WEST VICTORIA

COMPREHENSIVE REGIONAL ASSESSMENT REPORT (VOLUME 2)

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Prepared by officials to support the West Victoria Regional Forest Agreement Process

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Tel: 1800 650 983.

Requests should be addressed to:

Commonwealth and Victorian RFA Steering Committee

C/- Commonwealth Forests Taskforce

Department of the Prime Minister and Cabinet

3-5 National Circuit

BARTON ACT 2600

Tel: 1800 650 983

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FOREWORD

This report describes those components of the detailed Comprehensive Regional Assessment (CRA) that have been undertaken in Victoria's West Regional Forest Agreement (RFA) region in relation to:

- old growth; and
- biodiversity assessment (in particular for the Portland and Horsham regions).

Volume 1 of the Comprehensive Regional Assessment Report covered:

- biodiversity (Midlands and Otway regions);
- world heritage;
- social values;
- forest resources;
- tourism and recreation;
- streams and catchments;
- minerals;
- forest based industries; and
- ecologically sustainable forest management.

National Estate values will be covered in a separate report.

Meetings with local communities and interest groups will be held following the release of this Report and the Directions Report for the West region RFA. These consultations and assessments, along with those public meetings already held, will provide a basis for the Victorian and Commonwealth Governments to develop a Regional Forest Agreement for the West region RFA.

The RFA will define the commitments made by both Governments to forest conservation, use and development, and the development of those industries based on the forest resources of the region. The RFA will operate for 20 years.

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The West region Directions Report will provide EVC information that combines the EVC data presented in Volume 1 and Volume 2.

12.3 DATA REVIEW FOR TERRESTRIAL SPECIES

Introduction

The data review process involves systematically working through databases to determine the adequacy of information about the distribution of species within the West region. This information is important for understanding the distribution of flora and fauna and relating this to their habitat requirements. The data review relies on expert knowledge and professional judgement but is supplemented by explicit analyses where appropriate. The methods described here were used for terrestrial flora and fauna only - the data review for aquatic species was included in section 12.8 of Volume 1.

The first step in the process is to select only those survey data which meet required standards of accuracy, precision and reliability. This allows a degree of confidence when analysing the distribution of species.

The next step involves assessing the extent to which the site records for flora and fauna are representative samples of the environmental and geographic variation of the region. This is achieved by dividing the region into units or ‘strata’ which exhibit similar sets of environmental factors or variables. Although there are many variables to choose from (e.g. temperature, rainfall, elevation, slope), those which are considered to most influence the distribution of species in that region are selected to create the stratification. Each stratum may be represented by several discrete areas (or substrata) within a region.

These strata and substrata are then analysed to determine how well each has been surveyed for flora and fauna. That is, the density of survey sites is determined for each (such as number of survey sites per 10 000 hectares). Calculations are also made for each stratum of the probability of encountering species that have not previously been recorded in surveys there.

Methods

Analyses of the variation in annual rainfall, temperature extremes and rock types across the region were used to classify the major types of environments occurring in the West region. The classification analysis identified 86 different strata for the region, each characterised by a particular combination of rainfall, temperature and rock type. They ranged in size from 3 to 96 470 ha. It is important to note that only forested areas were considered. Twenty three of the 86 strata had an area of less than 500 ha each. These small strata comprised only 0.3 per cent of the area under forest cover, and were not evaluated while the 27 largest strata (>10 000 ha) occupied 87 per cent of the forested land area. This environmental stratification was subsequently used for the analyses of flora and fauna databases presented below.

Flora

The dataset used for the assessment of the West flora was derived from the Flora Information System of Victoria. It comprises all available data from vegetation surveys and studies of the region and includes 5515 site records, of which 3540 are on forested land.

The distribution and density of site records (summarised in Table 12.11), together with cumulative species curve analysis (probability that the next species encountered for a stratum would not already have been encountered), were used to evaluate the adequacy of sampling of the environmental variation in the region.

Table 12.11: Proportion of Flora Sampling Density Classes for the West Region

Density class	Sampling density for flora sites/10 000 ha	Number of strata	Total area (ha)	% of forest in the West region
high	> 40	18	251 719	21 %
moderate	10-40	27	643 088	53 %
low	>0-10	11	297 782	25 %
zero sites	0	7	10 030	0.83 %

The majority of forested land in the West region (53 per cent) has a moderate survey intensity with 21 and 25 per cent of the region having a high and low survey intensity respectively. The results from a cumulative species curve analysis suggests an adequate data coverage, with 89 per cent (39 strata) of the forested area of the region having probabilities of $\leq$20 per cent that the next species will be new.

Fauna

In Victoria, much of the existing site data for fauna has come from incidental records from a range of sources supplemented by information from systematic surveys. A lack of surveyed sites in certain strata does not necessarily mean that the strata have not been sampled; rather, it means that the information may not have been appropriate for use in this analysis. To ensure an adequate database of systematic survey records for terrestrial fauna, a general survey covering 122 sites was undertaken in the West region and used to supplement the existing data sets. This data audit includes only data from formal surveys and strata under forest cover.

The site-based biological data sets used in the fauna assessment were drawn from the *Atlas of Victorian Wildlife*. A number of groups were excluded from the study including marine birds, waders (except Latham's Snipe), marine mammals, marine reptiles and invertebrate fauna; records with less geographic precision were also excluded. Survey data were analysed for each of the species groups indicated in Table 12.12.

As was done for flora, the distribution and density of survey site records were used to evaluate the adequacy of sampling of the environmental variation in the region. The 63 strata larger than 500 ha were included in the evaluation. Strata and large polygons with low densities of sites were identified. The probability of the next species recorded for a particular stratum being new (i.e. not previously recorded in surveys for that fauna group in that stratum) was used as an indication of the adequacy of sampling effort. The analysis was mostly confined to the 27 most extensive strata, which range from 8 per cent to 0.84 per cent of the area (totalling 87 per cent of the forested area). A summary of results for these strata is given in Table 12.12.

Of the 27 largest strata generated by the stratification of the West region, the majority contained survey sites for each of the fauna groups considered. Diurnal birds are the most comprehensively surveyed groups across the region, based on them having the most strata with low probabilities of new species being detected (Table 12.12). Arboreal mammals, bats and large forest owls have also been well surveyed with between 65-70 per cent of the surveyed large strata having a low probability of detecting new species with further survey.

Additional surveys for amphibians are most likely to detect species not previously recorded in surveys.

Table 12.12: Adequacy of Terrestrial Vertebrate Fauna Survey, by Species Group

Faunal group	Arboreal mammals	Large mammals	Small ground mammals	Bats	Diur-nal birds	Noc-turnal birds	Large forest owls	Rep-tiles	Amph-ibians
Number of sites surveyed across all 87 strata	902	3017	2719	1417	1635	692	698	3056	164
Number of the 63 strata (>500 ha) with surveys	46	46	51	45	44	46	39	43	27
Number of the 27 largest strata with surveys	27	27	26	27	27	27	26	27	16
Number of the 27 largest strata with low probability (≤5 per cent) of new species in next survey	18	11	13	19	24	12	17	13	3

12.4 FOREST ECOSYSTEM ASSESSMENT

Introduction

Assessment of forest ecosystems is important to determine whether representative examples of these ecosystems and the natural ecological processes that support them are maintained throughout their natural range. The assessment of forest ecosystems has involved describing, mapping and analysing the distribution and variation of these ecosystems in the region. Due to the size of the region and complexity of the task, the vegetation assessment has been conducted in two parts. One part deals with the sub-region consisting of the Portland and Horsham FMAs, and for which the survey results are presented in this volume, and the other covers the Midlands and Otway Forest Management Areas (FMAs), and is reported in Volume One (VicRFASC 1999). The two parts will subsequently be merged for the purposes of developing a regionwide perspective on ecosystem representation.

