5. Native Vegetation

J. Hopper

The whole of the study area was originally covered by forests except for subalpine vegetation in the south-east and the woodlands of the Goulburn Valley.

The forests and woodlands have been cleared or thinned on nearly all of the private land. The remaining native forests on public land have retained their essential character, although all have been influenced to varying degrees by activities such as logging, grazing, fires and the introduction of exotic plant and animal species which accompanied European settlement.

Background

It was not until 1834 that Europeans in any numbers permanently settled in Victoria. Initially, land around Melbourne and Geelong was cleared of native vegetation and carved into small farms, many less than 40 hectares. By the mid 1840s agricultural expansion close to the larger settlements, was taking its toll on the woodlands and forests which had remained largely untouched during 40,000 years of Aboriginal occupation.

The earliest descriptions of the forests are fragmentary, often being evaluated in terms of their potential for agricultural and pastoral use. The original vegetation of Victorian forests had evolved over millions of years, and the pattern of forest structure was related to climate, soil and fire. Lightning was a natural cause of fire, and together with burning by Aborigines, was thought to have little effect on the vegetation of the forests in comparison to the change in extent and condition of the forests following colonisation.

In 1836, the Government of New South Wales passed an act which allowed squatters to occupy land for payment of a fee of 10 pounds per year. Pastoralists moved south from the more settled regions of New South Wales and, by 1844, almost three quarters of what is now Victorian was held by the squatters. The areas that first attracted the settlers were the grassy plains and open woodlands of the central and northern areas of the State, which included a major portion of the Goulburn River Valley.

This movement of pastoralists initiated the destructive exploitation of Victorian forests. The majority of the settlers regarded trees as a nuisance and as a result, trees were extensively ringbarked in the expectation that more grass would grow.

On the 15th July, 1851, Victoria was officially declared a separate colony and the majority of the population of 77,345 persons (excluding Aborigines), were pastoralists. Seven days later, on July 22, 1851, James Esmond revealed the locality of his gold discovery at Clunes. On 24th August, 1851, gold was discovered at Golden Point.

The discovery of gold in Victoria over the following years had a dramatic effect on Victoria's population growth and by 1854, Victoria's population increased seven fold.

The Victorian Government was conditioned to the needs of the mining industry, and since timber was necessary to enable mining to function, no restrictions were placed on the utilisation of Victorian forests. The forests adjacent to mining operations were soon decimated, and little thought was given to the reservation or protection of forests.

As the gold rushes began to subside, a series of depressions in the mid to late 1850's caused mass unemployment. In August 1860, as the Bourke and Wills expedition left Melbourne for the Gulf of Carpentaria, Parliament House in Melbourne was mobbed by a large crowd demanding 'A vote, a rifle and a farm'.

In subsequent years, forest areas were leased to settlers who destroyed them with an axe and fire (clearing of the forest was often included as a condition of the lease).

The lure of the land ownership tempted people to begin farming the Goulburn Valley and the Northern Plains. During the 1870's areas of the Goulburn Valley were opened up to the early pastoralists and by the 1880's dairying had spread rapidly into the Goulburn Valley and elsewhere to the north.

The clearing of forests along the Goulburn River Valley for agriculture and the introduction of cattle, sheep and numerous exotic weeds, destroyed many of the fragile forest ecosystems. Graziers wishing to improve the quality of their grazing land ringbarked the trees to let in more light, and scientists of the times such as William Farrer advocated ringbarking as a quick economical way of 'drying and sweeting the soil.'

The use of axe and fire to clear forests for grazing and cropping continued unabated for many years, with only the steeper, less fertile and inaccessible areas being excepted from clearing. Even these areas were drastically altered in floristic composition by the frequent and intense fires which so often roared up into the mountains from the valley flood below.

