

APPENDIX C: Descriptions of Ecological Vegetation Classes (EVCs) occurring in the Victorian North East RFA Region

Notes:

A vegetation **mosaic** consists of discrete floristic entities (EVCs) which were unable to be distinguished in the mapping due to the scale used (ie. 1:100 000).

A vegetation **complex** occurs where floristic entities are unable to be distinguished in an area but are known to exist discretely elsewhere. In the North East RFA area complexes were mapped as part of the pre-1750 mapping exercise on private land where sufficient information was available to determine that a group of EVCs occurred in a particular area but there was insufficient information available to accurately map the boundaries between them.

Mosaics and complexes where all components are individually described in this appendix have not been described separately.

Plains Grassy Woodland

Only one site is mapped (at Locksley) and appears to be a floristic community referred to by Foreman (in prep.) as Eastern Wet Grassland. Within the study area this vegetation occurs at the extreme eastern edge of the Northern Riverine Plains where annual rainfall is 500mm to 600mm, on Quaternary alluvial soils or (occasionally) on outwash colluvial deposits derived from adjacent Palaeozoic sediments. These soils are heavily textured throughout and are usually seasonally inundated. Scattered Grey Box *Eucalyptus microcarpa*, White Box *E. albens* and Yellow Box *E. melliodora* comprise the overstorey in the west of the study area whilst River Red Gum *E. camaldulensis* occurs further east where rainfall is higher and/or soils are more poorly drained. A sparse shrub layer of Golden Wattle *A. pycnantha*, Hedge Wattle *A. paradoxa*, Varnish Wattle *A. verniciflua* and other shrubs is often present.

Common species include Kangaroo Grass *Themeda triandra*, Wallaby Grasses *Austrodanthonia* spp., Spear Grasses *Austrostipa* spp., Common Wheat-grass *Elymus scaber*, Windmill Grass *Chloris truncata*, Common Bog-sedge *Schoenus apogon*, Little Club-sedge *Isolepis marginata*, Tall Sedge *Carex appressa*, Rushes *Juncus* spp., Black-anther Flax-lily *Dianella revoluta* s.s., Common Early Nancy *Wurmbea dioica* ssp. *dioica*, Vanilla Lily *Arthropodium* sp. aff. *strictum*, Milkmaids *Burchardia umbellata*, Yellow Bulbine-lily *Bulbine bulbosa*, Yellow Rush-lily *Tricoryne elatior*, Common Onion-orchid *Microtis unifolia*, Small Loosestrife *Lythrum hyssopifolia*, Scaly Buttons *Leptorhynchus squamatus*, Tall Sundew *Drosera peltata* ssp. *peltata*, Common Raspwort *Gonocarpus tetragynus*, Blue Devil *Eryngium ovinum*, Common everlasting *Chrysocephalum apiculatum* s.l., Common Sunray *Triptilodiscus pygmaeus*, Grassy Bindweed *Convolvulus remotus*, Grassland Wood-sorrel *Oxalis perennans*, Yellowish Bluebell *Wahlenbergia luteola* and Narrow Rock Fern *Cheilanthes sieberi* ssp. *sieberi*.

Despite the abundance of native species in this vegetation, the remnants are considered to be in moderate to poor condition due to a high frequency, cover and diversity of exotic species.

Plains Grassy Woodland is severely depleted within the study area and within Victoria. In the North East it occurs on very small, linear areas of public land such as road and rail reserves including Bonegilla, Glenrowan and Springhurst rail reserves and Boorhaman rail and road reserves. Plains Grassy Woodland in the study area is vulnerable to a variety of threats including grazing and trampling by stock, inappropriate burning regimes, weed invasion and soil disturbance associated with the maintenance of public utilities.

Equivalent unit in other studies:

Eastern Wet Grassland (in part) (Foreman in prep.).

Heathy Woodland

Heathy Woodland was observed at only one site in the study area at Jamieson Gap, north east of Jamieson on rocky maroon-coloured conglomerates. Structurally the vegetation occurs as a low, open woodland dominated in the over storey by Long-leaf Box *Eucalyptus goniocalyx* s.l. which attain a height of approximately ten metres. The understorey carries a diversity of shrubs (predominantly peas and epacrids) including Parrot Peas *Dillwynia* spp., Twisted Beard-heath *Leucopogon glacialis*, Prickly Broom-heath *Monotoca scoparia*, Daphne Heath *Brachyloma daphnoides*, and Guinea-flowers *Hibbertia* spp.. The field layer carries a dense array of grasses and herbs including Silvertop Wallaby-grass *Joycea* l., several species of daisy Asteraceae and several species of orchids.

Grassy Woodland

Floristic Community: Rainshadow Grassy Woodland

The characterisation of Rainshadow Grassy Woodland in the north-east is problematic as only one highly modified site was sampled. As a consequence, a character species table has not been produced. The information relating to the mapped locations does not have a strong correlation in terms of single site sampled and the species recorded there, however the environment (exposed sites, geology and rainfall) are correlated. Rainfall for all sites is less than 700mm per year. The parent geologies include Ordovician metamorphic rocks (primarily gneisses) and Devonian granitoids. Soils are sandy clay loams of moderate to high fertility which are deep brick red in colour.

The overstorey species vary in their dominance between Hill Red Gum *Eucalyptus blakelyi* and White Box *E. albens*. Lightwood *Acacia implexa*, Daphne Heath *Brachyloma daphnoides* and Nodding Blue-lily *Stypandra glauca* being commonly present in the understorey. Most sites are grassy with a medium to high cover of weedy herbs. Species commonly present (based on mapping) include: Five-awned Spear-grass *Pentapogon quadrifidus*, Kangaroo Grass *Themeda triandra*, Wallaby Grasses *Danthonia* spp., Elegant Hair-grass *Aira elegans*, Quaking Grass species *Briza* spp., Squirrel-tail Fescue *Vulpia bromoides* and *Bromus* spp. Forbs include Hairy Pink *Petrorhagia velutina*, Erect Chickweed *Moenchia erecta*, Pimpernel *Anagallis arvensis* and Wall Speedwell *Veronica arvensis*.

Additional mapping of pre-1750s extent shows Rainshadow Grassy Woodland to have once been extensive on the hills north of Tallangatta in the Bethanga - Talgarno area, on the hills immediately south of Wodonga and on the low, fertile hills east of the Hume Freeway between Euroa and Benalla. The geology south of Wodonga consists of granitoids and schists. Additional species from this mapping include Red Stringybark *E. macrorhyncha*, Red Box *E. polyanthemus*, Yellow Box, *E. melliodora*, Grey Box *E. microcarpa*, Apple Box *E. bridgesiana*, Drooping Sheoke *Allocasuarina verticillata*, Black Cypress-pine *Callitris endlicheri*, Red Wattle *A. rubida*, Deane's Wattle *A. deanei*, Hedge Wattle *A. paradoxa*, Currawang *A. doratoxylon* (in rocky areas), Currajong *Brachychiton populneus*, Sweet Bursaria *Bursaria spinosa*, Dense Spear-grass *Austrostipa densiflora*, Rough Spear-grass *Austrostipa scabra* ssp. *scabra*, Red-leg Grass *Bothriochloa macra*, Tall Wheat-grass *Elymus scaber*, Cane Wire-grass *Aristida ramosa* and Purple Coral-pea *Hardenbergia violacea*.

Equivalent unit in other studies:

Rainshadow Woodland (Woodgate *et al.* 1994).

Floristic Community: Foothill Grassy Woodland

Foothill Grassy Woodland has only recently been confirmed as an EVC thus it is poorly sampled and has been mapped as part of Herb-rich Foothill Forest. This vegetation occurs as a woodland to open forest on moderate to steep, fairly dissected valley slopes above rivers at foothill elevations. Aspects are generally north through to west. The overstorey is represented by a number of eucalypt species including Narrow-leaved Peppermint *Eucalyptus radiata*, Broad-leaved Peppermint *E. dives*, Brittle Gum *E. mannifera*, Eurabbie *E. globulus* ssp. *bicostata*. The shrub stratum is sparse but diverse and represented by a range of species which are usually present in adjacent EVCs, including Handsome Flat-pea *Platylobium formosum*, Prickly Bush-pea *Pultenaea juniperina* s.l., Beard-heaths *Leucopogon* spp., Honey-pots *Acrotriche serrulata*, Common Correa *Correa reflexa*, Pink-bells *Tetradlea ciliata* and Dwarf Geebung *Persoonia chamaepeuce*. Tree-form Silver Banksia *Banksia marginata* may also be present. The ground layer is high in both cover and diversity of grasses and forbs. Kangaroo Grass *Themeda triandra* and Tussock Grasses *Poa* spp., usually dominate, other species include Weeping Grass *Microlaena stipoides*, Wallaby Grasses *Austrodanthonia* spp., Bent Grasses *Deyeuxia* spp., Plume-grasses *Dichelachne* spp., Short-stem sedge *Carex breviculmis*, small Mat-rushes *Lomandra* spp., Flax-lilies *Dianella* spp., Small St. John's wort *Hypericum gramineum*, Ivy-leaf Violet *Viola hederacea*, Purple Coral-pea *Hardenbergia violacea*, Bluebells *Wahlenbergia* spp., Clustered Everlasting *Chrysocephalum semipapposum* and Hairy Pennywort *Hydrocotyle hirta*. Perennial geophytes such as orchids and lilies are common.

Floristic Community: Shrubby Granitic-outwash Grassy Woodland

This EVC occurs on north to north-western aspects on the edges of granite hills, although at the lower limit of the rainfall range it may occur on all aspects. It is restricted to freely-draining, deep sandy clay colluviums on gentle, lower slopes at altitudes of less than 300m. Rainfall ranges from 550 to 750mm and, although there is adequate run-off from the hills after rainfall, there is limited available moisture during drier periods. Within the study area it was mapped on the granite hills south of the Murray River in the far north east, Mount Pilot, Mount Barambogie, the lower gentle slopes below the Warby Range and the Strathbogie Ranges.

Floristically there is high species diversity in all strata. The overstorey includes Blakley's Red Gum *Eucalyptus blakelyi*, Red Stringybark *E. macrorhyncha*, and Red Box *E. polyanthemos*. Long-leaf Box *E. goniocalyx* and White Box *E. albens* may also be present. The dense low shrub layer is represented by a diversity of Guinea Flowers *Hibbertia* spp.. At the medium level the shrubs are scattered and dominated by Wattles *Acacia* spp.. Daphne Heath *Brachyloma daphnoides* and Common Fringe-myrtle *Calytrix tetragona* are also present and Lemon Bottlebrush *Callistemon pallidus* was found in the far north-east of the study area. The grassy ground layer is often dominated by Cane Wire-grass *Aristida ramosa* and may also include Dense Spear Grass *Austrostipa densiflora*, Rough Spear Grass *A. scabra*, Wallaby Grasses *Austrodanthonia* spp., Kangaroo Grass *Themeda triandra*, Soft Tussock-grass *Poa morrisii*. Herbs and geophytes present include Cranesbill *Geranium* sp., Stinking Pennywort *Hydrocotyle laxiflora*, Common Raspwort *Gonocarpus tetragynus*, Chocolate-lily *Arthropodium strictum*, Narrow Rock-fern *Cheilanthes sieberi*, Black-anther Flax-lily *Dianella revoluta*, Wattle Mat-rush *Lomandra filiformis*, Sun-orchid *Thelymitra* sp., Milkmaids *Burchardia umbellata*, Twining Fringe-lily *Thysanotus patersonii*, Leopard Orchid *Diuris pardina*, and Greenhood Orchids *Pterostylis* spp.

Equivalent units in other studies:

Granitic Grassy Forest (Cropper 1996)

Eastern Low-rises Grassy Woodland (ECC 1997)

Floristic Community: Slopes Box Grassy Woodland

Slopes Box Grassy Woodland was mapped on the low hills near Yarck and Gobur, west of Mansfield and east of Seymour. It may occupy low hills above Plains Grassy Woodland and Floodplain Riparian Woodland and be in association with Valley Grassy Forest which occupies adjacent protected slopes or gullies at higher rainfall. Grassy Dry Forest replaces it on steeper slopes above 500m.

This EVC is ecologically close to Rainshadow Grassy Woodland but carries fewer 'C4' grass species. It also lacks the typical rainshadow species such as Kurrajong *Brachychiton populneus*, Black Cypress Pine *Callitris endlicheri* and the suite of dry country wattles including Red-stem Wattle *Acacia rubida*, Currawang *A. doratoxylon* and Deane's Wattle *A. deanei*.

The overstorey is usually represented by Grey box *Eucalyptus microcarpa*, but White Box *E. albens* may be present (eg. in the Yarck area). The shrub stratum is low to medium height and includes Golden Wattle *Acacia pycnantha*, Hedge Wattle *A. paradoxa*, Black Wattle *A. mearnsii*, Lightwood *A. implexa*, Gold-dust Wattle *A. acinacea*, Drooping Cassinia *Cassinia arcuata*, Grey Parrot-pea *Dillwynia cinerascens*, Smooth Parrot-pea *D. sericea*, and Blue Finger-flower *Cheiranthra cyanara*. The ground layer is represented by a diversity of grasses and forbs and includes Wallaby Grasses *Austrodanthonia* spp., Spear Grass *Austrostipa* spp., Kangaroo Grass *Themeda triandra*, Tall Wheat Grass *Elymus scaber*, Black-anther Flax-lily *Dianella revoluta*, Pale Flax-lily *D. longifolia*, Wattle Mat-rush *Lomandra filiformis* and Yellow Bulbine-lily *Bulbine bulbosa*. Many of the forbs have affinities to Plains Grassy Woodland. Introduced species vary in cover, frequently observed species include St John's Wort *Hypericum perforatum*, Cat's Ear *Hypochoeris radicata* and a range of exotic pasture grasses including Tawoomba Canary Grass *Phalaris aquatica*.