Ecological vegetation classes (EVCs) are the basic mapping units used for biodiversity planning and conservation assessment at landscape, regional and broader scales in Victoria. They are derived from large-scale forest type and plant community mapping and are based on the following types of information:

- plant communities and forest types (including species and structural information);
- ecological information relevant to the species that comprise the communities (including life form and reproductive strategies); and
- information that describes variation in the physical environment (including aspect, elevation, geology and soils, landform, rainfall, salinity and climatic zones).

Each EVC represents one or more plant communities that occur in similar types of environments. The communities in each EVC tend to show similar ecological responses to environmental factors such as disturbance (e.g. wildfire). As well as representing plant communities, the EVCs can be used as a guide to the distribution of individual species and groups of species, including animals, and lower plants such as mosses and liverworts.

Ecological Vegetation Classes have been accepted as robust and appropriate units for assessing forest ecosystem diversity and conservation at the landscape scale, provided that the variability within widely distributed EVCs is also considered as part of the assessment (Comprehensive Regional Assessment, East Gippsland: Environment and Heritage Report – ref VicRFASC 1996). A detailed description of the EVC concept can also be found in that report.

A total of 355 EVC units have been identified as currently occurring in the Portland and Horsham FMAs. These EVCs have been mapped across all land in the region at a scale of 1:100 000 and are listed in Table 12.13. A description of each EVC is available in Appendix 1. It should be noted that approximately 70 per cent of the EVCs in the Portland and Horsham FMAs are described as mosaics or complexes (see Table 12.13 footnotes for definitions). For the purposes of this report and analysis of representation, 187 of the smallest mosaics and complexes have been grouped. These units are generally too small to be represented on maps and have been determined not to contribute to the vulnerability of their component EVCs. These units are typically less than 50 ha and most are located in permanent reserves (principally the Grampians National Park).

To allow a comparison of the current distribution of each EVC with its approximate distribution prior to European settlement, a map of the pre-1750 distribution of EVCs has been constructed (see Map 1, Vol. 2). The map is based on predictions derived from existing vegetation, a variety of physical environmental attributes, and expert knowledge.

EVCs that were not recorded in the public land vegetation mapping of the region are primarily confined to fertile soils which have been largely cleared for agriculture.

Reservation Status of Ecological Vegetation Classes

A reserve system that is comprehensive, adequate and representative in its regional coverage of forest ecosystems is an important component of the Regional Forest Agreement for the West region. The extent of representation of EVCs in conservation reserves has been used as the basis for evaluating the current reservation status of forest ecosystems in the region.

Table 12.13 shows the distribution of EVCs across all land tenures in the Portland and Horsham FMAs. Descriptions of some of the land tenure categories represented in the table are as follows:

Conservation: includes all dedicated National and State parks and other conservation reserves such as flora and fauna reserves, Regional Parks where timber harvesting does not occur and Heritage Rivers.

Other Parks and Reserves: includes historic and cultural features reserves, where timber harvesting may be permitted.

Other Public Land: includes land managed by Government agencies, such as water supply authorities.

Private Land: includes freehold land and plantations licensed to Hancock Victorian Plantations.

Table 12.13: Representative Conservation (percentage reservation status) of EVCs in the West Region (Portland & Horsham FMAs) based on pre-1750s Vegetation Mapping

EVC No.	Ecological Vegetation Class	Area (ha)		Per cent remaining	Conservation Parks and Reserves (%)	State Forest (%)	Other Parks and Reserves (%)	Other Public Land (%)	Private Land (%)	Water Bodies / Unknown (%)
		Pre-1750	Current							
3	Damp Sands Herb-rich Woodland	167,260	40,826	24.4	7.7	4.2	0.0	0.6	11.9	0.0
6	Sand Heathland	15,220	14,310	94.0	80.3	9.2	0.0	0.1	4.3	0.1
8	Wet Heathland	6,621	5,601	84.6	71.2	10.2	0.3	1.2	1.9	0.0
9	Coastal Saltmarsh	30	15	49.0	45.0	0.0	0.0	0.0	3.7	0.2
10	Estuarine Wetland	596	116	19.5	4.4	0.0	0.0	0.0	13.5	1.7
13	Brackish Sedgeland	575	153	26.6	21.6	0.8	0.0	1.1	3.0	0.1
16	Lowland Forest	57,013	48,989	85.9	24.1	56.5	1.8	0.1	5.3	0.0
18	Riparian Forest	1,266	798	63.0	38.8	11.2	12.2	0.0	13.1	0.0
19	Riparian Shrubland	160	106	66.2	54.7	0.2	0.0	0.0	10.9	0.4
20	Heathy Dry Forest	30,349	30,073	99.1	96.3	0.9	0.0	0.5	1.4	0.0
22	Grassy Dry Forest	2,384	2,126	89.2	75.7	0.0	0.0	0.3	12.5	0.6
23	Herb-rich Foothill Forest	78,142	20,514	26.3	4.2	12.5	1.3	0.0	9.5	0.0
28	Rocky Outcrop Shrubland	14,072	14,012	99.6	90.1	8.7	0.0	0.1	0.6	0.0
29	Damp Forest	302	302	100.0	100.0	0.0	0.0	0.0	0.0	0.0
30	Wet Forest	177	177	100.0	99.7	0.0	0.0	0.0	0.3	0.0
37	Montane Grassy Woodland	3	3	100.0	100.0	0.0	0.0	0.0	0.0	0.0
45	Shrubby Foothill Forest	4,169	4,169	100.0	100.0	0.0	0.0	0.0	0.0	0.0
47	Valley Grassy Forest	6,572	5,351	81.4	62.3	0.0	0.0	0.5	18.3	0.3
48	Heathy Woodland	188,079	155,886	82.9	35.9	34.0	0.4	1.1	11.8	0.1
50	Coastal Heathland	33	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
53	Swamp Scrub	22,209	1,839	8.3	1.6	1.4	0.0	0.0	5.0	0.2
55	Plains Grassy Woodland	656,082	26,934	4.1	0.5	2.4	0.0	0.1	1.0	0.0
56	Floodplain Riparian Woodland	18,818	3,003	16.0	4.9	0.6	0.0	0.1	10.4	0.0
61	Box Ironbark Forest	8,478	3,697	43.6	5.7	26.9	0.0	3.8	7.2	0.0
65	Sedge-rich Woodland	179	154	86.1	0.0	79.8	0.0	0.0	6.3	0.0
67	Alluvial Terraces Herb-rich Woodland	4,611	1,658	36.0	21.8	7.9	0.0	0.1	5.7	0.5
68	Creekline Grassy Woodland	50,221	1,324	2.6	0.5	0.4	0.0	0.0	1.7	0.0
71	Hills Herb-rich Woodland	20,261	13,600	67.1	38.2	2.4	0.0	0.2	26.3	0.1
73	Rocky Outcrop Shrubland/Herbland Mosaic	6,120	5,925	96.8	94.3	0.1	0.0	0.0	2.4	0.0
74	Wetland Formation	51	43	85.2	0.0	69.3	0.0	0.0	15.9	0.0
83	Swampy Riparian Woodland	2,025	4	0.2	0.1	0.0	0.0	0.0	0.1	0.0
93	Broombush Mallee	1,337	187	14.0	14.0	0.0	0.0	0.0	0.0	0.0
103	Riverine Grassy Chenopod Woodland	10,130	207	2.0	1.0	0.0	0.0	0.2	0.8	0.0
124	Grey Clay Drainage Line Herbland/Sedgeland	1,665	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
125	Plains Grassy Wetland	26,358	27	0.1	0.0	0.1	0.0	0.0	0.0	0.0
132	Plains Grassland	72,011	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
133	Limestone Pomaderris Shrubland	4	4	93.5	93.5	0.0	0.0	0.0	0.0	0.0