The farming landscape which was created as welcomed as evidence of advancing civilisation, yet despite its productivity and apparent orderliness, the agricultural landscape was less stable than the bush it replaced. A few species of foreign plants and animals, chosen solely for their commercial value, took the place of a complex natural community of plants and animals which had evolved over millions of years.

Farmers continued their agricultural pursuits, while remaining ignorant of the environmental consequences. The vegetation which had previously clothed all of the land retreated to isolated, scattered pockets.

Present Vegetation Distribution

In the 1980's the native vegetation of the study area is vastly different to that which existed in pre-colonial times.

Following the spread of the early pastoralists into the area, much of the native vegetation which existed along the Goulburn River valley from Eildon to Seymour was cleared. Today, only isolated native trees of original genotype are found scattered on freehold land with many showing signs of advanced dieback.

Relatively small areas of remnant vegetation occur along major river and creek courses on areas set aside as water frontage. Similarly, strips of native vegetation can be found along many road easements and unused roads.

Larger blocks of remnant native vegetation occur in isolated patches on private property, usually on steep slopes where soils have low agricultural potential.

In most of these locations, the understorey of these remnant forests has been severely modified by grazing, fire and weed invasion. In many locations the remaining tree species are the only reliable indicator of original native vegetation. In these areas, trees provide an important genetic link between tree growth and site adaption.

Only the south-eastern section still carries significant examples of native vegetation in a moderately undisturbed form (Plate 5.1). Much of this vegetation remains due to the formation of the Forests Commission of Victoria, constituted under the Forests Act of 1918. The establishment of this Commission led to many valuable forest areas, including the area in question, being surveyed and dedicated as reserved forest.

Because of this legislation, large areas of forest remain today. It is within the State Forests, National Parks, State Parks and other Public Land of the study area that the greatest diversity and most important examples of native vegetation occur.

Plate 5.1 The southern forests still contain significant example of native vegetation in a moderately undisturbed form.

Vegetation Descriptions

The native vegetation of areas of forest appear as mosaics of differing associations of plants, reflecting the differences in soil, aspect, drainage, climate, elevation and fire history. These factors vary widely within the study area resulting in a diversity of native vegetation species and communities. A significant portion of the structural vegetation forms and ecosystems of Victoria are represented.

The study area mainly within the confines of the Land Conservation Council's Melbourne Study Area, which contains 41 representatives of the 62 major vegetation alliances tabulated for Victoria. An alliance is described as a series of vegetative ecosystems having the same structural characteristics and the same or closely related species as dominants in the uppermost stratum.

Classification

The native vegetation of the area consist of plant communities of great diversity, ranging from the tallest of hardwood forests in the cool, wet mountains to the park-like splendour of River Red Gums along the banks of the Goulburn River.

Because of the great diversity of vegetation types, a system of classification must be employed to initially recognise similar vegetation alliances and then group them to indicate the relationship between alliances. A number of systems for the classification of vegetation exist and the system commonly used in Australia is that developed by Specht 1970.

This system classifies vegetation into a number of 'structural forms', based primarily on the height of the tallest species. (Table 5.1)

A good estimate of projective foliage cover can be obtained by estimating the proportion of sky blocked out by the leaves of the tallest trees and equating this to the percentage project foliage cover.

Using the Specht system, a River Red Gum forest would by classified as "woodland II' because the height of the mature trees generally falls between 15 and 28 metres, and the projective foliage cover is usually sparse (10 to 30%).

Similarly, a Mountain Ash forest would be classified as 'open forest IV', because the height of mature trees exceed 40 metres and the projective foliage cover is usually around 60 to 70 percent.

This method of classification is not based on detailed studies of species relations, but each structural form is readily recognisable in the field, and each structural form reflects the operation of a certain set of environmental factors.

The vegetation in the study area as shown in Figure 5.1 highlights the structural forms (following Specht) of the major species of tallest stratum, with the inclusion of Softwood Plantations on Crown Land. For display purposes, however this has been restricted to vegetation associations on the larger blocks of public land and as such the woodland areas (detailed later incorporating River Red Gum, Grey Box, Yellow Box and others) are not included. A summary of the principle native vegetation associations by structural form are highlighted in Table 5.2, with the major Eucalypt species found given in Appendix B.