Equivalent unit in other studies:

Box Woodland (Land Conservation Council 1991)

Box Woodland (Commonwealth of Australia 1997)

Creepline Grassy Woodland

Creepline Grassy Woodland is a depleted EVC and was mapped at only one site on public land in the North-East study area, on the flood-plain of the King River near Wangaratta. It was adjacent to both farmland and disturbed land, with a high proportion of weed species present. Other occurrences within the study area have been identified by the pre-1750 mapping exercise. These are largely represented as highly modified, disturbed vegetation along many of the smaller, intermittent creeks on the floodplain of larger rivers and along the ephemeral streams of the lower slopes of foothills, although some reasonably intact sites were located in Mount Pilot Multi-purpose Park near Beechworth.

Seasonal inundation and alluvial soils provide high fertility and moisture-availability which is reflected in the dominant species. The open canopy overstorey is usually dominated by River Red Gum *Eucalyptus camaldulensis*. Mountain Swamp Gum, *E. camphora* and Warby Swamp Gum, *E. cadens*, Blue Gum *E. globulus* ssp. *bicostata* and Silver Wattle *Acacia dealbata* may also be present. The sparse to dense grassy ground layer is dominated by Common Tussock-grass *Poa labillardierei* and Weeping Grass *Microlaena stipoides* with Rushes *Juncus* spp. and Flat-sedges *Cyperus* spp. were scattered throughout. Wood-sorrel species **Oxalis* spp., Blackberry **Rubus fruticosus* spp. agg. Rough

Dog's Tail **Cynosurus echinatus*, Quaking-Grasses **Briza* spp. and Sheep-Sorrel **Acetosella vulgaris* are some of the most common weed species.

Equivalent unit in other studies:

Creepline Grassy Woodland (Muir *et. al.* 1995).

Alluvial Terraces Herb-rich Woodland

The following description is based on that of Alluvial Terraces Herb-rich Woodland described by Muir *et al.* (1995). In the study area Alluvial Terraces Herb-rich Woodland occurs in Chiltern Box-Ironbark National Park. Generally it is found on the lower slopes, drainage lines and old alluvial plains of gently undulation landscapes. Poorly-drained sodic soils are derived from Ordovician sediments or Tertiary alluvium. The greater water availability and slightly higher fertility of these sites enables herbs to flourish.

The ground layer is dominated by forbs and grasses including Stinking Pennywort *Hydrocotyle laxiflora*, Coarse Lagenifera *Lagenifera huegelii*, Grassland Wood-sorrel *Oxalis perennans*, Sheep's Burr *Acaena echinata*, Yam Daisy *Microseris scapigera*, Solenogyne *Solenogyne dominii*, Common Wheat-grass *Elymus scabrus*, Rough Spear-grass *Austrostipa scabra* ssp. *falcata*, Common Bog-sedge *Schoenus apogon* and Rushes *Juncus* spp.. Geophytic lilies such as Chocolate-lily *Arthropodium strictum* and Yellow Rush-lily *Tricoryne elatior* are common as is a diverse range of annual herbs. The overstorey is very open and dominated by Yellow Box *Eucalyptus melliodora* with Grey Box *E. microcarpa* frequently co-dominant.

Gilgai Plains Woodland/Wetland Mosaic

The following description is based on that of Alluvial Terraces Herb-rich Woodland described by Muir *et al.* (1995). Additional data has enabled clarification of this EVC which has been split into Gilgai Plains Woodland/Wetland Mosaic and Alluvial Terraces Herb-rich Woodland. The latter only occurs within the study area in the Chiltern Box-Ironbark National Park.

At Reef Hills Regional Park, Gilgai Plains Woodland/Wetland Mosaic occupies old alluvial terraces of silt and clay which are no longer flooded (e.g. by the Broken River). However, these heavy soils do become inundated after winter rains as indicated by the gleyed appearance of the soil profile. Gilgai land forms occur as a result of self-mulching clays which crack and infill with crumbling peds over summer and swell with winter rain thus forming a complex series of humps and hollows. The vegetation of the humps and hollows is correspondingly complex in pattern. Vegetation in the hollows is Wetland whilst that of the raised humps are Gilgai Plains Woodland.

The overstorey is dominated by River Red Gum *Eucalyptus camaldulensis*. The understorey has scattered shrubs of Hedge Wattle *Acacia paradoxa*. The greatest diversity is in the ground layer which consists of a large number of herbs. Forbs are the dominant life form with perennial geophytes well represented. Forbs include Native Daisies *Brachyscome* spp., Goodenias *Goodenia* spp., Podolepis *Podolepis* spp. and Milkmaids *Burchardia umbellata* to name a few. Sedges, particularly *Isolepis* spp. and *Juncus* spp. are also well represented. Grasses are not common but Wallaby Grasses *Danthonia* spp. and occasionally Kangaroo Grass *Themeda australis* with the weedy Hair Grasses **Aira* spp. and Shell Grasses **Briza* also present but are not abundant.

Equivalent unit in other studies:

Alluvial Terraces Herb-rich Woodland (in part) (Muir *et. al.* 1995).

Floodplain Riparian Woodland

This community comprises the woodland vegetation which typically occurs along the banks of the larger, slower-moving rivers of the study area, including the Goulburn, Ovens and Murray Rivers. It frequently occurs in conjunction with one or more floodplain wetland communities.

River Red Gum (*Eucalyptus camaldulensis*) forms a tall, woodland canopy over a medium to tall shrub layer including Silver Wattle (*Acacia dealbata*) and Tree Violet (*Hymenantha dentata*). The ground layer features Common Tussock-grass (*Poa labillardierei*) on the drier, elevated banks, Rushes (*Juncus* spp.), Common Reed (*Phragmites australis*) and various sedge species (Cyperaceae spp.) occupying the saturated or inundated soils at the water's edge.

Environmental weeds form a major component of this community in virtually all stands. A wide variety of pasture grasses and herbs are ubiquitous.

Wetland Formation

The Wetland Formation in the study area comprises very few, small localised examples, largely due to the drainage of wetlands for agriculture. The formation described here, occurs in billabongs with

standing water and in soaks and depressions often near a larger water body. The structure is an open woodland to a treeless sedge/forb and grass-rich vegetation in which the shrub layer is sporadic and mostly non-existent. Nearly all of the environment where it could potentially occur has been dramatically altered and is invariably dominated by weed species.

The species common to undisturbed or little disturbed areas are River Red Gum *Eucalyptus camaldulensis* and Mountain Swamp Gum *E. camphora*. Shrub species may be present on the margins and include Prickly Tea-tree *Leptospermum continentale*, and Tree Violet *Hymenanthera dentata*. Common Reed *Phragmites australis* is often abundant and various sedge species including Flecked Flat-sedge *Cyperus gunnii*, Common Spike-sedge *Eleocharis acuta* and Bog-sedges *Schoenus* spp. are also abundant. Other ground flora include rushes, mainly *Juncus* spp., Water-pepper *Persicaria hydropiper* with Common Tussock-grass *Poa labillardierei* also common. The open water may support a carpet of duckweed *Lemna* spp. and/or Pacific Azolla *Azolla filiculoides*. Weeds are often a prominent component, the most common species being Bitter-cress **Rorippa* spp., Willow **Salix* spp., Bird's-foot Trefoil **Lotus* spp., Dock **Rumex* spp., Cat's Ear **Hypochoeris radicata*, Yorkshire Fog **Holcus lanatus* and Blackberry **Rubus fruticosus* spp. agg..

Equivalent units in other studies:

- Floodplain Riparian Woodland (LCC 1991)
- Floodplain Wetland Complex (LCC 1991).

Valley Grassy Forest

Relatively little Valley Grassy Forest remains in the study area, primarily due to clearing for agriculture. The combination of fertile, with good water retention capability, gently undulating lower slopes, and reasonable water availability have made such sites attractive for agriculture. Remaining examples therefore tend to be limited in extent and either adjacent to, or near private land. This proximity to cleared agricultural land facilitates weed invasion and as a consequence, Valley Grassy Forest has a relatively high weed composition. The largest example (which however is disturbed) occurs in Burrowa-Pine Mountain National Park in the Corryong area, with other smaller better quality sites being widely scattered across the study area.

The geology is generally colluvial or alluvial, of Quaternary age, and are derived from a range of geologies: on river flats, terraces and valleys floors and alluvial fans on valley sides. Other sites have soils which are colluviums derived from Devonian or Silurian igneous materials at the foot of slopes. Where organic matter and nutrients have been leached from upslope, soils are generally well developed, gradational and brown organic silty clay loams. The upper horizons may become water-logged over winter as indicated by the gleyed appearance of upper horizons of the soil profile. Altitudes range from 220m to 650m and rainfall is less than 1000mm per year.

Visually, this EVC is quite distinctive, set as it is on gentle undulating slopes with scattered eucalypts, a sparse shrub cover and, in season, a rich array of herbs, lilies and the usual grasses and sedges. At the drier end of the spectrum the ground layer may be sparse and slightly less diverse, but with the moisture-loving species still remaining. Upslope of Valley Grassy Forest on the steeper gradients the adjacent vegetation is usually Grassy Dry Forest or occasionally Shrubby or Heathy Dry Forest, with Herb-Rich Foothill Forest in the nearby moister protected environments.

Yellow Box *Eucalyptus melliodora* is often present, in association with dry forest or woodland eucalypts such as Red Stringybark *E. macrorhyncha*, White Box *E. albens* and Hill Red Gum *E. blakelyi*. Taller shrubs such as Lightwood *Acacia implexa*, Silver Wattle *A. dealbata* or Cherry Ballart *Exocarpos cupressiformis* may be present, with the ubiquitous low shrubs Grey Guinea-flower *Hibbertia obtusifolia* or Daphne Heath *Brachyloma daphnoides* scattered in low numbers and cover throughout.

The ground layer has a high proportion (and usually good cover) of both native and introduced grasses and forbs. Weeping grass *Microlaena stipoides*, Common Plume Grass *Dichelachne rara*, Common Wheat Grass *Elymus scabrus*, and the tussock grasses Grey Tussock Grass *Poa sieberiana* var. *sieberiana* and Common Tussock Grass *Poa labillardierei* are common. The usual native herbs are Kidney-Weed *Dichondra repens*, Creeping Cudweed *Euchiton gymnocephalus*, Austral Cranesbill *Geranium solanderi*, Common Raspwort *Gonocarpus tetragynus*, Small St. John's Wort *Hypericum gramineum*, Cotton Fireweed *Senecio quadridentatus*, Stinking Pennywort *Hydrocotyle laxiflora* and Sheep's Burr *Acaena* spp.. Introduced species can be common and include Cat's Ear **Hypochoeris radicata*, Pimpernel **Anagallis arvensis*, Common Centaury **Centaureum erythraea*, Sweet Vernal-grass **Anthoxanthum odoratum*, Large Quaking-Grass **Briza maxima*, Lesser Quaking-grass **Briza minor*, Clovers **Trifolium* spp. and Squirrel-tail Fescue **Vulpia bromoides*. The ground layer has an average composition of 23% weeds which constitutes 16% of the cover. A variety of lilies, sedges and mat-rushes may occur, including Common Bog-sedge *Schoenus apogon*, Short-stem sedge *Carex*

breviculmis, Chocolate-lily *Arthropodium strictum*, Wattle Mat-rush *Lomandra filiformis*, Yellow Bulbine Lily *Bulbine bulbosa*, Common Wood-rush *Luzula meridionalis* varieties and Finger Rush *Juncus subsecundus*.

At Mount Pilot Multi-Purpose Park near Beechworth a different floristic entity within this ecological vegetation class occurs. This Valley Grassy Forest grows in the soaks or depressions within gently undulating areas of Grassy Dry Forest. Soils may become water-logged over winter but remain moist year round and are brown sandy to clay loams derived from Devonian igneous intrusive materials such as granite. Hill Red Gum is usually present in the overstorey, with But But *E. bridgesiana* and Long-leaved Box / Silver Bundy *E. goniocalyx/nortonii*. Shrubs such as Silver Wattle and Prickly Tea-tree *Leptospermum continentale* may form a sparse cover, with Five-awned Spear-grass *Pentapogon quadrifidus*, Weeping Grass *Microlaena stipoides*, and Reed Bent-grass *Deyeuxia quadriseta* common in the grassy understorey. The introduced flora is unchanged, but some of the wetter ground species present also suggest a different floristic community. These may include Purple Bladderwort *Utricularia dichotoma*, Broad-leaf Rush *Juncus planifolius*, Varied Raspwort *Haloragis heterophylla* and Tall Sedge *Carex appressa*.

Equivalent units in other studies:

Herb-Rich Forest (Woodgate *et al.* 1994).

Valley Forest (LCC 1991).