EVC No.	Ecological Vegetation Class	Area (ha)		Per cent remaining	Conservation Parks and Reserves (%)	State Forest (%)	Other Parks and Reserves (%)	Other Public Land (%)	Private Land (%)	Water Bodies / Unknown (%)
		Pre-1750	Current							
134	Sand Forest	1,437	322	22.4	1.5	3.7	0.0	0.0	17.2	0.0
136	Sedge Wetland	3,974	1,351	34.0	7.9	17.6	0.0	1.9	6.5	0.0
155	Bird Colony Succulent Herbland	2	1	25.1	20.9	0.0	0.0	0.0	4.2	0.0
160	Coastal Dune Scrub	4,973	1,412	28.4	22.4	0.0	0.0	0.2	5.7	0.1
161	Coastal Headland Scrub	1,091	392	35.9	25.9	0.0	0.0	0.0	9.9	0.1
162	Coastal Headland Scrub/Headland Coastal Tussock Grassland Mosaic	1,194	199	16.7	16.1	0.0	0.0	0.0	0.6	0.0
164	Creekline Herb-rich Woodland	51	30	59.2	6.1	0.0	0.0	0.0	53.0	0.0
165	Damp Heath Scrub	1,337	1,336	99.9	97.6	1.0	0.0	1.0	0.1	0.1
175	Grassy Woodland	30,065	1,238	4.1	0.2	2.0	0.0	0.1	1.8	0.0
179	Heathy Herb-rich Woodland	41,475	21,784	52.5	12.4	19.6	0.0	2.0	18.5	0.0
184	Montane Wet Heathland	54	54	100.0	100.0	0.0	0.0	0.0	0.0	0.0
191	Riparian Scrub	6,679	4,810	72.0	42.6	15.2	1.4	1.8	12.2	0.1
192	Montane Rocky Shrubland	1,863	1,863	100.0	100.0	0.0	0.0	0.0	0.0	0.0
193	Rocky Outcrop Herbland	10,021	10,026	100.0	98.8	0.8	0.0	0.0	0.4	0.1
195	Seasonally Inundated Shrubby Woodland	8,820	5,481	62.1	24.6	13.2	0.0	1.0	11.0	12.2
198	Sedgy Riparian Woodland	3,114	2,706	86.9	71.6	12.0	0.0	1.5	1.8	0.1
200	Shallow Freshwater Marsh	5,113	1,060	20.7	13.0	3.3	0.0	0.0	2.9	1.5
203	Stoney Rises Woodland	21,065	13,055	62.0	42.1	0.1	0.0	0.0	19.8	0.0
264	Sand Ridge Woodland	996	91	9.2	0.1	4.1	0.0	0.0	4.9	0.0
278	Herb-rich Heathy Forest	431	431	100.0	99.8	0.0	0.0	0.2	0.0	0.0
279	Heathland Thicket	667	677	101.4	92.1	7.1	0.0	0.0	0.9	1.3
280	Floodplain Thicket	3,223	2,880	89.4	70.5	15.1	0.0	0.0	0.8	3.0
281	Sedge-rich Wetland	488	495	101.4	49.3	48.0	0.0	0.0	3.8	0.3
282	Shrubby Woodland	10,860	7,684	70.8	53.7	2.3	0.0	0.1	14.4	0.2
283	Plains Sedgy Woodland	4,333	2,283	52.7	7.5	32.5	0.0	0.0	12.4	0.2
284	Claypan Ephemeral Wetland	3	3	100.0	100.0	0.0	0.0	0.0	0.0	0.0
285	Dry Creekline Woodland	660	352	53.3	20.5	13.5	0.0	0.0	19.3	0.0
291	Cane Grass Wetland	1,213	96	8.0	2.9	0.0	0.0	0.0	3.0	2.0
292	Red Gum Wetland	30,808	1,453	4.7	1.3	1.1	0.0	0.0	2.2	0.0
300	Reed Swamp	105	58	55.7	22.9	0.0	0.0	0.0	32.8	0.0
341	Rocky Outcrop Shrubland/Herbland Mosaic	3	3	100.0	100.0	0.0	0.0	0.0	0.0	0.0
353	Rocky Outcrop Shrubland	9	9	100.0	100.0	0.0	0.0	0.0	0.0	0.0
401	Hills Herb-rich Woodland/Heathy Woodland Complex	737	737	100.0	97.4	0.0	0.0	0.0	2.6	0.0
432	Floodplain Thicket/Shallow Freshwater Marsh Complex	0	69							
458	Red Gum Wetland/Shallow Freshwater Marsh Mosaic	30	30	100.0	27.5	0.0	0.0	0.0	72.5	0.0
472	Heathy Woodland/Heathy Woodland Complex	734	734	100.0	77.4	22.1	0.0	0.0	0.4	0.1
481	Heathy Woodland/Heathy Dry Forest Complex	1,294	1,294	100.0	98.4	0.0	0.0	0.0	1.6	0.0