Table 5.1 Structural forms of vegetation in the study area

Life form and height of tallest stratum	Projective foliage cover of tallest stratum		
	Dense (70-100%)	Mid-dense (30-70%)	Sparse (10-30%)
Trees > 40 m		Open forest IV	
Trees 28-40 m		Open forest III	
Trees 15-28 m		Open forest II	Woodland II
Trees 5-15 m		Open forest I	Woodland I
Shrubs 0-2 m	Closed-heathland	Open-heathland	
Herbs (including moss ferns and lichens)		Grassland Mossland Herbfield	

Modified from – Specht R. L. 1970.

Subalpine Complex

The Subalpine Complex vegetation type is confined to relatively small, scattered areas in the south-east of the study area at elevations above 1,300 metres. Subalpine vegetation can be found at lake Mountain, Mount Bullfight, Mount Torbreck and the Southern end of the Blue Range.

According to Specht's system the subalpine vegetation can be classified into four main structural forms. Marked changes in structural form occur over very short distances, reflecting differences in exposure, aspect, drainage and soils.

Structural form of Subalpine Vegetation	Major species of Tallest stratum
(i) Woodland I to Open Forest I	Snow Gum
(ii) Open Heathland to closed Heathland	Alpine Mint Bush, Alpine Phebalium, Candle Health Alpine Health
(iii) Grassland/Herbfield	Tussock Grass Snow Daisy, Alpine Wallaby Grass
(iv) Mossland	Sphagnum Moss

The climate in the subalpine vegetation types is characterised by frequent snowfalls in winter and severe frosts during the growing season. Snow cover persists for an average of 12 weeks each year, and precipitation is 1,200 millimetres annually.

Snow Gum (*Eucalyptus pauciflora*) is the principal tree species of the subalpine woodland. It grows with deep crowns and short trunks and usually grows on well drained, brownish gradational soils. The ground cover is mainly Austral Snow Grass. Frequent shrubs in the subalpine woodland of Snow Gum and in the heath communities are Alpine Pepper, Alpine Oxylobium, Alpine Phebalium, Alpine Mint-bush and Subalpine Beard-heath (Plate 5.2).

Sphagnum Moss bogs are fairly common at these high elevations in the south-east of the study area, and occur on peat in waterlogged depressions. Shrubs such as Candle Health (*Richea continentis*) may become established on the edge of the Sphagnum Moss bogs. The bogs are unstable and are very sensitive to damage. They occur extensively between lake Mountain and Mount Bullfight and the southern end of the Blue Range (eg. Storm Creek). There is also a limited occurrence along Snobs Creek. (Plate 5.3).

Grasslands are found at exposed locations on organic loams that are better drained, often on sites where cold air drainage is a feature of the micro-climate.

Plate 5.2 An example of Snow Gum woodland at Lake Mountain.