Valley Grassy Forest (Muir *et al.* 1995)

Riparian Forest

Riparian Forest although widespread is relatively uncommon in the study area. This EVC is prone to weed invasion largely due to its fertile soils, abundant supply of water and the history of human and recurrent natural disturbance. Due to clearing for agriculture and the concentration of various forms of disturbance along rivers and creeks (such as mining and grazing), very few undisturbed examples remain. Riparian Forest grows along river flats and the larger creeks on Quaternary alluviums derived from a variety of parent geologies including Ordovician sedimentary and metamorphic rocks, Devonian granitoids, Lower Carboniferous and Cambrian sediments. The particle size of the soils is highly variable and can range from cobbles to silts that are randomly arranged in lenses as the result of floods. The majority of the soils' composition however, consists of moderately deep silty loams that are rich organic material in the A horizon. Rainfall is of the order of 900-1800 mm per annum with elevation in the range 600-1000 m.

The only tree species which is strongly characteristic of Riparian Forest is Manna Gum *Eucalyptus viminalis*. Tree height is mostly between 30 and 40 m which is a strong indicator of the high environmental site quality of the habitat of Riparian Forest. Numerous other eucalypts can be present, the most common of which are Narrow-leaf Peppermint *Eucalyptus radiata* s.l. and Eurabbie *E. globulus* ssp. *bicostata*. This EVC generally has a well developed secondary tree-layer which is indicative of high site quality with Blackwood *Acacia melanoxylon* and Silver Wattle *Acacia dealbata* being common.

The shrub layer is dominated by Hazel Pomaderris *Pomaderris aspera*, Tree Lomatia *Lomatia fraseri* and Prickly Currant-bush *Coprosma quadrifida*. The ground layer is generally rich in herbs, grasses and ferns. The most common forbs are Self-heal **Prunella vulgaris*, Ivy-leaf Violet *Viola hederacea*, Bidgee Widgee *Acaena nova-zelandiae*, Creeping Cudweed *Euchiton gymnocephalus* and Small-leaf Bramble *Rubus parviflorus*. Common grasses include Weeping Grass *Microlaena stipoides*, Common Hedgehog-grass *Echinopogon ovatus* and Yorkshire Fog **Holcus lanatus* in disturbed sites. Ferns characteristic of Riparian Forest include Fishbone Water-fern *Blechnum nudum*, Soft Water-fern *Blechnum minus*, Mother Shield-fern *Polystichum proliferum* and Soft Tree-fern *Dicksonia antarctica*. The Tall Sedge *Carex appressa* often dominates the high light environments such as stream bank and open areas free of shrubs.

The common and seriously invasive weeds of this EVC are Willow **Salix spp.*, Blackberry **Rubus fruticosus spp. agg.*, Cat's Ear **Hypochoeris radicata*, Self-heal, Yorkshire Fog **Holcus lanatus*, Musk Monkey Flower **Mimulus moschatus*, and White Clover **Trifolium repens*.

Equivalent units in other studies:

Riparian Forest (Woodgate *et al.* 1994).

Riparian Forest (LCC 1991).

Swampy Riparian Woodland

Once a common vegetation type along broad drainage lines with slight gradients and on lower slopes near streams or larger rivers, Swampy Riparian Woodland has been largely altered particularly by drainage for agriculture. Thus, whilst it is scattered widely in the study area, it is now depleted

within the study area. It may be found growing in broad drainage lines with slight gradients, on lower slopes near streams and less commonly in gentle basins on valley slopes in association with permanent soaks or springs, not necessarily associated with permanent streams. Rainfall is in the range of 900-1500 mm per year and the elevation range is between 300 and 800 m. Soils are mostly silt-rich river sands and gravels, although sites with heavier clay soils may also support Swampy Riparian Woodland. The soils are generally Quaternary alluviums in stream environments derived from a broad range of parent geologies which are mostly Cambrian and Ordovician marine sediments and metamorphosed sediments. Examples of this vegetation which occur in soaks away from in-stream habitats develop as gleyed soils derived from Silurian and Devonian granitoids and leucocratic granites. These soils are water-logged during much of winter and spring.

As the name suggests, the overstorey of this vegetation type has a woodland structure which often forms mosaics with wetter tree-less areas dominated by sedges, rushes and many other plants associated with riparian environments. Mountain Swamp Gum *Eucalyptus camphora* is the dominant overstorey species. A wide range of other eucalypts can be present, mainly as adventive species from the surrounding drier forests, and in the Mount Pilot (and adjacent Warby Ranges) area Warby Swamp Gum *E. cadens* grows in common association. The understorey shrubs consist of Blackwood *Acacia melanoxylon* (as it rarely reaches tree-form in this community) and Prickly Current-bush *Coprosma quadrifida*. Common Cassinia *Cassinia aculeata* and Silver Wattle *A. dealbata* are also sporadically present as adventive species from the surrounding drier vegetation. Ovens Wattle *A. pravissima*, Prickly Tea-tree *Leptospermum continentale* may also be present. The ground stratum is the most characteristic feature of this EVC and is normally dense with sedges such as Leafy Flat-sedge *Cyperus lucidus* and Tall Sedge *Carex appressa* competing for space with ferns like Fishbone Water-fern *Blechnum nudum*, Soft Water-fern *Blechnum minus* and Mother Shield-fern *Polystichum proliferum*.

There are many other plants which also occur in the Riparian Forest which compete for space between the inter-tussock gaps of sedges and ferns. Species commonly present are Bidgee Widgee *Acaena novae-zelandiae*, Water Starwort **Callitriche stagnalis*, Cat's Ear **Hypochoeris radicata*, Kidney-weed *Dichondra repens*, Cinquefoil Cranesbill *Geranium potentilloides*, Austral Brooklime *Gratiola peruviana*, Hairy Pennywort *Hydrocotyle hirta*, Musk Monkey-flower **Mimulus moschatus* and Self-heal **Prunella vulgaris*. The most common grasses (generally an uncommon life-form in this EVC) are Yorkshire Fog **Holcus lanatus* and Common Hedgehog-grass *Echinopogon ovatus*. The Showy Willow-herb *Epilobium pallidiflorum* is a depleted species and was recorded at one site in this study.

The presence of introduced species is a significant threat, particularly blackberries which can completely destroy this EVC. This is caused by disturbance in or near the stream environment which facilitates the establishment of these weeds. These infestations quickly move down-stream (even in the absence of future anthropomorphic disturbance) as a result of the natural recurrent disturbance associated with regular flooding. The construction of roads through or adjacent to this EVC allow introduced species to readily invade and often radically change the floristics and structure of the vegetation. Mean weed composition is 21% of species and 19% of cover.

Equivalent unit in other studies:

Swampy Riparian Forest (LCC 1991).

Riverine Escarpment Scrub

This EVC is described for the first time in this study although it is known from other areas south of the Great Dividing Range. It is characterised by a medium to tall shrub layer which often limits the regeneration of overstorey trees to the natural gaps in the canopy and results in a sparse overstorey. The ground layer is often open due to heavy shading. Most sites occur on Ordovician sediments or various Devonian igneous rocks including granite, granodiorite, rhyolite, rhyodacite and basalt. The soils are loamy sands often rocky and shallow in the A horizon merging to clayey sands at depth. As such the clays at depth may be palaeosols with the sandy soils of the 'A' horizon representing more recent alluvial deposits associated with flood events of the adjacent stream.

Riverine Escarpment Scrub can be equally present on gentle slopes, alluvial terraces/levee banks and near-stream steep (lower) slopes associated with rivers and the larger creeks of the study area. This EVC is restricted to the lowland and foothill country elevations of 300-650 m. Rainfall varies from 1000 to over 1500 mm per year. The overstorey is mainly Candlebark *Eucalyptus rubida* which is the most common species followed by Narrow-leaved Peppermint *E. radiata* s.l. and Manna Gum *E. viminalis*. The shrub layer is dominated by Slender Tea-tree *Leptospermum brevipes* and Burgan *Kunzea ericoides*. Other species with a generally minor presence are Hazel *Pomaderris aspera*, Sweet Bursaria *Bursaria spinosa* and Silver Wattle *Acacia dealbata*. Curiously there is generally a suite of Pomaderris species with restricted distribution present in Riverine Escarpment Scrub. These include: Blunt-leaf

Pomaderris *P. helianthemifolia* (the most common), Velvet Pomaderris *P. velutina* and Prunus Pomaderris *P. prunifolia*.

The ground layer can range from low to high diversity (which may be dependant on the time since the last disturbance) and consists of forbs, grasses and sedges. The cover of these life forms is however, generally low. The ubiquitous forbs include Bidgee Widgee *Acaena novae-zelandiae*, Kidney Weed *Dichondra repens*, Bedstraw *Galium* spp., Cranesbill *Geranium* spp., Creeping Cudweed *Euchiton gymnocephalus* and Ivy -leafed Violet *Viola hederacea*. The common grasses are Common Hedgehog-grass *Echinopogon ovatus*, Common Wheat-grass *Elymus scabrus* and Weeping Grass *Microlaena stipoides*. In sites that continue to the stream edge, sedges such as Common Bog-sedge *Schoenus apogon* and *Carex* spp. often occur. The other sedge frequently present is Variable Sword-sedge *Lepidosperma laterale*. Riverine Escarpment Scrub can have a high component of weeds in places where it extends to the stream bank and this stems from disturbances in the upstream catchment and direct disturbance by flood action or road construction or past mining.

Equivalent unit in other studies:

Not previously described, however it is known from similar habitat throughout Gippsland and the Central Highlands. It was obliquely referred to as a riverine form of Rocky Outcrop Scrub in Woodgate *et al.* (1994).

Riparian Shrubland

The stream beds of minor creeks in a restricted part of the study area were observed to have Riparian Shrubland present, however it may be more common than is delineated on the maps due to inaccessibility of substantial sections of rivers and creeks in the study area. The soils are generally infertile coarse sands and rock bars. The environment is one of periodic and severe disturbance as a result of floods. Adult eucalypts only inhabit the margins of this vegetation although saplings may be transitory in the river beds. The overstorey is dominated by a diverse array of shrubs able to withstand frequent flooding or those able to regenerate rapidly after such disturbance. Species present include Blackwood *Acacia melanoxylon*, Silver Wattle *A. dealbata*, Ovens Wattle, *A. pravissima*, Black Wattle, *A. mearnsii*, Musk Daisy-Bush *Olearia argophylla*, Burgan *Kunzea ericoides*, Prickly Currant-bush *Coprosma quadrifida*, Victorian Christmas-bush *Prostanthera lasianthos*, River Lomatia *Lomatia myricoides*, Woolly Tea-tree *Leptospermum lanigerum*, Sweet Bursaria *Bursaria spinosa*, River Bottle-brush *Callistemon sieberi*, Tree Violet, *Hymenanthera dentata* and in the moist sites Austral Mulberry *Hedycarya angustifolia*, Alpine Pepper *Tasmannia xerophylla*. Forbs and grasses either survive between severe floods on bare sand or in cracks of rocks or regenerate rapidly from seed. These include Glandular Willow-herb **Epilobium ciliatum*, Clustered Cudweed *Euchiton gymnocephalus*, Weeping Grass *Microlaena stipoides*, Spiny-headed Mat-rush, *Lomandra longifolia* and Common Tussock Grass, *Poa labillardierei* and Common Blown Grass *Agrostis avenacea*.

Equivalent unit in other studies:

Riparian Shrubland (Woodgate *et al.* 1994).

Riparian Forest/Swampy Riparian Woodland/Riverine Escarpment Scrub Mosaic

Riparian Mosaic is a mapping unit used when predicability of mapping in riparian situations was low, and more than one type of riparian vegetation was assumed to be present using aerial photograph interpretation, or where the size of different ecological vegetation classes could not be adequately represented at the 1:100,000 mapping scale. As a consequence, no character species table is supplied. It is employed where riparian sites are narrow, or where their characteristics rapidly change causing the quality and nature of the riparian vegetation to be likewise variable. Additionally such sites are usually inaccessible. Combinations of Riparian Forest, Swampy Riparian Woodland, Riverine Escarpment Scrub, Riparian Shrubland, and disturbed vegetation may be present where Riparian Mosaic has been mapped.

Granitic Hills Woodland

Granitic Hills Woodland is mostly restricted to intrusive igneous geologies in the north and west of the study area with occasional examples on acid volcanics (which have the same composition but a different origin). Parent geologies include Devonian leucocratic granites, micaceous granite and Devonian rhyodacite. The ecological vegetation class occurs on the granite country of Mount Pilot, Mount Lawson, Mount Wombat, Mount Granya and Burrowa-Pine Mountain National Park. The largest occurrence on acid volcanics is also in the Burrowa-Pine Mountain National Park. The soils which result are brown and sandy, ranging in texture from a gritty sand to a sandy clay loam. The water-holding capacity and hence moisture availability is therefore low.

Spurs and rocky outcrop slopes with a north east to westerly aspect are favoured by this EVC. Slopes vary widely from 0 to 45 degrees. The altitude range is somewhat broad, from 220 to 760m. Rainfall can reach up to 1000mm per annum but characteristically shows a high variation from year to year. Outcropping rock is common in any given locality, in either slab or as tors, covering on average 45% of sites. It is not uncommon for Granite Hills Woodland to be interspersed with Rocky Outcrop Mosaic, the delineation of the two vegetation types dependant upon the degree of soil development, with the latter having the more skeletal soils.