EVC No.	Ecological Vegetation Class	Area (ha)		Per cent remaining	Conservation Parks and Reserves (%)	State Forest (%)	Other Parks and Reserves (%)	Other Public Land (%)	Private Land (%)	Water Bodies / Unknown (%)
		Pre-1750	Current							
636	Brackish Lake	3,659	40	1.1	0.2	0.0	0.0	0.2	0.0	0.7
640	Creekline Sedgy Woodland	2,879	372	12.9	8.8	0.2	0.0	0.0	3.7	0.1
641	Riparian Woodland	13,852	2,781	20.1	9.0	1.5	0.4	0.0	9.6	0.0
642	Basalt Shrubby Woodland	70,899	79	0.1	0.0	0.0	0.0	0.0	0.1	0.0
643	Brackish Drainage Line Herbland/Sedgeland	1,115	24	2.2	1.1	0.0	0.0	0.0	1.1	0.0
644	Cinder Cone Woodland	487	214	44.0	41.6	0.0	0.0	0.0	0.0	2.4
645	Wet Heathland / Heathy Woodland Mosaic	6,350	4,489	70.7	44.5	19.1	0.0	0.0	7.1	0.0
646	Heathy Woodland / Plains Grassy Woodland Mosaic	1,162	326	28.1	0.0	0.2	0.0	0.0	27.9	0.0
647	Plains Sedgy Wetland	11,496	105	0.9	0.1	0.4	0.0	0.1	0.3	0.0
648	Saline Lake Verge Herbland/Sedgeland	18	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
649	Stony Knoll Shrubland	175	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
650	Heathy Woodland / Damp Heathy Woodland / Damp Heathland Mosaic	25,812	12,833	49.7	7.5	31.9	0.0	1.6	8.7	0.0
651	Plains Swampy Woodland	19,707	87	0.4	0.0	0.1	0.0	0.0	0.3	0.0
652	Lunette Woodland	2,378	57	2.4	0.6	0.0	0.0	0.0	1.6	0.2
653	Aquatic Herbland	2,512	276	11.0	4.0	3.4	0.0	0.2	3.1	0.3
654	Creekline Tussock Grassland	2,564	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
655	Lignum Cane Grass Swamp	542	34	6.3	1.5	0.0	0.0	0.0	0.0	4.8
656	Brackish Wetland	1,080	195	18.0	17.1	0.5	0.0	0.1	0.0	0.3
657	Freshwater Lignum Shrubland	1,076	22	2.0	0.7	0.5	0.0	0.0	0.8	0.0
658	Riverine Grassy Woodland / Riverine Sedgy Forest / Aquatic Herbland Mosaic	1,199	213	17.7	7.4	0.0	0.0	0.2	10.1	0.0
659	Plains Riparian Shrubby Woodland	416	281	67.5	60.0	0.0	0.0	2.3	5.3	0.0
660	Plains Woodland/Plains Grassy Wetland Mosaic	7,911	2,228	28.2	1.6	21.9	0.0	0.0	4.7	0.0
662	Escarpment Shrubland / Grassy Woodland / Riparian Woodland Mosaic	65	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
663	Black Box Lignum Woodland	348	65	18.7	7.9	0.0	0.0	4.2	6.6	0.0
664	Limestone Ridge Woodland	29	29	99.9	78.2	0.0	0.0	0.0	21.7	0.0
665	Coastal Mallee Scrub	597	302	50.6	32.4	0.0	0.0	0.0	18.2	0.0
666	Riparian Shrubland / Escarpment Shrubland / Grassy Woodland Mosaic	2,641	30	1.1	0.5	0.0	0.0	0.0	0.7	0.0
668	Riparian Woodland / Escarpment Shrubland Mosaic	573	22	3.9	0.0	0.0	0.0	0.0	2.3	1.5
669	Escarpment Shrubland / Damp Sands Herb-rich Woodland / Riparian Woodland / Swamp Mosaic	275	170	61.7	44.3	0.0	0.0	0.0	0.1	17.3
670	Limestone Woodland	69	69	100.0	100.0	0.0	0.0	0.0	0.0	0.0
672	Damp Sands Herb-rich Woodland / Shrubby Woodland Mosaic	1,094	313	28.6	7.5	5.0	0.0	0.0	16.0	0.0
673	Dune Soak Woodland	121	47	38.9	4.3	15.7	0.0	0.0	18.2	0.7
674	Sandy Stream Woodland	7,321	792	10.8	0.1	0.2	0.0	0.1	10.4	0.0

EVC No.	Ecological Vegetation Class	Area (ha)		Per cent remaining	Conservation Parks and Reserves (%)	State Forest (%)	Other Parks and Reserves (%)	Other Public Land (%)	Private Land (%)	Water Bodies / Unknown (%)
		Pre-1750	Current							
675	Escarpment Shrubland / Damp Sands Herb-rich Woodland / Swamp Scrub Mosaic	152	88	57.8	41.2	0.0	0.0	0.0	2.9	13.8
676	Salt Paperbark Woodland	188	49	26.3	11.5	3.9	0.0	0.0	9.3	1.6
677	Inland Saltmarsh	363	4	1.0	1.0	0.0	0.0	0.0	0.0	0.1
679	Drainage Line Woodland	3,818	375	9.8	5.1	1.1	0.0	0.2	3.4	0.0
680	Freshwater Meadow	1,705	151	8.9	0.4	3.2	0.0	0.0	5.3	0.0
681	Deep Freshwater Marsh	6,639	1,312	19.8	12.0	4.7	0.0	0.1	2.9	0.0
682	Permanent Open Freshwater	673	101	14.9	5.6	0.0	0.0	0.1	0.9	8.3
683	Semi-permanent Saline	1,226	41	3.3	0.9	0.5	0.0	0.0	0.6	1.3
684	Permanent Saline	667	84	12.6	6.4	0.0	0.0	0.2	0.4	5.6
690	Floodplain Riparian Woodland/Billabong Wetland Mosaic	1,558	1	0.1	0.0	0.0	0.0	0.0	0.1	0.0
691	Aquatic Herbland/Plains Sedgy Wetland Mosaic	21,862	200	0.9	0.4	0.3	0.0	0.0	0.2	0.1
697	Grassy Woodland / Alluvial Terraces Herb-rich Woodland Mosaic	970	119	12.3	0.4	11.4	0.0	0.0	0.5	0.0
704	Lateritic Woodland	7,266	1,421	19.6	1.4	8.7	0.0	0.1	9.3	0.0
705	Basalt Creekline Shrubby Woodland	3,998	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
707	Sedgy Swamp Woodland	356	48	13.6	0.0	2.4	0.0	0.0	11.2	0.0
709	Scree-slope Grassland/Woodland	32	7	22.2	22.2	0.0	0.0	0.0	0.0	0.0
710	Damp Heathland	7,641	5,468	71.6	24.9	37.3	0.0	1.6	7.8	0.0
711	Shallow Sands Woodland / Plains Sedgy Woodland Mosaic	3,264	1,878	57.5	40.3	9.4	0.0	0.2	7.7	0.0
713	Damp Sands Herb-rich Woodland / Damp Heathland / Damp Heathy Woodland Mosaic	84,334	2,935	3.5	0.1	0.7	0.0	0.0	2.6	0.0
714	Stony Knoll Shrubland / Plains Grassy Woodland / Plains Grassy Wetland Mosaic	58,184	10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
715	Plains Grassland / Stony Knoll Shrubland Mosaic	853	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
716	Plains Grassy Woodland / Stony Knoll Shrubland Mosaic	1,629	3	0.2	0.0	0.0	0.0	0.1	0.0	0.1
719	Grassy Woodland / Damp Sands Herb-rich Woodland Mosaic	43,875	933	2.1	0.0	0.2	0.0	0.0	1.9	0.0
720	Swamp Scrub / Aquatic Herbland Mosaic	2,435	101	4.1	2.0	0.0	0.0	0.0	1.9	0.2
724	Plains Woodland/Plains Sedgy Woodland/Damp Sands Herb-rich Woodland Mosaic	5,531	965	17.4	0.0	5.0	0.0	2.6	9.8	0.0
729	Sand Ridge Woodland / Damp Sands Herb-rich Woodland Mosaic	428	86	20.1	14.5	0.0	0.0	0.0	5.6	0.0
732	Damp Sands Herb-rich Woodland / Plains Swampy Woodland / Aquatic Herbland Mosaic	9,400	228	2.4	0.1	0.1	0.0	0.0	2.2	0.0
733	Swamp Scrub / Plains Sedgy Wetland / Aquatic Herbland Mosaic	8,982	72	0.8	0.5	0.0	0.0	0.0	0.3	0.0
734	Damp Heathland / Damp Heathy Woodland / Wet Heathland Mosaic	995	635	63.8	1.9	53.2	0.0	2.2	6.5	0.0
736	Limestone Rise Grassland / Limestone Rise Woodland Mosaic	98	90	91.8	0.0	91.4	0.0	0.0	0.4	0.0
737	Heathy Woodland / Limestone Woodland Mosaic	3,547	3,215	90.6	84.7	4.6	0.0	0.0	1.3	0.1