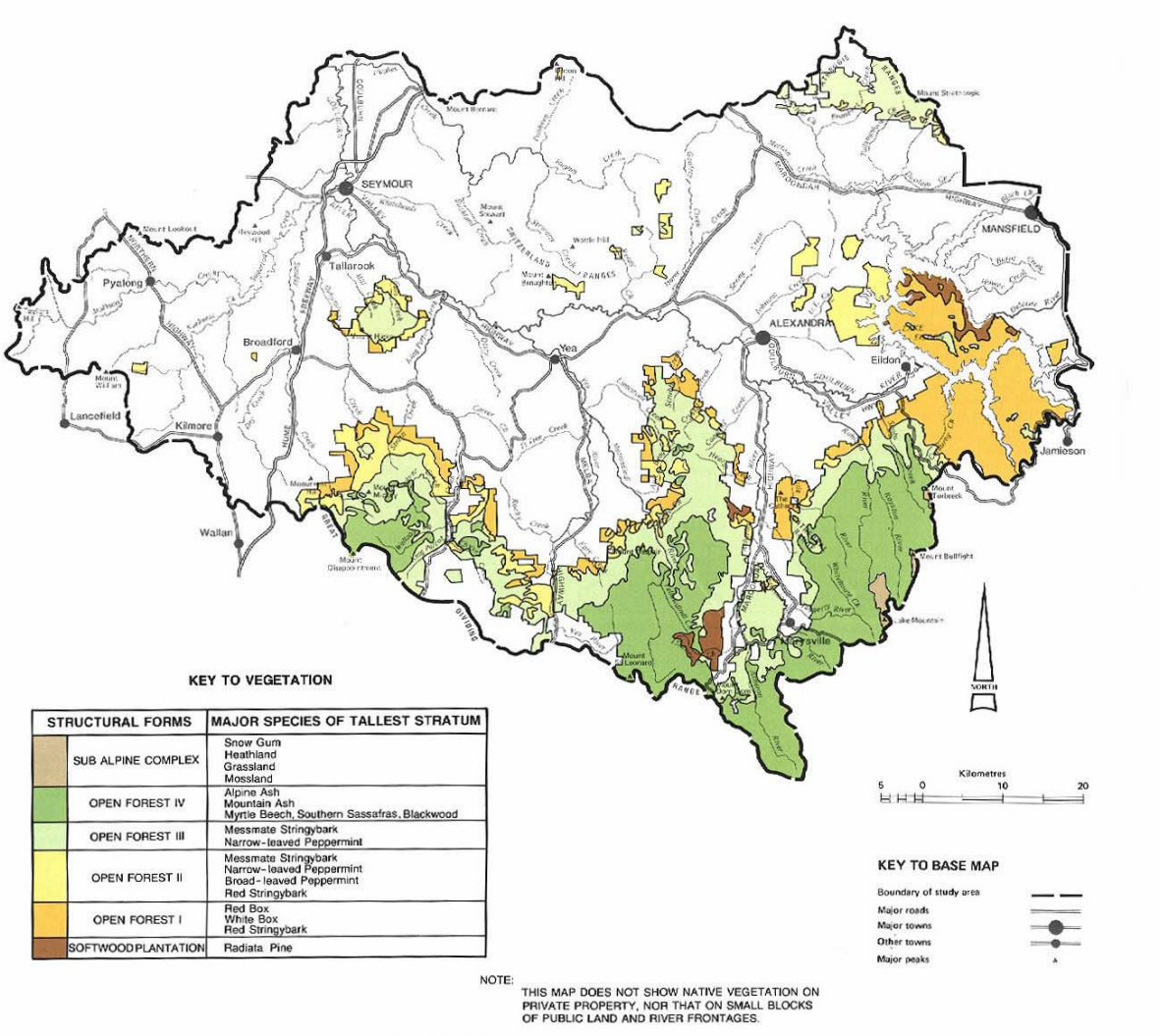

Figure 5.1 Vegetation Map depicting vegetation forms on crown land. (Small blocks of public land and river frontages are not shown).

Open Forest IV

Open forests exceeding 40 metres in height are common in the south-east of the study area at elevations above 600 meters where the rainfall exceeds 1,100 millimetres annually.

The open forest IV structural form can be divided into three main groups:

(1) Alpine Ash
(2) Mountain Ash
(3) Myrtle Beech, Sassafras, Blackwood.

(1) Alpine Ash (*Eucalyptus delegatenis*) forests occur at elevations generally above 950 metres, and ascend to the subalpine zone.

The climate in these areas is characterised by cold winters and heavy precipitation of 1,000 to 2,500 millimetres per year, including snow. Generally, snow lies on the ground for up to 18 weeks per year, and there are up to 200 forests per annum. Alpine Ash forests generally grow in pure stands, although they do grow in association with Shining Gum (*Eucalyptus nitens*) and Snow Gum (*Eucalyptus pauciflora*) along their altitudinal limits.