Two broad floristic entities emerged within this vegetation class, one from the relatively intact and not recently fire affected sites at Mount Lawson, Mount Granya and Burrowa-Pine Mountain National Park, and the other from the more disturbed and weedy sites across the study area, with varying fire histories. The level of weed invasion seems to be partly a measure of the distance of the site from sources of disturbance and weed propagules.

The overstorey of both entities is commonly a low woodland to 15m of Hill Red Gum *Eucalyptus blakelyi*, but other dry forest eucalypts such as Red Stringybark *Eucalyptus macrorhyncha* ssp. *macrorhyncha*, and Long-leaf Box/Silver Bundy *Eucalyptus goniocalyx/nortonii* can also be present. Black Cypress Pine *Callitris endlicheri* is normally found in uncleared and fire sheltered rocky areas where it can be structurally dominant, but virtually absent in sites that have suffered a history of fire and grazing. It can however occur in both floristic entities.

Understorey species of Granitic Hills Woodland include the small tree Drooping Sheoak *Allocasuarina verticillata*, and the forbs Cotton fire-weed *Senecio quadridentatus*, Nodding Blue Lily *Stypantra glauca*, Austral Carrot *Daucus glochidiatus*, Tall Raspwort *Gonocarpus elatus* and Common Raspwort *G. tetragynus*. Acacia species are common in all Granitic Hills Woodland sites, including Varnish Wattle *Acacia verniciflua*, Currawang *Acacia doratoxylon* and Red-Stem Wattle *Acacia rubida*. Dense growth of Common Fringe Myrtle *Calytrix tetragona* can result from fires or drought and sometimes gives the appearance of a monoculture. Small rock-loving species are often present including Australian Stonecrop *Crassula sieberiana* ssp. *tetramera* and Green Rock Fern *Cheilanthes austrotenuifolia*. Common introduced species include Elegant Hair-grass **Aira elegans*, Lesser Quaking-grass **Briza minor* and Squirrel-tail Fescue **Vulpia bromoides*.

An important feature of rocky granite country on which Granitic Hills Woodland occurs, is the high cover of bryophyte and lichen species usually present on both rocks and soils. *Triquitrella papillata*, *Leptodontium paradoxum* and *Bryum* spp. are the common mosses forming the soil crust. The Coral Lichens *Cladia aggregata* and *Cladia retiphora* are frequently present, sometimes forming an almost continuous ground layer amongst the vascular plants. On the rock surfaces moss species such as *Grimmia laevigata*, *Campylopus bicolor*, *Hedwigia integrifolia* and *Breutelia affinis* can be present, with the liverwort *Frullania probosciphora* sometimes epiphytic on tree trunks. After rain liverworts including *Asterella drummondii* and *Fossombronina* spp. may be evident as a part of the soil crust. Great expanses of rock may be covered with the many species of the lichen genus *Parmelia*.

Black Cypress Pine was normally present in the first floristic community, which includes all except one of the Burrowa-Pine sites. Hairy Geebung *Persoonia rigida*, along with some of the rarer Grevillea species such as Green Grevillea *Grevillea jephcottii*, Crimson Grevillea *Grevillea polybractea* and Fan Grevillea *Grevillea ramosissima*. Species of the family Fabaceae are represented by Smooth Parrot-pea *Dillwynia glaberrima*, Small-leaf Parrot-Pea *Dillwynia phyllicoides*, Showy Parrot-pea *Dillwynia sericea* and the Heathy Bush-Pea *Pultenaea procumbens*. The minimal level of weed invasion in this floristic entity may be partly due to decreased possibilities for weed growth with an increase in shrub cover, the generally poor soils and the steep topography which have preserved this EVC from clearing and fragmentation. Spider Orchids *Caladenia* spp. and Greenhood Orchids *Pterostylis* spp. are much more frequently recorded and in greater diversity than in the 'more disturbed' floristic community. Introduced species comprised less than 7% of cover and 18% of species.

In the second floristic entity Black Cypress Pine was only present in either uncleared or unburnt sites where regeneration was able to take place. The most notable difference apart from the lack of many of the shrub and orchid species is inclusion of many more introduced species eg. Large Quaking Grass **Briza maxima*, Hare's foot Clover **Trifolium arvense*, Common Mouse-ear Chickweed **Cerastium glomeratum*, Hop Clover **T. campestre*, Dwarf Rush **Juncus capitatus* and Tiny Flat-Sedge **Cyperus tenellus*. Weeds constitute 22% of the cover and 31% of the species. Rock Isotome *Isotoma axillaris* is often present amongst the rocks.

Equivalent unit in other studies:

Granitic Hills Woodland (Muir *et al.* 1995).

Box Ironbark Forest

The following description is based on that of Muir *et al.* (1995). Box Ironbark Forest only occurs within the study area in the Chiltern Box-Ironbark National Park and is one of three communities of this EVC. The community that occurs in the study area is Box Ironbark Forest (North-eastern Victoria) and is restricted to the Chiltern Box Ironbark National Park and Reef Hills Regional Park.

Box Ironbark Forests in the north-east are found on undulating rises and low rolling hills of Ordovician sediments. These soils are often stony and have low fertility and poor water-holding capacity.

These forests differ from those of the Goldfields (further west) in the development of a much denser cover of grasses, commonly about 30%. This could be attributed to the higher annual rainfall this area receives. A more developed litter layer may provide more amenable growing conditions for plants.

The most obvious species difference compared with the Goldfields communities is the replacement of Red Ironbark *Eucalyptus tricarpa* with Mugga *Eucalyptus sideroxylon*. Common Goldfields species such as Yellow Gum *Eucalyptus leucoxylon*, Gold-dust Wattle *Acacia acinacea*, Spiky Guinea-flower *Hibbertia exutiacies* and Cranberry Heath *Astroloma humifusum* are absent or uncommon in the north-east, and species such as Grey Guinea-flower *Hibbertia obtusifolia* and Dense Spear-grass *Austrostipa densiflora* become prominent. The remnant nature of these north-eastern forests, in combination with slightly better site quality, has made them susceptible to weed invasion by species such as Cat's Ear *Hypochoeris radicata* and Large Quaking-grass *Briza maxima*.

Box Ironbark forest mapped south of the Hume Highway on the low hills of Reef Hills Regional Park is referable to Sub-community 22.2 of Muir *et al.* (1995). Red Box *Eucalyptus polyanthemus* is the most common tree species, with Red Stringybark *Eucalyptus macrorhyncha* and Mugga *Eucalyptus sideroxylon* also occurring. Silky Guinea-flower *Hibbertia sericea* and Showy Parrot-pea *Dillwynia sericea* are the most frequent shrubs present. Silver-top Wallaby Grass *Chorizanthe pallida*, Kangaroo Grass *Themeda triandra* and Small St John's Wort *Hypericum gramineum* are common plants in the ground-layer.

Sub-community 22.3 of Muir *et al.*, is confined to Chiltern Box-Ironbark National Park within the study area and is characterised by the dominance of Mugga *Eucalyptus sideroxylon* with Grey Box *Eucalyptus microcarpa* as the sub-dominant tree. The dense shrub layer often contains Cat's Claws *Grevillea alpina*, Narrow-leaf Bitter-pea *Daviesia leptophylla*, Daphne Heath *Brachyloma daphnoides* and Erect Guinea-flower *Hibbertia riparia*. Grey Tussock-grass *Poa sieberiana*, Rough Spear-grass *Austrostipa scabra* ssp. *falcata*, Shiny Everlasting *Bracteantha viscosa* and Ivy Goodenia *Goodenia hederacea* are common elements of the ground layer.

Equivalent unit in other studies:

Box Ironbark Forest (North-eastern Hills) (Muir *et al.* 1995).

Clay Heathland

Clay Heathland is located in the northern section of the Mount Lawson State Park from four very restricted locations, with patch size being no more than 200m x 200m each and often much less. This vegetation is also of very limited extent in the Victorian context with the closest known location being in lowland East Gippsland. Most of the occurrences are on northern and western aspects on gentle lower slopes adjacent to or near small streams which is analogous with several sites in East Gippsland. The underlying geology is leucocratic granite and the rainfall is between 760-890mm per year. The soil (investigated at only one site in NE Victoria) was a pale yellowish brown in colour with a texture of clayey sand with quartz grains being prominent in the A horizon, becoming more compact in the B horizon and changing to a distinct white colour. The soils appear to have a water impeding capacity which often leads to the soil profile being sodden in winter and spring, however the soils appear to quickly dry out over summer. This is consistent with sites supporting this EVC in East Gippsland.

Dry forest tree species often invade over long dry periods, only to die or dieback during wet phases. Trees when present are stunted and commonly less than 20 m in height. The presence of species from both dry and moist environments may be a product of these soil characteristics which cause individual patches to have fluctuating boundaries associated with climatic fluctuations.

The overstorey consists of the ubiquitous eucalypts from the surrounding dry forests including Broad-leaved Peppermint *Eucalyptus dives*, Red Stringybark *Eucalyptus macrorhyncha* and Brittle Gum *Eucalyptus mannifera*. The structure of Clay Heathland is characterised by a dense shrub stratum consisting of Prickly Tea-Tree *Leptospermum continentale* and Silver Banksia *Banksia marginata*. Species more typical of the dry surrounding forest occur as a result of the small patch size such as Small-leaf Parrot-pea *Dillwynia phyllicoides* and Heathy Bush-pea *Pultenaea procumbens*.

Some of the forbs, grasses and small shrubs are also present in the surrounding vegetation and include Narrow Groundsel *Senecio tenuiflorus*, Grass Trigger Plant *Stylidium graminifolium*, Pink-bells *Tetratea ciliata*, Common Plume Grass *Dichelachne rara*, Velvet Wallaby -grass

Austrodanthonia pilosa var. *paleacea*, Slender Rice-flower *Pimelea linifolia* ssp. *linifolia* and Grey Tussock-grass *Poa sieberiana* var. *sieberiana*. These species can tolerate seasonally wet soils, however there are a suite of species which are not common in the surrounding vegetation which prosper on wet soils, but can tolerate dry conditions over summer. These species include Dwarf Boronia *Boronia nana* var. *hyssoifolia*, Milkmaids *Burchardia umbellata*, Common Hedgehog-grass *Echinopogon ovatus*, Prickly Tea-tree *Leptospermum continentale*, Violet Kunzea *Kunzea parvifolia*, Weeping Grass *Microlaena stipoides* var. *stipoides*, Common Bog-sedge *Schoenus apogon*, Kangaroo Grass *Themeda triandra* and Showy Violet *Viola betonicifolia* ssp. *betonicifolia*. This flora combines to produce the characteristic composition and appearance of Clay Heathland.

Introduced species are generally low in cover and diversity, probably due to the seasonally waterlogged soils and the dense cover of the shrub stratum. Track construction in the vicinity of this class may have a detrimental effect by altering the drainage patterns influencing these sites.

Equivalent unit in other studies:

Clay Heathland (Woodgate *et al.* 1994).

Spring Soak Herbland

Spring-soak Herbland is widespread but rare and very localised in the study area. It is a seasonal wetland community dominated by indigenous herbaceous perennials. It is completely dependent on the continual availability of a reliable water supply and is threatened by changes to the hydrological regime, stock trampling and weed invasion. With intact and relatively weed-free stands now rare and of regional significance (Cameron and Moorrees unpubl.).

Spring Soak Herbland is a herbland. However, many other life forms such as sedges and rushes are common. The usual species are cited here from a site which is not in the study area but is a good example of this ecological vegetation class as it occurs within the study area. The common herbaceous species include the vulnerable Narrow Goodenia *Goodenia macbarronii* which is characteristic of this EVC, Common Onion Grass *Romulea rosea*, Square Cicienda *Cicienda quadrangularis*, Pale Sundew *Drosera peltata* ssp. *peltata*, Small Mud-mat *Glossostigma elatinoides*, Swamp Isotome *Isotoma fluviatilis*, Small St. John's Wort *Hypericum gramineum*, Matted St. John's Wort *Hypericum japonicum*, Smooth Cat's Ear *Hypochoeris glabra*, Cat's Ear *Hypochoeris radicata*, Small Wrinklewort *Rutidosus multiflora*, and Solenogyne *Solenogyne dominii*. The common sedges include Common Bog-sedge *Schoenus apogon*, Awned Club-sedge *Isolepis hystrix* and Slender Aphelia *Aphelia gracilis*. Rushes are represented by common species such as Dwarf Rush *Juncus capitatus*, and *Juncus sp. (A) sensu L. Johnson*. Grasses are mostly weed species like Lesser Quaking -grass *Briza minor* and Squirrel-tail Fescue *Vulpia bromoides*. Some sites have a eucalypt overstorey which may include Warby Swamp Gum *Eucalyptus cadens* (Mount Pilot area), Blakley's Red Gum *E. blakelyi* (Warby Range, Glenrowan and Euroa areas) and Long-leaf Box *E. goniocalyx/ E. nortonii* (Euroa area).

The pre-1750 mapping exercise determined that this EVC occurs within an association of several EVCs arranged in radial zones around a moisture source. The wetter centre (Wetland Formation) contains taller sedge species and occasionally Ground Fern *Hypolepis* sp.. This is surrounded by a shrubby woodland (Swampy Riparian Woodland or Clay Heathland) and the outer edge, which occasionally dries out, is predominantly herb-rich (Spring-soak Herbland/Woodland Mosaic).

Equivalent units in other studies:

Spring Soak Herbland (Cameron and Moorrees unpubl.).