EVC No.	Ecological Vegetation Class	Area (ha)		Per cent remaining	Conservation Parks and Reserves (%)	State Forest (%)	Other Parks and Reserves (%)	Other Public Land (%)	Private Land (%)	Water Bodies / Unknown (%)
		Pre-1750	Current							
739	Plains Grassy Woodland / Plains Swampy Woodland Mosaic	5,396	142	2.6	0.0	0.4	0.0	0.1	2.1	0.0
740	Damp Sands Herb-rich Woodland / Heathy Woodland / Sand Heathland Mosaic	1,008	969	96.1	95.8	0.0	0.0	0.0	0.3	0.0
741	Salt Paperbark Woodland / Inland Saltmarsh Mosaic	232	17	7.4	5.9	0.1	0.0	0.0	0.0	1.5
742	Basalt Shrubby Woodland / Herb-rich Foothill Forest Mosaic	1,237	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
744	Stony Knoll Shrubland / Basalt Shrubby Woodland Mosaic	223	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
745	Hills Herb-rich Woodland / Plains Grassy Woodland Mosaic	5,875	890	15.2	0.5	8.0	0.0	0.0	6.7	0.0
746	Damp Heathland / Damp Heathy Woodland Mosaic	22,766	4,009	17.6	2.8	10.8	0.0	0.3	3.7	0.0
748	Shallow Sands Woodland / Heathy Woodland Mosaic	958	787	82.2	52.4	23.8	0.0	0.0	6.0	0.0
749	Shallow Sands Woodland / Plains Sedgy Woodland / Seasonally Inundated Shrubby Woodland Mosaic	4,167	907	21.8	1.4	15.5	0.0	0.0	4.9	0.0
750	Shallow Sands Woodland / Plains Sedgy Woodland / Seasonally Inundated Shrubby Woodland / Damp Sands Herb-rich Woodland Mosaic	20,275	5,700	28.1	1.7	19.6	0.0	0.0	6.8	0.0
751	Seasonally Inundated Shrubby Woodland / Plains Sedgy Woodland Mosaic	3,483	1,254	36.0	2.1	22.1	0.0	0.1	11.6	0.0
752	Grassy Woodland / Hills Herb-rich Woodland / Damp Sands Herb-rich Woodland Mosaic	20,083	814	4.1	0.2	0.1	0.0	0.0	3.8	0.0
757	Damp Sands Herb-rich Woodland / Seasonally Inundated Shrubby Woodland Mosaic	697	342	49.1	26.8	0.1	0.0	0.0	21.9	0.3
762	Damp Heathland / Sand Heathland Mosaic	822	655	79.7	30.6	44.9	0.0	3.3	0.9	0.0
763	Damp Heathland / Damp Heathy Woodland / Seasonally Inundated Shrubby Woodland Mosaic	1,481	11	0.8	0.0	0.0	0.0	0.0	0.7	0.0
770	Damp Sands Herb-rich Woodland / Lowland Forest Mosaic	1,836	932	50.8	9.2	18.0	6.6	0.2	23.4	0.0
776	Plains Swampy Woodland / Swamp Scrub Mosaic	2,664	77	2.9	0.3	0.4	0.0	0.0	2.2	0.0
779	Damp Sands Herb-rich Woodland / Shallow Sands Woodland Mosaic	2,202	474	21.5	0.6	9.9	0.0	0.0	11.0	0.0
781	Damp Sands Herb-rich Woodland / Herb-rich Foothill Forest Mosaic	3,119	404	13.0	0.0	6.0	0.0	0.0	6.9	0.0
785	Heathy Herb-rich Woodland / Damp Sands Herb-rich Woodland Mosaic	5,343	717	13.4	6.7	1.9	0.0	0.0	4.9	0.0
786	Heathy Woodland / Heathy Herb-rich Woodland / Damp Heathy Woodland Mosaic	3,466	2,622	75.7	0.0	54.0	0.0	0.0	21.6	0.0
787	Plains Woodland/Damp Sands Herb-rich Woodland Mosaic	219	109	49.9	48.1	0.0	0.0	0.0	1.8	0.1
791	(Plains Grassy Woodland / Damp Sands Herb-rich WoodlandComplex) / Damp Sands Herb-rich Woodland Mosaic	35,053	186	0.5	0.0	0.0	0.0	0.0	0.5	0.0
792	Stony Rises Woodland / Stony Knoll Shrubland Mosaic	3,587	2,014	56.1	0.2	35.3	0.0	0.0	20.7	0.0
793	Damp Heathy Woodland	2,608	833	32.0	4.2	19.5	0.0	0.2	8.0	0.0
794	Floodplain Riparian Woodland / Plains Grassy Woodland Mosaic	2,896	13	0.4	0.3	0.0	0.0	0.0	0.2	0.0

EVC No.	Ecological Vegetation Class	Area (ha)		Per cent remaining	Conservation Parks and Reserves (%)	State Forest (%)	Other Parks and Reserves (%)	Other Public Land (%)	Private Land (%)	Water Bodies / Unknown (%)
		Pre-1750	Current							
802	Grassy Woodland / Heathy Woodland Mosaic	2,825	520	18.4	1.5	0.0	0.0	0.9	16.1	0.0
803	Plains Woodland	440,062	4,433	1.0	0.2	0.2	0.0	0.0	0.5	0.0
858	Calcarenite Dune Woodland	13,438	3,933	29.3	20.7	1.6	0.0	0.0	6.9	0.1
876	Spray-zone Coastal Shrubland	77	9	11.8	11.8	0.0	0.0	0.0	0.0	0.0
881	Damp Sands Herb-rich Woodland / Heathy Woodland Mosaic	5,941	4,824	81.2	58.5	6.2	0.0	0.0	16.3	0.1
882	Shallow Sands Woodland	45,204	8,599	19.0	4.3	8.6	0.0	0.3	5.8	0.0
885	Damp Sands Herb-rich Woodland / Plains Grassy Woodland Complex	91,497	1,450	1.6	0.0	0.3	0.0	0.1	1.1	0.0
886	Red Gum Wetland / Aquatic erbland Mosic	1,280	149	11.6	4.3	5.3	0.0	0.0	1.6	0.4
892	Heathy Woodland/Sand Heath Mosaic	7,532	4,603	61.1	23.0	21.7	0.0	0.0	16.5	0.0
894	Scoria Cone Woodland	1,934	54	2.8	1.4	0.0	0.0	1.3	0.1	0.0
895	Escarpment Shrubland	1,130	120	10.6	1.7	0.0	0.0	0.5	8.4	0.0
897	Plains Grassland/Plains Grassy Woodland Mosaic	135,652	71	0.1	0.0	0.0	0.0	0.0	0.0	0.0
	Minor Mosaics and Complexes (numbering 187)	14,153	12,674	89.6	70.0	10.3	0.0	0.9	7.5	0.9
57	Plantation - Softwood	0	54,888							
58	Cleared / Severely Disturbed	0	1,414							
121	Plantation - Hardwood	0	14							
987	Plantation - Undefined	0	9,450							
988	Quarry	0	81							
989	Cleared / Severely Disturbed Due To Power Easement	0	6							
991	Water Body-Salt	5,263	33							
992	Water Body-Fresh	3,477	7,086							
995	Water - Ocean	405	0							
997	Cleared Land - No tree cover	0	2,393,048							
999	Unknown / Unclassified	1,443	518							
TOTAL		3,068,609	3,068,609							

A vegetation *mosaic* consists of discrete floristic entities (EVCs) which were unable to be distinguished in the mapping due to the scale used (i.e. 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 West region 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 was available to accurately map the boundaries between them.