The best development of Alpine Ash forest is on soils derived from granitic and basaltic rocks.

Understoreys in Alpine Ash forests vary with elevation, aspect and fire history. Generally, the understorey is a tall stratum of Blanketleaf, Hazel Pomaderris, Musk Daisy bush and Shining Cassinia. At higher elevations, Silver Wattle, Mountain Hickory Wattle, Hop Bitter-pea and Elderberry Panax make up a shrubby understorey. Major occurrences of Alpine Ash occur in the south-east of the study area on the Royston Range, Blue Range, Torbreck Range and Lake Mountain.

(2) Mountain Ash (*Eucalyptus regnans*) forests generally predominate below the Alpine Ash zone, from an altitude of approximately 500 metres to 950 metres (Plate 5.4).

Mountain Ash forests are located on deep well drained loamy soils derived from granitic and sedimentary rocks.

Within the study area, extensive areas of Mountain Ash forests are found at Marysville and surrounding areas, the southern portion of the Black Range east of Toolangi and the eastern slopes of Mount Disappointment.

Typical mature Mountain Ash forests is a dense stand of trees of uniform age, over 70 metres high. All the dominant trees are Mountain Ash, and there are three distinct strata beneath them. These lower stratums are made up of Blackwood, Myrtle Beech, Silver Wattles, Hazel Pomaderris, Prickly Coprosma, Musk Daisybush, Blanketleaf, Common Cassinia, and Soft and Rough Tree-ferns.

Plate 5.3 Sub-alpine complex at the head of Storm Creek. This is an example of an alpine bog, the dominant vegetation being candle heath (Richea continentis), alpine phebalium (Phebalium phylicifolium), and sphagnum moss.

Plate 5.4 Within the study area, extensive areas of Mountain Ash forest are found around Marysville, Toolong and Mount Disappointment.

Shining Gum (*Eucalyptus nitens*), either in pure stands or in mixture, occurs at the junction between the Alpine Ash and the Mountain Ash zones. At its lower elevations Mountain Ash may become mixed with Mountain Grey Gum (*Eucalyptus cypellocarpa*), Messmate (*Eucalyptus obliqua*) or Manna Gum (*Eucalyptus viminalis*).

(3) Myrtle Beech (*Nothofagus cunninghamii*), Southern Sassafras (*Atherosperma moschatum*) and Blackwood (*Acacia melanoxylon*) occasionally form a closed forest within areas of the moist Mountain Ash forests. This often occurs in moister gullies, particularly those with southern aspects. The headwaters of the Taggerty River contain good examples.

Open Forest III

Open forest III is often referred to as 'mixed species' forest, owing to the number of eucalypt species that it may contain on any one site. This is in contrast to the 'pure stands' of Mountain Ash and Alpine Ash that exist at higher altitudes.

Within the study area, there is a large area of this forest type, mainly within State Forest. (Mount Disappointment, Tallarook, Black Range, Toolangi, Blue Range and Marysville State Forest).

Mature height of the dominant eucalypt species in this forest type ranges for 28 to 40 metres, and occur mainly in the south-east of the study area, generally below 900 metres in elevation and where annual rainfall exceeds 1,100 millimetres.

These forests are usually found on yellowish gradational soils, and in some area (eg. Black Range) occur on friable reddish gradational soils.

This forest type can be broken into two main groups, depending on the proportion of the main eucalypt species:

(1) Messmate type (*Eucalyptus obliqua*) and
(2) Narrow-leaved Peppermint type (*Eucalyptus radiata*).

(1) Tall Messmate forests generally occupy the best sites, on deep loamy soils and in moist sheltered gully heads with southern aspects. They may be found growing in association with Narrow-leaved Peppermint (*Eucalyptus radiata*), Mountain Grey Gum (*Eucalyptus cypellocarpa*), Manna Gum (*Eucalyptus viminalis*) or Blue Gum (*Eucalyptus globulus ssp. Bicostata*).