Rocky Outcrop Shrubland/Herbland Mosaic

Rocky Outcrop Shrubland/Herbland Mosaic occurs mainly in the low to moderate elevations (400-1000 m) in areas such as the northern Strathbogie Ranges, Mount Wombat, Mount Pilot Multi Purpose Park, Mount Lawson State Park and Burrowa-Pine Mountain National Park. The EVC occurs mostly on Devonian igneous substrates primarily granites, but less commonly also on acid volcanics and rarely on the Carboniferous conglomerate on the escarpments of the Wabonga Plateau. The soils are generally skeletal and moisture availability is generally very low, except in the cracks between rock surfaces. Rainfall is generally less than 1000mm per year. Most sites have between 50-90% exposed rocky substrate, which with the absorption of sunlight become extremely hot, particularly in summer.

The structural characteristics of the EVC are generally the presence of low shrubs, occasional eucalypts, a low ephemeral ground cover and high bryophyte cover. Introduced species often form a significant component of this class, with 18 % of species and 13 % of cover.

Eucalypts may or may not be present, the most common being Hill Red Gum *Eucalyptus blakelyi*. Any of the eucalypts from the surrounding dry forest can be present. In the Mount Pilot area,

Burrowa-Pine Mountain National Park and Mount Lawson State Park Black Cypress-pine *Callitris endlicheri* can be an overstorey component. The shrub stratum is often dense, except in sites with higher cover of outcropping rock. The common species are Common Fringe-myrtle *Calytrix tetragona*, Shiny Cassinia *Cassinia longifolia*, Nodding Blue-lily *Stypandra glauca* and Vanish Wattle *Acacia verniciflua*. Daphne Heath *Brachyloma daphnoides* is a ubiquitous species of Rocky Outcrop Shrubland/Herbland Mosaic in Mount Pilot Multi-Purpose Park. The cover of ferns, forbs and grasses is generally low and the dominant species are Green Rock Fern *Cheilanthes austrotenuifolia*, Elegant Hair-grass *Aira elegans*, Rock Isotome *Isotoma axillaris*, Common Centaury **Centaurium erythraea*, Creeping Cudweed *Euchiton gymnocephalus*, Austral Cranesbill *Geranium solanderi*, Common Raspwort *Gonocarpus tetragynus*, Small St John's Wort *Hypericum gramineum* and Spoon Cudweed *Stuartina muelleri*. Tiny Daisy *Brachyscome ptychocarpa* and the Hairy Hop-bush *Dodonaea boroniifolia* are both rare species recorded Rocky Outcrop Shrubland/Herbland Mosaic.

Equivalent units in other studies:

Rocky Outcrop Shrubland (LCC 1991)

Rocky Outcrop Shrubland (Woodgate *et al.* 1994)

Rocky Outcrop Shrubland/Herbland Mosaic (Muir *et al.* 1995, in part)

Grassy Dry Forest

Grassy Dry Forest is scattered throughout the north-east in areas which receive moderate annual rainfall (700-1000mm). What remains, occurs mostly on lower slopes along the northern edge of the public land in close proximity to farmland. Although less fertile than the northern plains, these areas do have higher effective precipitation. Much of this marginal farmland at the foot-slopes of the Great Dividing Range in the study area was once Grassy Dry Forest. In these localities Grassy Dry Forest usually occurs on the drier northern or western aspects with gentle slopes. On the adjacent steeper slopes and rocky hill tops Heathy Dry Forest develops. However in areas of lower rainfall and poorer fertility, Heathy Dry Forest occupies the northern and western aspects and Grassy Dry Forest more commonly grows on the moister eastern or north-eastern aspects. Overall, Grassy Dry Forest occurs on a variety of gradients and altitudes ranging from 300m on gently undulating terrain to 850m mostly on steeper slopes. In the higher elevation areas, it can also occur on broad gentle ridges, and occasionally on isolated knolls at 1000m such as Mount Big Ben.

This EVC may occur on a range of geologies, the critical factor being that the resultant soils are moderately fertile and well developed with good moisture-holding capacity. Geologies include Ordovician mudstone and siltstone, Silurian metamorphics such as schist or gneiss with Devonian granite, rhyodacites are also common. Soils tend to be gradational sandy to clay loams which are brown in colour with moderate organic content.

Grassy Dry Forest is a low to medium height forest mostly 15 to 20m, sometimes resembling a woodland, with a sparse to densely grassy ground layer. At the moister sites this vegetation has a high diversity and cover of forbs and grasses. Shrub cover and diversity tends to be low. Close proximity to farmland and moderate fertility often result in the presence of weeds, averaging 15% of diversity and 12% of cover.

The most common eucalypts in Grassy Dry Forest are Red Stringybark *Eucalyptus macrorhyncha*, Long-leaved Box / Silver Bundy *E. gonicalyx / nortonii* and Broad-leaved Peppermint *E. dives*. Shrubs present may include Silver Wattle *Acacia dealbata*, Honey Pots *Acrotriche serrulata*, Common Hovea *Hovea linearis*, Grey Guinea-flower *Hibbertia obtusifolia*, Slender Rice-flower *Pimelea linifolia* ssp. *linifolia* and Cherry Ballart *Exocarpos cupressiformis*. The ground layer constitutes most of the species diversity for this EVC, with up to 60 species in this stratum. Common grasses include Silver-top Wallaby-grass *Chionochloa pallida*, Velvet Wallaby-grass *Austrodanthonia pilosa* var. *pilosa*, Common Plume-grass *Dichelachne rara*, Common Wheat-grass *Elymus scabrus*, Grey Tussock-grass *Poa sieberiana* var. *sieberiana*, Weeping grass *Microlaena stipoides*, and weedy grasses such as Large Quaking-grass **Briza maxima*, Elegant Hair-grass **Aira elegans*, Yorkshire Fog **Holcus lanatus*. Common herbaceous species include Stinking Pennywort *Hydrocotyle laxiflora*, Common Woodrush *Luzula meridionalis* var. *flaccida*, Small St. John's Wort *Hypericum gramineum*, Austral Cranesbill *Geranium solanderi*, Small Poranthera *Poranthera microphylla*, Common Raspwort *Gonocarpus tetragynus*, Creeping Cudweed *Euchiton gymnocephalus*, Cotton Fireweed *Senecio quadridentatus*, Tall Sundew *Drosera peltata* ssp. *auriculata* and the ubiquitous weedy species Cat's Ear **Hypochoeris radicata*. One species, Southern Tick-trefoil *Desmodium gunnii* occurs sporadically in Grassy Dry Forest but rarely in any other ecological vegetation class in the study area.

Addition mapping of pre-1750s vegetation found Grassy Dry Forest occurring at lower elevations (less than 500m) in both moister situations in the drier western end of the study area and in the more exposed situations in the wetter parts of the study area. In areas of higher rainfall (approximately 1000mm) it is found on the more exposed (northern and western) lower slopes. In the mid-range

rainfall areas it may develop on all aspects depending on slope. In areas of lower rainfall (700mm) Grassy Dry Forest tends to occupy the protected south facing slopes. 'Cappings' of EVCs which prefer drier habitats (eg. Heathy Dry Forest and Rocky Outcrop Mosaic) often occupy adjacent steep or exposed ridge-lines or slopes. There may be several floristic communities present based on geography, altitude and rainfall. On private land Grassy Dry Forest occupies lower altitude and lower rainfall habitats as the lower, grassy edges of the hills were more accessible for agriculture and thus often depleted.

Equivalent units in other studies:

Dry Sclerophyll Forest (LCC 1991).

Grassy Dry Forest (Woodgate *et al.* 1994)

Grassy Dry Forest (Northern Foothills) (Muir *et al.* 1995)

Shrubby Dry Forest

This common and widespread ecological vegetation class favours exposed aspects in the higher altitudes, generally from 550 to 1100 metres. Medium to steep eastern, northern and western upper slopes commonly support Shrubby Dry Forest and also occurs on ridge lines and near-ridge southern aspects that are marginally protected. Rainfall is frequently less than 1000mm per annum, but the class can occur in areas which receive up to 1500mm. However the effective rainfall on all sites is low as a result of the exposed aspects, shallow soils and often steep sites.

Shrubby Dry Forest exists on a range of geologies, predominantly Ordovician sediments, but Ordovician metamorphic schists and Devonian-Silurian igneous materials are also common. Resultant soils range from brown to dark brown sandy loams to clay loams, often rocky and usually quite shallow.

The height of the overstorey varies greatly, from 8 to 40 m, though 20-25 m is the most common. Compared to other dry forest vegetation classes the trees in Shrubby Dry Forest have a good form. The understorey consists of a moderately dense shrub layer up to 2 m and a very sparse ground layer of drought tolerant grasses, herbs and lilies. It is characteristically a non-weedy vegetation class because of its generally remote occurrence and moderate to low environmental site quality.

The dominant overstorey trees are Broad-leaved Peppermint *Eucalyptus dives* and Brittle Gum *E. mannifera*. Red Stringybark *E. macrorhyncha* is a more common component in the driest sites, and Mountain Gum *E. dalrympleana* occurs at the higher altitudes near this ecological vegetation class' boundary with Montane Dry Woodland.

The shrubby understorey commonly comprises Dwarf Geebung *Persoonia chamaepeuce*, Rough Coprosma *Coprosma hirtella*, Slender Rice-flower *Pimelea linifolia* ssp. *linifolia*, Common Cassinia *Cassinia aculeata*, Handsome Flat-Pea *Platylobium formosum*, Silver Wattle *Acacia dealbata* and Gorse Bitter-Pea *Daviesia ulicifolia*. Hop Bitter-Pea *Daviesia latifolia* can be dominant as a result of frequent burning. Low shrubs such as Heath Pink-Bells *Tetradlea bauerifolia*, Pink-Bells *Tetradlea ciliata* and Grey Guinea-Flower *Hibbertia obtusifolia* are also frequently present. Two shrubs, Heath Milkwort *Comesperma ericinum* and Rough Star-hair *Astrotricha asperifolia* occur sporadically in Shrubby Dry Forest, but rarely in any other ecological vegetation class in the study area.

If burnt very frequently, or left unburnt for long periods, the ground layer may have Silvertop Wallaby-grass *Chionochloa pallida* as the dominant species. Other grasses include Common Plume-grass *Dichelachne rara*, Plume-grass *Dichelachne sieberiana* s.s., and the rare grass Soft Ledge-grass *Poa hothamensis* var. *parviflora*. The drought and fire-tolerant mat-rushes, sedges and lilies present can include Wattle Mat-rush *Lomandra filiformis* ssp. *filiformis*, Cluster-headed Mat-Rush *Lomandra longifolia* ssp. *exilis*, Black-anther Flax-lily *Dianella revoluta* var. *revoluta* and Common Woodrush *Luzula meridionalis* var. *flaccida*. Though not present in large numbers the consistently represented forbs include Common Raspwort *Gonocarpus tetragynus*, Creeping Cudweed *Euchiton gymnocephalus*, Small Poranthera *Poranthera microphylla* and Stinking Pennywort *Hydrocotyle laxiflora*. The Purple Coral-pea *Hardenbergia violacea* and Grass Trigger-plant *Stylidium graminifolium* are also common.

In the altitudinal sequence of north east Victoria Shrubby Dry Forest often grades into Heathy Dry Forest at lower elevations (approximately 500-600 m) and Montane Dry Woodland at montane elevations (approximately 1000 m). However, on very exposed aspects in montane situations (up to 1200 m) Shrubby Dry Forest can persist but can abruptly become Montane Dry Woodland with a slight decrease in insolation allowing snow to persist.

Equivalent units in other studies:

Montane Dry Woodland (in part) (LCC 1991)

Shrubby Dry Forest (Woodgate *et al.* 1994).

Heathy Dry Forest

This EVC is widespread and common throughout most of the study area, particularly from low to moderate elevations (200-1000 m) on exposed northern and western slopes and ridge tops. The free-draining soils are derived from Ordovician sediments, Devonian granitoids and Rhyolite. The nutrient levels of these soils are low due to their generally sandy texture and low levels of organic matter. Rainfall is generally less than 1000 mm per annum. In higher rainfall areas, Heathy Dry Forest grows on sites that have a low effective rainfall.

The overstorey is characteristically low (mostly 15-20 m), but can reach 30 m on exceptional sites with higher rainfall. The overstorey mostly consists of Red Stringybark *Eucalyptus macrorhyncha* and Long-leaf Box /Silver Bundy *E. goniocalyx/nortonii*. These ubiquitous species combine with Broad-leaved Peppermint *E. dives* in some situations and with Red Box *E. polyanthemos* in higher environmental site quality locations grading into Grassy Dry Forest on less exposed aspects.

The shrub layer is the most characteristic and dominant stratum which gives Heathy Dry Forest its name. Ericoid and small-leaved shrubs, often of low stature (rarely exceeding 0.5 m) include Small-leaf Parrot-pea *Dillwynia phyllicoides* and Daphne Heath *Brachyloma daphnoides*. Less common species are Silky Guinea-flower *Hibbertia sericea*, Common Wedge-pea *Gompholobium huegelii*, Austral Grass-tree *Xanthorrhoea australis*, Heathy Bush-pea *Pultenaea procumbens* and Urn Heath *Melichrus urceolatus*. The Cat's Claws Grevillea *Grevillea alpina* and Hairy Geebung *Persoonia rigida* are common with Grey Bush-pea *Pultenaea cunninghamii* dominant in the Whitfield-Buffalo River area, mainly on acid volcanics. Other geology types include Lower Carboniferous and Ordovician sediments. There are a few species which sporadically occur in Heathy Dry Forest which do not generally inhabit other ecological vegetation classes in the study area. These species are Thin-leaf Wattle *Acacia aculeatissima*, Ploughshare Wattle *A. gunnii* and Hairy Plume-grass *Dichelachne hirtella*.