In the Portland and Horsham FMAs, 37 of the EVCs occur predominantly on private land, with the remaining 131 occurring mainly on public land. For those EVCs that are not considered endangered, vulnerable or rare, the national reserve criteria reservation target of 15 per cent of the pre-1750 extent has been met for all EVCs.

For many of the EVCs that are endangered, vulnerable or rare as a result of depletion (Table 12.16), the only significant occurrence outside conservation reserves is on private land. This reflects the historic demarcation between public land and the selection of arable lands for farming associated with private land.

Sub-regional reservation of Ecological Vegetation Classes

Sub-regional representation of EVCs will be considered on a Forest Management Area (FMA) basis. Portland and Horsham FMAs are shown on Map 2 (Vol. 2). Information on EVCs for the Midlands and Otway FMAs has recently been published in Volume 1.

An analysis of the percent reservation of pre-1750 EVCs within each FMA can assist in evaluating the extent to which the reserve system encompasses regional variation in forest ecosystems. The results of this analysis are presented in Table 12.14 - only EVCs with a pre-1750 extent of at least 5000 ha (representing 94.3 per cent of the region) are shown in the table.

Table 12.14: Representative Conservation (percentage reservation status) of EVCs in the West Region (Portland & Horsham) by FMA

EVC	Ecological Vegetation Class	Total Area (ha)		Horsham		Portland	
		Pre-1750	Current	Ha Remaining	% Pre-1750 Protected	Ha Remaining	% Pre-1750 Protected
55	Plains Grassy Woodland	656,082	26,934	23,250	1.8	3,355	0.1
803	Plains Woodland	440,062	4,433	4,417	0.2	0	0.0
48	Heathy Woodland	188,079	155,886	105,604	41.1	50,133	26.2
3	Damp Sands Herb-rich Woodland	167,260	40,826	12,099	22.7	28,727	5.3
897	Plains Grassland/Plains Grassy Woodland Mosaic	135,652	71	0	0.0	71	0.0
885	Damp Sands Herb-rich Woodland / Plains Grassy Woodland	91,497	1,450	164	0.1	1,285	0.0
713	Damp Sands Herb-rich Woodland / Damp Heathland / Damp Heathy Woodland	84,334	2,935	0	-	2,935	0.1
23	Herb-rich Foothill Forest	78,142	20,514	1,157	92.5	19,357	2.8
132	Plains Grassland	72,011	1	1	0.0	1	0.0
642	Basalt Shrubby Woodland	70,899	79	0	0.0	79	0.0
714	Stony Knoll Shrubland / Plains Grassy Woodland / Plains Grassy Wetland	58,184	10	0	-	10	0.0
16	Lowland Forest	57,013	48,989	8,729	99.3	40,260	10.4
68	Creekline Grassy Woodland	50,221	1,324	637	3.8	619	0.1
882	Shallow Sands Woodland	45,204	8,599	7,075	2.5	1,524	19.1
719	Grassy Woodland / Damp Sands Herb-rich Woodland	43,875	933	11	0.2	922	0.0
179	Heathy Herb-rich Woodland	41,475	21,784	7,132	4.0	14,652	15.7
791	Plains Grassy Woodland / Damp Sands Herb-rich Complex / Dam	35,053	186	0	-	186	0.0
292	Red Gum Wetland	30,808	1,453	1,351	1.8	102	0.0
20	Heathy Dry Forest	30,349	30,073	30,073	96.3	0	-
175	Grassy Woodland	30,065	1,238	1,118	0.3	0	0.0
125	Plains Grassy Wetland	26,358	27	3	0.0	24	0.0
650	Heathy Woodland / Damp Heathy Woodland / Damp Heathland	25,812	12,833	2,368	2.4	10,465	8.3
746	Damp Heathland / Damp Heathy Woodland	22,766	4,009	0	-	4,009	2.8
53	Swamp Scrub	22,209	1,839	19	0.0	1,820	1.7
691	Aquatic Herbland/Plains Sedgy Wetland Mosaic	21,862	200	4	0.0	196	0.5
203	Stoney Rises Woodland	21,065	13,055	0	0.0	13,055	42.1

EVC	Ecological Vegetation Class	Total Area (ha)		Horsham		Portland	
		Pre-1750	Current	Ha Remaining	% Pre-1750 Protected	Ha Remaining	% Pre-1750 Protected
750	Shallow Sands Woodland / Plains Sedgy Woodland / Seasonally Inundated Shrubby Wo	20,275	5,700	4,286	1.0	1,414	3.1
71	Hills Herb-rich Woodland	20,261	13,600	12,737	43.3	739	5.6
752	Grassy Woodland / Hills Herb-rich Woodland / Damp Sands Herb-rich Woodland	20,083	814	276	0.5	538	0.1
651	Plains Swampy Woodland	19,707	87	25	0.0	62	0.0
56	Floodplain Riparian Woodland	18,818	3,003	931	12.5	2,072	3.9
6	Sand Heathland	15,220	14,310	12,888	84.9	1,423	46.2
28	Rocky Outcrop Shrubland	14,072	14,012	13,896	90.5	116	61.4
641	Riparian Woodland	13,852	2,781	1,559	14.8	1,196	6.3
858	Calcarenite Dune Woodland	13,438	3,933	0	-	3,933	20.7
647	Plains Sedgy Wetland	11,496	105	20	0.7	85	0.0
282	Shrubby Woodland	10,860	7,684	7,591	54.1	92	24.4
103	Riverine Grassy Chenopod Woodland	10,130	207	207	1.0	0	-
193	Rocky Outcrop Herbland	10,021	10,026	10,023	98.8	3	100.0
732	Damp Sands Herb-rich Woodland / Plains Swampy Woodland / Aquatic Herbland	9,400	228	0	0.0	228	0.1
733	Swamp Scrub / Plains Sedgy Wetland / Aquatic Herbland	8,982	72	0	-	72	0.5
195	Seasonally Inundated Shrubby Woodland	8,820	5,481	5,230	29.5	250	0.6
61	Box Ironbark Forest	8,478	3,697	3,697	5.7	0	-
660	Plains Woodland/Plains Grassy Wetland	7,911	2,228	2,228	1.6	0	0.0
710	Damp Heathland	7,641	5,468	227	0.5	5,241	25.8
892	Heathy Woodland/Sand Heath Mosaic	7,532	4,603	4,385	32.2	218	0.0
674	Sandy Stream Woodland	7,321	792	65	0.0	727	0.2
704	Lateritic Woodland	7,266	1,421	1,258	0.2	163	37.5
191	Riparian Scrub	6,679	4,810	2,449	66.1	2,361	20.5
681	Deep Freshwater Marsh	6,639	1,312	10	0.0	1,301	16.8
8	Wet Heathland	6,621	5,601	1,176	82.9	4,425	68.2
47	Valley Grassy Forest	6,572	5,351	5,351	62.3	0	-
645	Wet Heathland / Heathy Woodland	6,350	4,489	0	-	4,489	44.5