The understorey varies with micro-climate, but in moist sheltered situations, may include tall, dense shrubs similar to those found in Mountain Ash forests. On less favourable sites, the floristic composition of the understorey may be limited as a result of differences in elevation, aspect, fire history and soil parent material.

(2) Narrow-leaved Peppermint forests of height class 28 to 40 metres at maturity, are also quite extensive throughout the study area and tend to replace Messmate forests at lower elevations where available soil moisture is lower. They are generally found growing in association with Candlebark (*Eucalyptus rubida*) or Manna Gum (*Eucalyptus viminalis*).

The understorey is usually less dense than Messmate type forest, and comprises Bracken (*Pteridium esculentum*). Common Cassinia (*Cassinia aculeata*) and Silver Wattle (*Acacia dealbata*) with species such as Musk Daisy-bush (*Olearia argophylla*) and Hazel Pomaderris (*Pomaderris aspera*) in the moist gullies.

Open Forest II

The tree canopy of this forest type is generally 15 to 28 metres tall, and is typically found in the foothills below 600 metres elevation in areas where annual rainfall is between about 700 and 1,000 millimetres. They generally occur on yellowish, gradational soils.

The species composition often resembles that of open forest III, but this forest is not as tall and the trees have poorer form and a more open canopy. Understorey shrubby vegetation is often sparse with a more complete Tussock Grass cover.

Messmate seldom occurs in pure stands, but is mixed with other eucalypt species such as Narrow-leaved Peppermint mixed with Candlebark and sometimes Broad-leaved Peppermint (*Eucalyptus dives*) and Red Stringybark (*Eucalyptus macrohynca*) occupy drier sites.

Large areas of this forest type were cleared during the last century for agriculture, but scattered pockets can be found on private property throughout much of the study area.

Open Forest I

The principal tree species in this forest type are the same as those in the previous unit, consisting mainly of peppermints, Red Stringybark and Red and White Box on the drier ridges. Top heights of these forests are generally less than 15 metres and they occur at lower elevations where moisture availability is low. Vegetative ground cover is often discontinuous and soil protection depends largely on forest litter.

In many locations throughout the study area, Red Box (*Eucalyptus polyanthemos*) forms pure stands of this forest type, although other eucalypt species may also be found growing in association with Red Box to form mixed species stands.

A major portion of the central part of the study area was originally covered with forest of this type, but was cleared during the latter stages of the 1800's and early 1900's.

Remnants of this forest type can be found in isolated patches on private property throughout the study area. More often than not, only solitary trees remain that are in advanced stages of dieback.

Woodlands

Vast areas of woodland, with River Red Gum as the principal eucalypt, once covered the central portion of the study area.

This was the first area to be cleared for pastoral development in the late 1800's, and include the flood plains of the Goulburn River and its major tributaries, elevations below 300 metres and with annual rainfalls of less than 650 millimetres.

As a result, almost all of this vegetation type has been replaced by pastures and very few remnants remain in the study area. Even where the trees themselves remain, the natural grassy ground cover has been completely altered by the addition of fertilisers, cattle, sheep and invasion by exotic plants.

The principal woodland association which still exists in small pockets scattered throughout the Goulburn Valley, is River Red Gum woodland. Only scattered River Red Gums remain along the major water-courses, and as discussed previously, are the only remaining store of 'Goulburn' genetically adapted seed.

Woodland of Grey Box and Yellow Box occur to the north and west of Seymour and reach their best development on the more fertile sodic duplex soils found on the lower slopes of broad valleys.

Red Ironbark woodland can also be found to the north-west of the study area, close to Puckapunyal.

Significant vegetation

There exists a number of localised and rare vegetation communities within the study area and there are also a number of rare and endangered plant species.