There are few grasses or forbs in this ecological vegetation class, although Silvertop Wallaby-grass *Chionochloa pallida* is usually present. Herbs present are drought tolerant. Ground layer species commonly include Black-anther Flax-lily *Dianella revoluta* var. *revoluta*, Large Quaking-grass **Briza maxima*, Common Hovea *Hovea linearis*, Variable Stinkweed *Opercularia varia*, Stinking Pennywort *Hydrocotyle laxiflora*, Many-flowered Mat-rush *Lomandra multiflora*, Narrow Groundsel *Senecio tenuiflorus* and Grass Trigger-plant *Stylidium graminifolium*. Weeds are generally not a major component of this EVC. However due to edge effects, sites near disturbed land can have a significant presence of weeds.

Many observations throughout the study area have indicated the critical importance of fire regimes in maintaining the shrub component of Heathy Dry Forest. A single fire at the wrong stage in the reproductive cycle of species in Proteaceae (particularly in the Genus *Grevillea*), can completely remove that species from a site. On granitic geologies repeated burning was observed to have produced a quantum shift in the floristics from Heathy Dry Forest to Grassy Dry Forest as the fire-sensitive shrub species (*Monotoca*, *Brachyloma*, *Grevillea*, *Persoonia*, *Banksia*, *Gompholobium* and *Dillwynia*) were eliminated and a diverse range of grasses and forbs established. This is particularly evident in the Mount Pilot Multi Purpose Park, where Heathy Dry Forest appears to be in severe decline in favour of Grassy Dry Forest as the result of past burning. Similarly, frequent burning in Heathy Dry Forest on sedimentary or acid volcanic (rhyodacite) geology appeared to lead to a loss in species from these genera as well. In contrast however to those sites on granitic geologies, these sites did not develop a diverse array of grasses and forbs, but were often only dominated by Silvertop Wallaby-grass *Chionochloa pallida*. This floristic entity is described separately, below.

Equivalent units in other studies:

Heathy Dry Forest (LCC 1991)

Heathy Dry Forest (Woodgate *et al.* 1994)

Heathy Dry Forest (North-eastern Hills), in part (Muir *et al.* 1995)

Heathy Dry Forest (Northern Foothills), in part (Muir *et al.* 1995)

The second floristic entity was encountered over substantial areas but in only four locations in the north and west of the study area and was generally not on granitic geology. Structurally this entity is a low open forest with a sparse shrub cover, the outstanding feature of which, being the dominance of Silvertop Wallaby-grass *Chionochloa pallida*. Large tussocks of Silver-top Wallaby-grass can crowd out most other ground layer species, often having a cover-abundance of over 50%. Consequently this entity is very species poor.

Aspects seem to vary for this form of Heathy Dry Forest, but most are exposed, north eastern to western slopes. Slopes range from gentle to steep, with most sites on a gentle gradient. Altitude varies

from 220 m to 680 m. Soils tend to have a high component of sand or rock with low to moderate nutrient status and poor moisture-holding ability.

Characteristic eucalypts are always dry forest species, namely Red Stringybark *Eucalyptus macrorhyncha*, Long Leaved Box / Silver Bundy *E. goniocalyx* / *nortonii*, Broad-leaved Peppermint *E. dives* and Brittle Gum *Eucalyptus mannifera*. Shrub species if present can include Grey Guinea-flower *Hibbertia obtusifolia*, Common Hovea *Hovea linearis*, Trailing Ground-berry *Acrotriche prostrata*, Narrow-leaf Bitter-Pea *Daviesia leptophylla* and Silver Wattle *Acacia dealbata*. Other species which may occur are Spiny-headed Mat-Rush *Lomandra longifolia*, Grassland Daisy *Brachyscome angustifolia*, Nodding Blue-Lily *Stypandra glauca* and Long-hair Plume-grass *Dichelachne crinita*. Weedy species have a low cover and diversity.

Equivalent unit in other studies:

Not previously described.

Herb-rich Foothill Forest

Herb-rich Foothill Forest is widespread and common throughout the study area on both public and private land except at the lowest elevations (200 -300m) and at higher elevations (greater than 1200 m). The EVC grows mostly on sheltered aspects and the occurrences on exposed sites are generally on lower slopes which afford sufficient protection, through afternoon shading by surrounding hills, or persistent high humidity such as along river or creek valleys. However, the amount of protection required varies with rainfall. For example, there are extensive areas of this EVC on plateau landforms such as in the Strathbogie Ranges, Whitfield and Freeburgh districts where higher rainfall and persistent cloud cover replaces the need for the requirement of topographic protection whilst under the lowest rainfall regimes this EVC is entirely restricted to gullies and valley sides with southern or eastern aspects. Optimal rainfall is wide ranging from 760-1600 mm per annum..

This ecological vegetation class occupies an extremely wide range of geological types which include outwash alluviums, Ordovician sandstones and metamorphics, Devonian and Silurian granitoids and Cambrian greenstone/diabase. As such, it appears aspect and moisture availability are the primary environmental determinants for this EVC. The consequent soil types vary from sandy loams to medium clays. On the drier sites tree height is 20-25 m and on the moister sites is commonly 40-50 m.

The structure is an open forest with a sparse to very dense shrub layer and commonly high cover of herbs in the ground layer. Austral Bracken *Pteridium esculentum* may tend to dominate following frequent disturbance, particularly by fire. The diversity is moderate to high with mean floristic richness being 54 species per site (higher elevation sites have lower diversity).

The most common overstorey species are Narrow-leaf Peppermint *Eucalyptus radiata* s.l. and less commonly: Eurabbie *Eucalyptus globulus* ssp. *bicostata* (often on granitic geology), Mountain Gum *Eucalyptus dalrympleana* ssp. *dalrympleana* (more prominent at higher altitudes) with Broad-leaved Peppermint *Eucalyptus dives* at drier localities. The shrub layer consists of sparse to dense Silver Wattle *Acacia dealbata*, Common Cassinia *Cassinia aculeata*, Prickly Currant-bush *Coprosma quadrifida* and Tree Lomatia *Lomatia fraseri* (prominent in the moist sites), while Handsome Flat-pea *Platylobium formosum*, and Pink-bells *Tetratheca ciliata* are conversely more abundant in the drier examples of Herb-rich Foothill Forest.

The forbs and grasses are the most distinctive floristic and structural indicator for Herb-rich Foothill Forest because of their generally high cover and diversity. Common species are Bidgee Widgee *Acaena nova-zelandiae*, Ivy-leaf Violet *Viola hederacea*, Prickly Woodruff *Asperula scoparia*, Kidney-weed *Dichondra repens*, Austral Bear's-ears *Cymbonotus preissianus*, Common Lagenifera *Lagenifera stipitata*, Common Woodrush *Luzula meridionalis* var. *flaccida* and the Tasmanian Flax-lily *Dianella tasmanica*.

Grasses are the other conspicuous life form, the most common species being Weeping Grass *Microlaena stipoides* var. *stipoides*, Common Wheat-grass *Elymus scabrus*, Common Hedgehog-grass *Echinopogon ovatus* and Grey Tussock-grass *Poa sieberiana* var. *sieberiana*. Austral Bracken occurs in almost all sampling sites and Mother Shield-fern *Polystichum proliferum* is often present in moist sites. Climbers are represented by Twining Glycine *Glycine clandestina* and Mountain Clematis *Clematis aristata*, particularly in moist sites with a moderate to dense shrub layer. The rare species Soft Ledge-grass *Poa hothamensis* var. *parviflora* appears to be largely restricted to Herb-rich Foothill Forest.

This vegetation can be adversely affected by disturbances resulting in weed invasion, the most serious weed species being *Blackberry *Rubus fruticosus* spp. agg..

Equivalent units in other studies:

Herb-rich Foothill Forest (LCC 1991)

Herb-rich Forest (in part) (Woodgate *et al.* 1994).

Damp Forest

Damp Forest is widespread, but not common in the study area. It grows in gullies or on sheltered southern and south eastern slopes and is often restricted and localised in extent, except in the highest rainfall areas. The elevation range is from 600-1000 m and the rainfall ranges from 900-1600 mm per annum. The parent geologies are wide ranging and include Devonian and Silurian igneous rocks, Ordovician metamorphic and sedimentary rocks, Cambrian, Lower Carboniferous and upper Devonian sediments.

The soils are generally deep loams with medium to high levels of humus which are colluvially-formed and are well structured. Moisture availability is generally good due to the high rainfall and the development of good peds in the regolith. The height of the overstorey varies from 30-50 m. Damp Forest is characterised by a moderate to dense broad-leaved shrub layer, the tree stratum consisting of species from moist environments and the ground layer normally mostly ferns with grasses and herbs being a minor component.

The overstorey is mostly represented by Messmate *Eucalyptus obliqua*, Narrow-leaved Peppermint *Eucalyptus radiata* s.l. and Eurabbie *Eucalyptus globulus* ssp. *bicostata*. There is consistently a medium to tall shrub layer of Musk Daisy-bush *Olearia argophylla*, Hazel Pomaderris *Pomaderris aspera*, Blackwood *Acacia melanoxylon* and Blanket Leaf *Bedfordia arborescens*. The most common species of the ground layer consists of ferns with Common Ground-fern *Calochlaena dubia*, Fishbone Water-fern *Blechnum nudum* and Austral Bracken *Pteridium esculentum* being common. Some herbs and grasses are usually present, but with a low dominance and include Ivy-leaf Violet *Viola hederacea*, Kidney Weed *Dichondra repens*, Cinquefoil Cranesbill *Geranium potentilloides*, Common Woodrush *Luzula meridionalis* var. *flaccida* and Weeping Grass *Microlaena stipoides*.

Equivalent units in other studies:

Damp Sclerophyll Forest (LCC 1991)

Damp Forest (Woodgate *et al.* 1994).

Wet Forest

This ecological vegetation class is relatively uncommon and occurs at moderate elevations (500-1300 m) and is characterised by a tall eucalypt overstorey, scattered understorey trees, a tall broad-leaved shrubby understorey and a fern-rich ground layer that is usually dominated by a dense layer of tree-ferns. It is largely restricted to protected sites in gullies and on southern aspects. Rainfall is high ranging from 1200-1800 mm per year. The parent geologies are variable, the common types being Ordovician sediments, followed by Silurian metamorphic and igneous rocks, Devonian igneous and Lower Carboniferous sediments.

Soils are deep gradational clay or sandy clay loams rich in humus. Moisture availability is high due to the high rainfall and moisture retaining ability of the humus and litter layer component of the soils. Trees are generally very tall when present, often surrounding or overhanging from an adjacent ecological vegetation class. Within Wet Forest there are very localised occurrences of Cool Temperate Rainforest species such as Southern Sassafras *Atherosperma moschatum*, which rarely coalesce to form patches with a continuous canopy.

The overstorey of Wet Forest is the tallest of any ecological vegetation class in the study area and may attain heights of 70 m. The dominant overstorey species are Alpine Ash *Eucalyptus delegatensis* and Mountain Gum *Eucalyptus dalrympleana* with Manna Gum *Eucalyptus viminalis* and Narrow-leaf Peppermint *Eucalyptus radiata* s.l. occurring less frequently. There is usually an understorey of small trees such as Silver Wattle *Acacia dealbata* and Blackwood *A. melanoxylon*. The tall shrub layer is dominated by Austral Mulberry *Hedycarya angustifolia*, Musk Daisy-bush *Olearia argophylla*, Hazel Pomaderris *Pomaderris aspera* and Blanket-leaf *Bedfordia arborescens*. Beneath these there is nearly always a dense layer of Soft Tree-fern *Dicksonia antarctica*.

The groundlayer is dominated by ferns with Fishbone Water-fern *Blechnum nudum*, Mother Shield-fern, *Polystichum proliferum*, Mother Spleenwort *Asplenium bulbiferum*, Bat's Wing-fern *Histiopteris incisa* and Hard Water-fern *Blechnum watsii* the most usual. There may be a scattering of herbs where light can penetrate to the forest floor. The common forbs include Ivy-leaf Violet *Viola hederacea*, Shade Nettle *Australina muelleri*, White Elderberry *Sambucus gaudichaudiana* and Forest Starwort *Stellaria flaccida*. The species described thus far are common in undisturbed forests. After disturbance such as fire, roading or logging a thick profusion of pioneer species clothe the groundlayer. These species grow and reproduce quickly, then largely die out. Such species include the shrubs Common Cassinia *Cassinia aculeata*, Victorian Christmas-bush *Prostanthera lasianthos*, the forbs Golden Everlasting *Bracteantha bracteata*, Fireweed Groundsel *Senecio linearifolius* and Raspwort *Gonocarpus sp.*. Blackberry **Rubus fruticosus* can be a serious weed in areas disturbed by roading, other infrastructure and timber harvesting.

Equivalent units in other studies:
Wet Sclerophyll Forest (LCC 1991)
Wet Forest (Woodgate *et al.* 1994).