EVC	Ecological Vegetation Class	Total Area (ha)		Horsham		Portland	
		Pre-1750	Current	Ha Remaining	% Pre-1750 Protected	Ha Remaining	% Pre-1750 Protected
73	Rocky Outcrop Shrubland/Herbland Mosaic	6,120	5,925	5,924	94.5	2	9.5
881	Damp Sands Herb-rich Woodland / Heathy Woodland	5,941	4,824	82	0.2	4,742	60.0
745	Hills Herb-rich Woodland / Plains Grassy Woodland	5,875	890	824	0.4	67	1.1
724	Plains Woodland/Plains Sedgy Woodland/Damp Sands Herb-rich Woodland	5,531	965	965	0.0	0	-
739	Plains Grassy Woodland / Plains Swampy Woodland	5,396	142	0	-	142	0.0
785	Heathy Herb-rich Woodland / Damp Sands Herb-rich Woodland	5,343	717	477	25.4	240	3.4
200	Shallow Freshwater Marsh	5,113	1,060	837	29.3	222	2.0
160	Coastal Dune Scrub	4,973	1,412	0	-	1,412	22.4

Reservation of Floristic Variation across EVCs

The extent to which the reserve system includes a representative sample of the floristic communities within each EVC has not yet been assessed. This analysis will be presented in the West region Biodiversity Assessment Report for the CRA and will assist in evaluating the extent to which the reserve system encompasses regional variation in forest ecosystems.

Threatened Forest Ecosystems

The conservation status of EVCs in the West region has been assessed using the criteria derived from the National Forest Reserve Criteria (JANIS 1997) (see Table 12.15).

Table 12.15: The National Forest Reserve (JANIS) Criteria Used to Assess the Conservation Status of EVCs

Status of EVC	Criteria
Rare	R1. Total range generally less than 10,000 ha. R2. Total area generally less than 1,000 ha. R3. Patch sizes generally less than 100 ha.
Vulnerable	V1. Approaching greater than 70 per cent lost (depletion) and remains subject to threatening processes. V2. Includes EVCs where threatening proces ses have caused: • significant changes in species composition, • loss or significant decline in species that play a major role within the ecosystem, or • significant alteration to ecosystem processes. V3. Not depleted but subject to continuing threatening proc esses which may reduce its extent.
Endangered	E1. Distribution has contracted to less than 10 per cent of original range. E2. Less than 10 per cent of original area remaining. E3. 90 per cent of area is in small patches subject to threatening processes and unlikely to persist.

A total of 87 EVCs from the Portland and Horsham FMAs have been classified as endangered, vulnerable or rare - these are listed in Table 12.16.

Table 12.16: Endangered, Vulnerable and Rare Ecological Vegetation Classes in the Portland and Horsham FMAs

EVC No	EVC Name	Criteria	Approximate % Reservation in Conservation Parks and Reserves[1]	Threatening Processes
3	Damp Sands Herb-rich Woodland 672 Damp Sands Herb-rich Woodland/Shrubby Woodland 713 Damp Sands Herb-rich Woodland / Damp Heathland / Damp Heathy Woodland 732 Damp Sands Herb-rich Woodland / Plains Swampy Woodland / Aquatic Herbland 740 Damp Sands Herb-rich Woodland / Heathy Woodland / Sand Heathland 757 Damp Sands Herb-rich Woodland / Seasonally Inundated Shrubby Woodlan	V1, V2	5.9	clearing, weed invasion (including pine escapes), plantation development, , grazing, bracken invasion, inappropriate fire regimes, fragmentation

EVC No	EVC Name	Criteria	Approximate % Reservation in Conservation Parks and Reserves[1]	Threatening Processes
	770 Damp Sands Herb-rich Woodland / Lowland Forest 779 Damp Sands Herb-rich Woodland / Shallow Sands Woodland 781 Damp Sands Herb-rich Woodland / Herb-rich Foothill Forest 785 Heathy Herb-rich Woodland/ Damp Sands Herb-rich Woodland 881 Damp Sands Herb-rich Woodland / Heathy Woodland 885 Damp Sands Herb-rich Woodland / Plains Grassy Woodland 729 Sand Ridge Woodland / Damp Sands Herb-rich Woodland			
6	Sand Heathland 762 Damp Heathland/Sand Heathland 892 Heathy Woodland/Sand Heathland Mosaic	R3, V2	73.5	inappropriate fire regimes, plantation development, dieback (cinnamon fungus)
8	Wet Heathland 645 Wet Heathland/Heathy Woodland	R3, V3	62.3	clearing, grazing, weed invasion, inappropriate fire regimes, fragmentation, plantation development, hydrological change as a result of plantations
9	Coastal Saltmarsh	R2, R3	45.0	
10	Estuarine Wetland	R2, R3, V1	4.4	clearing, grazing, weed invasion, hydrological alteration
13	Brackish Sedgeland	R2, R3, V1, E3	21.6	agriculture, grazing, weed invasion, hydrological alteration
18	Riparian Forest	R2, R3, V2	38.8	weed invasion, grazing, road construction and maintenance, timber harvesting, hydrological alteration, recreation,
19	Riparian Shrubland 666 Riparian Shrubland / Escarpment Shrubland / Grassy Woodland	R2, R3, E3	8.8	weed invasion, grazing, hydrological alteration
23	Herb-rich Foothill Forest	V1	4.2	clearing for agriculture, grazing, weed invasion, timber harvesting
29	Damp Forest	R2, R3	100.0	
30	Wet Forest	R2, R3	99.7	
37	Montane Grassy Woodland	R1, R2, R3	100.0	
50	Coastal Heathland	R2, R3	0.0[2]	
53	Swamp Scrub 720 Swamp Scrub / Aquatic Herbland	E2, E3	1.7	clearing, grazing, weed invasion, fragmentation, hydrological alteration