The Sphagnum Moss beds of the alpine areas are sensitive to disturbance and are confined to relatively small and discrete locations within the area. Similarly, the Silver Gum Reserve near Buxton is extremely limited in distribution and occurs naturally on an area of only a few hectares.

The riparian vegetation and ancient rainforest systems that occur in the Acheron Valley and headwaters of the Taggerty River, are significant and are extremely localised.

The most westerly occurrence of Spinning Gum (*Eucalyptus perriniana*) occurs on the Blue Range. This vegetation community is also confined to a small and discrete location and is thus quite significant.

A number of plant species are claimed by various botanists to be threatened within the study area. These include:

(i) Turquoise Coprosma (*Coprosma moorei*) – found near Lake Mountain.
(ii) Fairy Lanterns (*Thismia rodwayi*) – found near Narbethong and Kinglake.
(iii) Baw Baw Berry (*Wittsteinia vacciniacea*) – found near Lake Mountain and Rubicon State Forest.

It is most likely that there are many other native plant species that are extremely localised and therefore threatened. A lack of detailed knowledge of native plant distribution throughout the region (and Victoria as a whole), makes conservation of threatened species quite difficult.

Table 5.2 Vegetation Classification

Structural form		Major Species of Tallest Stratum	Common Species of Lower Strata
SUBALPINE COMPLEX (occurs at elevations above 1,300 metres)	Subalpine Woodland	Snow gum	Alpine Grass, Heaths
	Heathland	Alpine Mint-bush Alpine Phebalium	Alpine Pepper, Bush Peas
	Herbfield/ Grassland	Tussock Grass, Alpine Grass	
	Mossland	Sphagnum Moss	
OPEN FOREST IV (occurs at elevations above 600 metres)		Alpine Ash (found at elevations above 950 metres)	Ferns; scattered small trees. Mountain Hickory Wattle, Elderberry Panax
		Mountain Ash (found at elevations above 600 metres)	Blanket-leaf Mountain Correa
OPEN FOREST III (may occur at elevations below 600 metres)		Messmate Stringybark	Varies with micro-environment and fire history. Generally dense tall shrubs
		Narrow-leaved Peppermint Messmate Stringybark	Generally low open shrubs
OPEN FOREST II (may occur at elevations below 600 metres)		Narrow-leaved Peppermint Red Stringybark	Sedges, many of Papillionaceae Family

Structural form	Major Species of Tallest Stratum	Common Species of Lower Strata
OPEN FOREST I (occurs at elevations below 350 metres) WOODLANDS (occurs at elevations below 300 metres)	Red Stringybark Red Box River Red Gum	Sparse ground cover of grasses and low shrubs varies with fire history Kangaroo Grass Wallaby Grass

Dieback of native Vegetation

Dieback is severe and widespread within the study area. (Plate 5.5)

Over a major portion of the study area, mainly on private land where native vegetation once existed, remnant solitary trees and small areas of remnant vegetation are dying. This tree decline, as it is popularly called, occurs because trees left after early clearing are not being replaced.

The causes of tree decline in the rural landscape include fire, soil compaction, herbicides, drought, mistletoe, lightning strikes and wind throw.

The benefits of conserving and protecting remnant vegetation are numerous and include:

(i) Shade and shelter for stock
(ii) Soil protection
(iii) Reducing salting
(iv) Landscape enhancement
(v) Wildlife habitat.

The remaining trees and clumps of native vegetation throughout the study area, are the last link with the forests and woodlands that once protected the land of the Mid-Goulburn Valley and surrounding districts. (Plate 5.6)

A listing of the major plant species found within the study are as listed in Appendix B.

Plate 5.5 The remnants of native forest on land that has been cleared of trees for agriculture, only scattered trees remain.

Plate 5.6 The annual cut of hardwood sawlogs from public land in the study area is about 123,000 cubic metres. This represents about 12% of the states output.