Montane Dry Woodland

Montane Dry Woodland occurs on dry and exposed mid to upper slopes at montane elevations (greater than 1000 m), often extending onto the ridges. In the highly dissected terrain where Shrubby Dry Forest can exist at marginal montane levels on warm aspects where snow does not persist, Montane Dry Woodland develops on the adjacent slightly colder aspects where snow can remain for substantial periods. Influences from surrounding topography particularly cloud and cold-air drainage can also be significant in terms of the amount of snow fall and its persistence. Generally Montane Dry Woodland is widespread and common in the southern or highland part of the study area, up to 1350 m altitude. Precipitation is generally around 1000 mm, but reaching up to 1500 mm at Mount Buffalo and 2000 mm at Mount Bogong. Much of this precipitation outside the summer months falls as snow. Geologies are predominantly Ordovician sediments although there are also areas of Devonian igneous materials and Silurian metamorphics. Soils range from brown sandy loams to loamy clays, often tending to be shallow and rocky but sometimes better developed.

Montane Dry Woodland has a variable structure, from an open woodland to an open forest with a denser shrub stratum. The overstorey structure may be a result of past disturbance such as frequent burning which can increase tree density in this ecological vegetation class (Woodgate *et al.* 1994), or the structure may be site specific. Trees can attain heights of 40-45 m in sheltered positions (although generally less). The weed abundance is low, averaging 3% of species and 1% of cover. Species diversity is also low for this study area, with a mean diversity of 36 species per site.

Broad-leaved Peppermint *Eucalyptus dives* and Mountain Gum *E. dalrympleana* ssp. *dalrympleana* are common overstorey trees at the lower elevations within this class, whilst Alpine Ash *E. delegatensis* ssp. *delegatensis* is usual at higher altitudes or simply on more protected sites affording greater moisture availability. It is not uncommon for Snow Gum *Eucalyptus pauciflora* to be present in the overstorey on sites which are particularly cold and exposed, mostly towards the upper limit of the elevation range.

The understorey is an unusual combination of species which tolerate exposed montane conditions and species which enjoy the increased moisture available from cloud and fog drip. The generally shrubby understorey may have combinations of Hop Bitter-Pea *Daviesia latifolia*, Rough Coprosma *Coprosma hirtella*, Moth Daisy-bush *Olearia erubescens*, Mountain Hickory Wattle *Acacia obliquinervia*, Tree Lomatia *Lomatia fraseri*, Common Cassinia *Cassinia aculeata*, Elderberry *Panax Polyscias sambucifolia*, Mountain Pepper *Tasmannia lanceolata*, Alpine Podolobium *Podolobium alpestre* and Silver Wattle *Acacia dealbata*. If frequently burnt Austral Bracken *Pteridium esculentum* and Hop Bitter Pea can dominate. The ground layer is rarely high in grass and forb cover however some of the more typical grass species are Sword Tussock-grass *Poa ensiformis*, Tasman Bent-grass *Deyeuxia rodwayi*, Mountain Bent-grass *Deyeuxia monticola*, Common Wheat-grass *Elymus scabrus* and various Wallaby Grasses *Austrodanthonia* spp. and Tussock grasses *Poa* spp. Herbaceous species include Grass Trigger-plant *Stylidium graminifolium*, Showy Violet *Viola betonicifolia* ssp. *betonicifolia*, Narrow Groundsel *Senecio tenuiflorus*, Prickly Woodruff *Asperula scoparia*, Derwent Speedwell *Derwentia derwentiana*, Prickly Starwort *Stellaria pungens*, Australian Caraway *Oreomyrrhis eriopoda* and Mountain Cotula *Leptinella filicula*. The Lily Tasman Flax Lily *Dianella tasmanica* is often present.

Equivalent units in other studies:
Montane Dry Woodland (LCC 1991)
Montane Dry Woodland (Woodgate *et al.* 1994).

Montane Damp Forest

Montane Damp Forest is widespread and common in the moderate to high elevation (900-1500m) forests of the southern half of the study area. Rainfall is as low as 1000 mm increasing to 2000 mm per year. Montane Damp Forest is most common on sheltered south-western, southern and south eastern slopes and in gully heads. It also can develop on small Montane plateaus. In these localities cold air drainage has not had a chance to pool and depress minimum temperatures for substantial periods, so that periods of low temperature are only associated with late autumn, winter and early spring. Montane Damp Forest grows on a wide range of parent geologies including Ordovician sedimentary and metamorphic rocks, Devonian Silurian igneous rocks, Silurian and Lower Carboniferous sediments. The soils are generally deep friable well drained loams. Moisture availability is high due to the high rainfall. Trees are generally tall, mostly 30-45 m. The general appearance of this EVC is of a

tall open forest with a varying shrub density and a normally dense ground layer of ferns, herbs and grasses.

The overstorey is dominated by Alpine Ash *Eucalyptus delegatensis* with Mountain Gum *Eucalyptus dalrympleana* and Broad-leafed Peppermint *Eucalyptus dives* less common, occurring in the drier more exposed sites. Snow Gum on the areas exposed to coldest conditions at the higher altitudinal limits for Montane Damp Forest. The understorey often has an understorey tree layer of Silver Wattle *Acacia dealbata*. There is usually a well developed shrub-layer of Rough Coprosma *Coprosma hirtella*, Dusty Daisy-bush *Olearia phlogopappa* var. *phlogopappa*, White Elderberry *Polyscias sambucifolia* and Tree Lomatia *Lomatia fraseri*. Hop Bitter-pea *Daviesia latifolia* is common, particularly in frequently burnt sites.

The ground layer is dominated by grasses, forbs and ferns. The common grasses are Ledge Grass *Poa hothamensis*, Sword Tussock-grass *P. ensiformis* and Tall Tussock-grass *Poa helmsii*. Some of the common herbs include Bidgee Widgee *Acaena novae-zelandiae*, Showy Violet *Viola betonicifolia*, Ivy-leaf Violet *Viola hederacea*, Prickly Starwort *Stellaria pungens*, Cinquefoil Cranesbill *Geranium potentilloides*, Broad-leaf Woodruff *Asperula euryphylla* and Common Lagenifera *Lagenifera stipitata*. The most abundant fern is Mother Shield-fern *Polystichum proliferum*. The Tasman Flax-lily *Dianella tasmanica* is present at most sites. This EVC generally has a low cover and diversity of weeds except in specific areas where some form of disturbance occurred such as timber harvesting, roading, mining and fire. A major weed threat to this ecological vegetation class in the Bogong High Plains area is English Broom **Cytisus scoparius* whose seed is spread in the mud attached to the hooves of cattle which are agisted there during the warmer months of the year. The rare Velvety Geebung *Persoonia subvelutina* was recorded from Montane Damp Forest.

Equivalent units in other studies:

Montane Damp Forest (LCC (1991)

Montane Damp Forest (Woodgate *et al.* 1994).

Montane Riparian Thicket

Montane Riparian Thicket is mostly found along the riparian zones of Montane Damp Forest. It is occasionally found within non-montane areas where cold air drainage mimics the climate of higher montane elevations. The restricted nature of habitat of this class means that it has a restricted occurrence within the study area. The soils are colluviums or alluviums and are generally silty to sandy clay loams with a high organic matter content, often resembling a peaty texture and are generally waterlogged. This EVC reaches its best development on slow flowing streams with gentle gradients in broad valleys. Streams although small, are generally permanent. The elevation range is from 500 m in cold air drainage sites to 1400 m, sometimes extending into Sub-alpine Woodland. Rainfall is in excess of 1000 mm per year.

Montane Riparian Thicket characteristically has a thicket structure with a dense tall shrub layer which often significantly reduces the amount of light reaching ground level. The overstorey mostly consists of eucalypts from montane environments such as Alpine Ash *Eucalyptus delegatensis* and Mountain Gum *Eucalyptus dalrympleana*, however other species occur at lower levels. In such cases the most common lower elevation species are Narrow-leafed Peppermint *E. radiata* s.l. and Manna Gum *Eucalyptus viminalis*. The characteristic thicket species is Mountain Tea-tree *Leptospermum grandifolium*. Under this is a sparse to dense layer of ferns, forbs and grasses.

The common species include Fishbone Water-fern *Blechnum nudum*, Alpine Water-fern *B. pennamarina*, Mother Shield-fern *Polystichum proliferum*, Bidgee Widgee *Acaena novae-zelandiae*, Cinquefoil Cranesbill *Geranium potentilloides*, Forest Mint *Mentha laxiflora*, Small-leaf Bramble *Rubus parviflorus*, Tall Tussock-grass *Poa helmsii* and Ledge-grass *P. hothamensis*. The shrubs Dusty Daisy-bush *Olearia phlogopappa* and Mountain Pepper *Tasmannia lanceolata* are common. The Tall Sedge *Carex appressa* is frequently present.

Weeds are not generally a problem, however if disturbance has occurred in the catchment weeds such as Blackberry **Rubus fruticosus* spp. agg. can become established. Road construction often leads to weed invasion as a result of the disturbance to the dense shrub canopy which can normally limit the growth of most weed species.

Equivalent units in other studies:

Montane Riparian Thicket (LCC 1991)

Montane Riparian Thicket (Woodgate *et al.* 1994).

Sub-alpine Woodland

Sub-alpine Woodland grows on a wide range of geologies within the study area and has been sampled at elevations ranging from 1300-1720 m above sea level. It is reasonably common in the high

mountainous areas of the study area with Montane Damp Forest, Montane Dry Woodland and Treeless Sub-alpine Complex the most common nearby ecological vegetation classes. Soil types are variable, but mostly free draining skeletal sandy clay loams with a rich humus layer at or near the soil surface in most instances (although this may be reduced on exposed ridges and northern or western aspects).

Sub-alpine Woodland can occur equally on any aspect in the upper end of the altitudinal range, but is mainly restricted to the exposed western and northern aspects nearing its lower altitudinal limits. Annual precipitation is very high for the study area and ranges from 1200 mm east of Mount Pinnibar to around 2400 mm per year at Falls Creek Alpine Village. A large proportion of this precipitation falls as snow that persists for many months at a time. The average winter and summer temperatures are substantially lower in this environment than most of the rest of the study area.

The overstorey mostly consists of Snow Gum *Eucalyptus pauciflora*. At the lower end of the altitudinal range Alpine Ash *Eucalyptus delegatensis* and Mountain Gum *Eucalyptus dalrympleana* may have a minor presence.

The understorey varies from grass and forb dominated with scattered shrubs to a dense shrub stratum. The understorey shrub species which commonly occur are Leafy Bossiaea *Bossiaea foliosa*, Dusty Daisy-bush, *Olearia phlogopappa*, Alpine Podolobium *Podolobium alpestre* and Alpine Pepper *Tasmannia xerophila*. The ground-layer is rich, the most common species including Bidgee Widgee *Acaena novae-zelandiae*, Sheep Sorrel **Acetosella vulgaris*, Mountain Woodruff *Asperula gunnii*, Tasman Flax-lily *Dianella tasmanica*, Pale Everlasting *Helichrysum rutidolepis s.l.*, Australian Carraway *Oreomyrrhis eriopoda*, Prickly Starwort *Stellaria pungens*, Grass Trigger Plant *Stylidium graminifolium*, Showy Violet *Viola betonicifolia* and Royal Bluebell *Wahlenbergia gloriosa*.

Sub-alpine Woodland generally has a low open woodland structure except when frequently burnt. This may lead to altered species composition with Hop Bitter-pea *Daviesia latifolia* dominating in the lower altitudinal range in some areas. Cattle grazing has had detrimental effects such as weed introduction, trampling of delicate vegetation, particularly in creek lines, thus reducing the cover and abundance of herbs in heavily grazed areas such as on the Bogong High Plains.

Equivalent units in other studies:

Sub-alpine Woodland (LCC 1991)

Sub-alpine Woodland (Woodgate *et al.* 1994).

Treeless Sub-alpine Mosaic

This complex is restricted to the cold air drainage sites at sub-alpine elevations (1200-1700m) and the highest peaks and alpine plateaux of the study area where it is common but small in overall area. It consists of a number of floristic communities often closely associated with the alluvial flats and associated nearby slopes. The complex also exists towards the summits of mountains over 1500-1830 m in height where the local exposure or poor drainage is too severe for Snow Gum *Eucalyptus pauciflora* to be present. The overall altitudinal range for the complex is from 1400-1986 m and the rainfall varies from 1500-2400 mm per year.

The ecological vegetation classes within this complex were not mapped during the study and more detailed information can be found in McDougall (1982a; 1982b; 1982c); McDougall 1984; McDougall 1985; Walsh *et al.* (1983; 1984; 1986). Broadly, this EVC consists of a range of dry and wet classes including Blockstream Coniferous Heathland, Feldmark, Fen, Snowpatch Heathland, Sub-alpine Damp Heathland, Sub-alpine Dry Heathland, Sub-alpine Grassland, Sub-alpine Grassy Shrubland, Sub-alpine Shrubland, Sub-alpine Wet Heathland, Sub-alpine Wet Heathland/Fen Mosaic, Wet Sub-alpine Heathland. The geology is diverse and consists of Quaternary alluviums, Carboniferous, Silurian and Ordovician sediments, Devonian igneous and Ordovician metamorphic rocks. There is a wide variety of soil types, ranging from coarse lithosols, through alpine humus soils to peats and snow patch soils (Gibbons and Rowan 1993).

