buildings and other areas that need protection from fire.
- Occasional wildfires may burn the shelterbelt. If native species have been used (except rainforest species) this can be regarded as a natural event from which the plants are likely to recover. In fact, occasional wildfire can stimulate natural regeneration.
- Leave mistletoes as wildlife shelter and food.

References & Further Reading

Ahern, L. & Yen, A. (1977) A comparison of the invertebrate fauna under Eucalyptus and Pinus forests in the Otway Ranges, Victoria. Proc. Roy. Soc. Vict., 89. Pt 1, pp 127-136.

Carr et al (1992) Environmental weed invasions in Victoria: conservation and management implications. Dep't Conservation and Environment and Ecological Horticulture Pty Ltd.

Garrett, B.K. (1991). Whole Farm Planning: principles and options. Dep't Conservation, Forests and Lands.

LFW Note 3 'Creating habitat corridors for wildlife', LFW Note 4 'Wildlife management considerations on private land - a summary', LFW Note 10 'How wildlife habitats can benefit your property', LFW Note 16 'Natural regeneration - case studies on the farm', LFW Note 19 'Woodlots and wildlife'.

Petris, S. (1992). Planting Trees to Enhance Bushfire Safety. Trees and Natural Resources, December 1992. pp 17-19. Natural Resources Conservation League of Victoria.

Simpfendorfer, K.J. (1989). Trees Farms and Fires. Dep't Conservation, Forests and Lands.