Research into plant succession suggest that certain sub-communities are possibly grazing and/or fire induced variants. The original character and distribution of the Kunzea heathlands have been significantly modified by grazing and fires. Some modification of the alpine vegetation has occurred as a result of clearing and/or revegetation of downhill ski-slopes (Conn 1993). Weeds can be prominent in disturbed sites, particularly the moist areas where cattle faeces introduce weeds from the lowlands. Sheep Sorrel **Acetosella vulgaris* is widely spread and common in this mosaic.

Equivalent units in other studies:

Bog (McDougall 1982)

Closed Heathland (McDougall 1982)

Kunzea Heathland (McDougall 1982)

Late-lying Snowpatch (McDougall 1982)

Open Heathland (McDougall 1982)
Poa costiniana Tussock Grassland (McDougall 1982)
Poa hiemata Tussock Grassland (McDougall 1982)
Podocarpus Heathland (McDougall 1982)
Relic Bog (McDougall 1982)
Rocky Grassland (McDougall 1982)
Short-turf Snowpatch (McDougall 1982)
Dry Sub-alpine Shrubland (LCC 1991)
Damp Sub-alpine Heathland (LCC 1991)
Wet Sub-alpine Heathland (LCC 1991)
Sub-alpine Shrubland (Woodgate *et al.* 1994)
Sub-alpine Treeless Complex (Woodgate *et al.* 1994).

Valley Heathy Forest

This EVC was identified in the Central Highlands RFA study area during the pre-1750 vegetation mapping project (Commonwealth of Australia 1997). Within the North East RFA study area this vegetation occurs as an open forest on the outwash slopes and in the valleys below low granitic or sedimentary hills. Soils are colluvial sands and rainfall ranges from 750 to 850mm. Structurally the vegetation is predominantly sedgy and grassy with a sparse or clumped stratum of tall shrubs and low ericoid shrubs.

North of Mount Samaria the overstorey is represented by Hill Red Gum *Eucalyptus blakelyi*, Red Stringybark *E. macrorhyncha*, Red Box *E. polyanthemos* and Long-leaf Box *E. goniocalyx*. The shrub layer includes Varnish Wattle *Acacia verniciflua*, Hedge Wattle *A. paradoxa*, Thin-leaved Wattle *A. aculeatissima*, Black Wattle *A. mearnsii*, Urn Heath *Melichrus urceolatus*, Rough-barked Honey Myrtle *Melaleuca parvistaminea* (often clumped), Prickly Tea-tree *Leptospermum continentale* and Violet Kunzea *Kunzea parvifolia* (often forming thickets). Large patches of Thatch Saw-sedge *Gahnia radula* can occur, possibly due to management (eg. fire regime) or seepage. These may also influence the clump and thicket formations of other understorey species. Ground layer is less well known and includes Common Sword-sedge *Lepidosperma laterale*, Common Raspwort *Gonocarpus tetragynus*, Brown-back Wallaby Grass *Austrodanthonia duttoniana* and exotic grasses.

A basin of sedimentary colluvium north of Cherry Tree Range (south-east of Seymour) carries Valley Heathy Forest represented by reasonably intact, roadside vegetation. Red Stringybark *E. macrorhyncha*, Red Box *E. polyanthemos*, Grey Box *E. microcarpa* and Yellow Box *E. melliodora* form the overstorey. Shrubs are sparse and only Black Wattle *Acacia mearnsii* and Grey Guinea-flower *Hibbertia obtusifolia* are present. Small Grass-trees *Xanthorrhoea minor* and Saw-sedges *Gahnia spp.* are common and, in some areas, dominant in cover. The ground-layer includes Pale Flax-lily *Dianella longifolia*, Wattle Mat-rush *Lomandra filiformis*, Rushes *Juncus spp.*, Dense Spear Grass *Austrostipa densiflora* and Spear Grass *Austrostipa sp.*

Correlation to a distinct attribute, such as soil type, is not clear and the absence of remnant vegetation precluded more detailed mapping. Around Moorngag, south of Benalla and in the valley south of Lima East

the unit mapped as Valley Grassy Forest may have contained Valley Heathy Forest. On private land adjacent to Wabonga Plateau in the National Park in the valley to the east of Paradise Falls the area to the north, mapped as Herb-rich Foothill Forest, may have included Valley Heathy Forest.

Valley Heathy Forest was found in association with Valley Grassy forest, Heathy Dry Forest, Plains Grassy Woodland and Herb-rich Foothill Forest.

Sand Ridge Woodland

This EVC has not been sampled and there are no known intact remnants in Victoria. The following description is based on field observation and sampling undertaken across the Murray River of similar sand ridges.

Source-bordering dunes composed of deep sandy soil (Sandmount Sand (Skene and Poutsma 1962), Lockington Sand (Skene and Hardford 1964) and Sand Rises (Skene 1963)) support this vegetation. These soils types are developed on sand blown up by wind action from a prior stream bed (Skene and Poutsma 1962). This geomorphological phenomenon occurs in close proximity to the larger rivers (Goulburn and Murray) at 400 to 550mm annual rainfall and merges into a flatter sandy plain which supports Pine-Box Grassy Woodland. Sand Ridge Woodland can also directly abut Floodplain EVCs and the Riverina (shrubby) Grassy Woodland.

The overstorey predominantly consists of White Cypress-pine *Callitris glaucophylla*, Yellow Box *Eucalyptus melliodora*, and rarely Drooping Sheoke *Allocasuarina verticillata*. Historically, Silver

Banksia *Banksia marginata* was also present on sand hills (Robinson and Mann 1993). The shrub layer consists of Common Fringe-myrtle *Calytrix tetragona*, Grey Mulga *Acacia brachybotrya*, Lightwood *A. implexa*, Golden Wattle *A. pycnantha*, Mallee Wattle *A. montana*, Gold-dust Wattle *A. acinacea*, Sweet Bursaria *Bursaria spinosa*, and Drooping Cassinia *Cassinia arcuata*. Historically the shrub layer also carried Yarran Wattle *Acacia omalophylla* (Robinson and Mann 1993). The ground layer contains *Digitaria* spp., *Panicum* spp., Nigger-heads *Enneapogon nigricans*, and Spear Grasses *Stipa* spp.

In similar soil, but drier environment, at a site north of the New South Wales border, the following species were recorded: Wallowa *Acacia calamifolia* Sticky Hop-bush *Dodonaea viscosa*, Wedge-leaf Hop-bush *D. viscosa* spp. *cuneata* Nodding Saltbush *Einadia nutans* Urn Heath *Melichrus urceolatus*, Wire Grass *Aristida* spp., Brown-clubbed Spider *Caladenia phaeoclavia*, Mountain Burr-daisy *Calotis cuneata*, Yellow Burr-daisy *Calotis lappulacea*, *Carduus* spp., Sedge *Carex* spp., Flat Spurge *Chamaesyce drummondii*, Green Rock Fern *Cheilanthes austrotenuifolia*, Narrow Rock Fern *Cheilanthes sieberi* spp. *sieberi*, Common Everlasting *Chrysocephalum apiculatum* s.l, Australian Stonecrop *Crassula sieberiana*, Common Wallaby-grass *Danthonia caespitosa*, Bristly Wallaby-grass *Danthonia setacea*, Austral Carrot *Daucus glochidiatus*, Common Wheat-grass *Elymus scabrus*, Spider Grass *Enteropogon acicularis*, Twining Glycine *Glycine clandestina*, Cut-leaf Goodenia *Goodenia pinnatifida*, *Hordeum* spp., Stinking Pennywort *Hydrocotyle laxiflora*, *Lepidosperma* spp., Many-flowered Mat-rush *Lomandra multiflora* spp. *multiflora*, Wingless Bluebush *Maireana enchylaenoides* *Microtis* spp., Grassland Wood-sorrel *Oxalis perennans*, Grey Tussock-grass *Poa sieberiana*, Grey Tussock-grass *Poa sieveriana* var. *sieberiana*, Pussy-tails *Ptilotus spathulatus*, Cotton fireweed *Senecio quadridentatus*, *Sida* spp., Rough Spear-grass *Stipa scabra*, *Stipa* spp., *Swainsona* spp., Common Sunray *Triptilodiscus pygmaeus*, Woolly New Holland Daisy *Vittadinia gracilis* *Wahlenbergia* spp., Common Early Nancy *Wurmbea dioica* spp. *dioica*.

Equivalent units in other studies:

- Sandmount Sand (Skene and Poutsma 1962)
- Sand Rises and Lunette Soils (Skene 1963)
- Lockington Sand (Skene and Hardford 1964)

Riverine Grassy Woodland/Riverine Sedgy Forest Mosaic

This unit represents a mosaic of Riverine floodplain vegetation types. The major components are grassy woodland typically dominated by River Red Gum *Eucalyptus camaldulensis* (but in ecotonal sites sometimes including Yellow Box *E. melliodora* or Grey Box *E. microcarpa*), in less frequently flooded areas, and taller, typically open forest formation of River Red Gum with a grassy-sedgy understorey in more frequently flooded sections. Smaller areas of treeless wetland and floodway vegetation of reedbed or rushland, grassland, sedgeland or herbland structure also occur within the mosaic. The component vegetation types are confined to alluvial soils (typically loams to clay-loams but sometimes gravelly or sandy), almost entirely along the Murray River and the lower reaches of its major tributaries where they traverse the riverine plain. Upstream, the mosaic grades into Floodplain Riparian Woodland/Billagong - wetland complex. Downstream, resolution of the component types is more readily achieved (eg. in the broader floodplains of the Cobram to Echuca area).

Component species include the following:

Riverine Grassy-Sedgy Forest and (other) wetland types

River Red Gum, Rush Sedge *Carex tereticaulis*, Veined Swamp Wallaby-grass *Amphibromus nervosus*, Brown-back wallaby-grass *Austrodanthonia duttoniana*, Warrengo Summer-grass *Setaria jubiflora*, Common spike-sedge *Eleocharis acuta*. Other graminoid species include Spiny Mud-grass *Pseudoraphis spinescens*, River Swamp Wallaby-grass *Amphibromus fluitans*, Silky Browntop *Eulalia aurea*, Common tussock-grass *Poa labillardierei*, Tall flat-sedge *Cyperus exaltatus* and various *Carex* spp.. A number of herb species are (often seasonally) apparent, including Water-ribbons *Triglochin procerum*, Upright Milfoil *Myriophyllum crispatum*, Common sneezeweed *Centipeda cunninghamii*, Yellow Twin-heads *Eclipta platyglossa*, Knotweeds *Persicaria* spp., Docks *Rumex* spp., Hypsela *Hypsela tridens*, Burr-daisies *Calotis* spp., Poison Pratia *Pratia concolor*, Starwort and *Stellaria caespitosa*. Floristics vary according to seasonal conditions and site factors, particularly relative to the time since and duration of flooding. Aquatics including Azollas *Azolla* spp., Clove-strip *Ludwigia peploides*, *Nymphaea crenata*, Milfoils *Myriophyllum* spp. and Tall Spike-sedge *Eleocharis sphacelata* occur in more permanent wetlands within this system.

Riverine Grassy Woodland

The floristics of remnants are often simplified by grazing. River Red Gum is typically dominant. Grey Box and/or Yellow box can also be present in more marginal sites. The major understorey grasses are Common wallaby-grass *Austrodanthonia caespitosa* and Bristly wallaby-grass *A. setacea*. Herbaceous species include Slender Dock *Rumex brownii*, Jersey Cudweed *Pseudognaphalium luteo-album*,

Saltbushes *Einadia* spp., Bluebells *Wahlenbergia* spp., Cotton Fireweed *Senecio quadridentatus* and Cranesbills *Geranium* spp. Other now rare species (eg. Woolly Buttons *Ixiolaena* sp.) were presumably previously far more common.

Perched Boggy Shrubland

In the north-east this EVC occurs in valleys on granitic massif plateaux at 400-600m altitude. Rainfall is high ranging from 900mm to 1150mm. It occurs on all aspects of very gentle slopes above drainage lines or across hillsides between drainage lines. The soils are extremely saturated sandy clay which may be associated with an impermeable clay layer or an hydrological phenomenon creating a soak or spring effect. It is common on the plateau north of the Strathbogie Range at Strathbogie, south of Boho South including Seven Creeks and tributaries, Munroes Swamp Creek, Spring Creek and along broad valleys and plateaux around Ruffey. A site is known (but not mapped) on public land near a pine plantation south-east of Mount Lawson (W.D. Peel, pers. comm.).

Perched Boggy Shrubland occurs as a dense shrubland 2-3 metres tall over a herb and sedge-rich ground layer. There is no detailed floristic information available, but the following observations were recorded during this study; the overstorey is a dense mosaic and may include a few or all of *Baeckea* *Baeckea* sp., Prickly Tea-tree *Leptospermum continentale* and Ovens Wattle *Acacia pravissima*; the understorey has a dense layer of bryophytes including Sphagnum Moss *Sphagnum* spp. In accessible areas the following understorey species were recorded: Creeping Raspwort *Gonocarpus micranthus*, Buttercup *Ranunculus* sp., Spiny-headed Mat-rush *Lomandra longifolia*, Common Woodrush *Luzula meridionalis*, Saw-sedge *Gahnia* sp., Rush *Juncus* spp.

Perched Boggy Shrubland was always found to be surrounded by Herb-rich Foothill Forest.

Equivalent units in other studies:

None

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