EVC No	EVC Name	Criteria	Approximate % Reservation in Conservation Parks and Reserves[1]	Threatening Processes
55	Plains Grassy Woodland 745 Hills Herb-rich Woodland / Plains Grassy Woodland 646 Heathy Woodland / Plains Grassy Woodland 794 Floodplain Riparian Woodland / Plains Grassy Woodland 897 Plains Grassland/Plains Grassy Woodland Mosaic 791 Plains Grassy Woodland / Damp Sands Herb-rich Complex / Dam 885 Damp Sands Herb-rich Woodland/Plains Grassy Woodland Complex 739 Plains Grassy Woodland / Plains Swampy Woodland 716 Plains Grassy Woodland / Stony Knoll Shrubland	E2, E3	0.4	clearing, fragmentation, grazing, weed invasion, inappropriate fire regimes, timber harvesting
56	Floodplain Riparian Woodland 690 Floodplain Riparian Woodland/Billabong Wetland Mosaic	R2, R3, E2, E3	4.7	clearing, grazing, weed invasion, fragmentation, hydrological alteration
61	Box Ironbark Forest	R2	5.7	
65	Sedge-rich Woodland	R2, R3, V2	0.0	clearing, grazing, weed invasion
67	Alluvial Terraces Herb-rich Woodland	R2, R3, E2, E3	21.8	clearing, grazing, weed invasion
68	Creekline Grassy Woodland	R2, R3, V2, E2	0.5	clearing, hydrological alteration, grazing, weed invasion
73	Rocky Outcrop Shrubland/Herbland Mosaic 193 Rocky Outcrop Herbland 28 Rocky Outcrop Shrubland	E3	93.8	weed invasion, grazing, pest animals
74	Wetland Formation	R2, R3, E2, E3	0.0	drainage and other hydrological alteration, salinity, raised bed cropping, grazing, weed invasion, agricultural run-off
83	Swampy Riparian Woodland	R2, R3, E2, E3	0.1	clearing, grazing, weed invasion, hydrological alteration, fragmentation
93	Broombush Mallee	R2	14.0	
103	Riverine Grassy Chenopod Woodland	R2, R3, E2, E3	1.0	clearing, salinity, grazing, minor forest produce, pest animals
125	Plains Grassy Wetland	R2, R3, E2, E3	0.0	raised bed cropping, grazing, drainage and other hydrological alteration, weed invasion, fire breaks
132	Plains Grassland 715 Plains Grassland / Stony Knoll Shrubland 897 Plains Grassland/Plains Grassy Woodland Mosaic	E2, E3	0.003	grazing, ploughing and cropping, fragmentation, weed invasion, innappropriate burning regime, road construction and maintenance, utility services
133	Limestone Pomaderris Shrubland	R2, R3	93.5	weed invasion
134	Sand Forest	R2, V1	1.5	inappropriate fire regimes, dieback
136	Sedge Wetland	R3, V1	7.9	drainage and other hydrological alteration in pine plantation areas, weed invasion
155	Bird Colony Succulent Herbland	R2, R3	20.9	

EVC No	EVC Name	Criteria	Approximate % Reservation in Conservation Parks and Reserves[1]	Threatening Processes
160	Coastal Dune Scrub	V1, V2	22.4	clearing, weed invasion
161	Coastal Headland Scrub 162 Coastal Headland Scrub/Coastal Tussock Grassland Mosaic	R2, R3	22.4	
164	Creekline Herb-rich Woodland	R2, R3, V2	6.1	clearing, grazing, weed invasion
175	Grassy Woodland 697 Grassy Woodland / Alluvial Terraces Herb-rich Woodland 719 Grassy Woodland / Damp Sands Herb-rich Woodland 802 Grassy Woodland / Heathy Woodland 752 Grassy Woodland / Hills Herb-rich Woodland / Damp Sands Herb-rich Woodland	E2, E3	0.2	clearing, grazing, weed invasion, habitat loss, fragmentation
184	Montane Wet Heathland	R2, R3	100.0	
191	Riparian Scrub	R3	42.6	
192	Montane Rocky Shrubland	R3	100.0	
195	Seasonally Inundated Shrubby Woodland 751 Seasonally Inundated Shrubby Woodland/Plains Sedgy Woodland	R3, V1	21.5	weed invasion, hydrological alteration, grazing, clearing
200	Shallow Freshwater Marsh 432 Floodplain Thicket/Shallow Freshwater Marsh Complex	R3, E2, E3	13.0	grazing, hydrological alteration, weed invasion, cropping, fertiliser run-off
264	Sand Ridge Woodland	R2, R3, E2	0.1	clearing, grazing, weed invasion, pest animals
278	Herb-rich Heathy Forest	R1, R2, R3	99.8	
279	Heathland Thicket	R2, R3	92.1	
281	Sedge-rich Wetland	R2, R3, V3	49.3	clearing, grazing, , weed invasion,
284	Claypan Ephemeral Wetland	R2, R3	100.0	weed invasion
285	Dry Creekline Woodland	R2, R3	20.5	grazing, minor forest produce, weed invasion
291	Cane Grass Wetland	R2, E2	2.9	clearing, hydrological alteration, grazing, weed invasion
292	Red Gum Wetland 886 Red Gum Wetland/Aquatic Herbland 458 Red Gum Wetland/Shallow Freshwater Marsh Mosaic	R3, E2, E3	1.4	clearing and draining, weed invasion, grazing
300	Reed Swamp	R2, E3	22.9	clearing and draining, grazing, changed hydrology and salinity
636	Brackish Lake Mosaic	R2, V3	0.2	changed salinity regimes
640	Creekline Sedgy Woodland	R2, V1	8.8	clearing, grazing, weed invasion, minor forest produce
641	Riparian Woodland	V1, E3	9.0	clearing, grazing, weed invasion, recreation, hydrological alteration, minor forest produce
642	Basalt Shrubby Woodland 742 Basalt Shrubby Woodland / Herb-rich Foothill Forest 744 Stoney Knoll Shrubland / Basalt Shrubby Woodland	R2, E2, E3	0.002	grazing, weed invasion, inappropriate fire regimes, clearing, utility services

EVC No	EVC Name	Criteria	Approximate % Reservation in Conservation Parks and Reserves[1]	Threatening Processes
643	Brackish Drainage Line Herbland/Sedgeland	R2, R3, E2, E3	1.1	clearing, raised bed cropping, weed invasion, grazing, fertiliser run-off, hydrological alteration
644	Cinder Cone Woodland	R2, E2, E3	41.6	clearing, weed invasion,
647	Plains Sedgy Wetland	R2, E2	0.1	clearing, raised bed cropping, hydrological alteration, grazing, weed invasion, fire breaks
649	Stony Knoll Shrubland 716 Plains Grassy Woodland / Stony Knoll Shrubland 715 Plains Grassland / Stony Knoll Shrubland 792 Stony Rises Woodland / Stony Knoll Shrubland 714 Stony Knoll Shrubland / Plains Grassy Woodland / Plains Grassy Wetland 744 Stony Knoll Shrubland / Basalt Shrubby Woodland	E2, E3	0.02	clearing, weed invasion, rock removal, inappropriate grazing regimes or inappropriate fire regimes
651	Plains Swampy Woodland 776 Plains Swampy Woodland / Swamp Scrub	R2, E2, E3	0.03	clearing, weed invasion, hydrological alteration
652	Lunette Woodland	R2, E2, E3	0.6	clearing, grazing, weed invasion, minor forest produce
653	Aquatic Herbland 733 Swamp Scrub / Plains Sedgy Wetland / Aquatic Herbland 658 Riverine Grassy Woodland / Riverine Sedgy Forest / Aquatic Herbland 886 Red Gum Wetland/Aquatic Herbland 732 Damp Sands Herb-rich Woodland / Plains Swampy Woodland / Aquatic Herbland 720 Swamp Scrub / Aquatic Herbland 691 Aquatic Herbland/Plains Sedgy Wetland Mosaic	R2, R3, V1	1.0	clearing, raised bed cropping
655	Lignum Cane Grass Swamp	R2, E2, E3	1.5	clearing, weed invasion, hydrological alteration, grazing, raised bed cropping
656	Brackish Wetland	R2, V1	17.1	clearing, grazing, raised bed cropping, hydrological alteration, salinity, weed invasion
657	Freshwater Lignum Shrubland	R2, E2, E3	0.7	weed invasion hydrological alteration, grazing, clearing, agricultural run-off
659	Plains Riparian Shrubby Woodland	R2, V2	60.0	weed invasion, uncontrolled access by stock, minor forest produce
663	Black Box Lignum Woodland	R2, R3, V1, E3	7.9	clearing, weed invasion, salinity, hydrological change, grazing
664	Limestone Ridge Woodland	R2, R3	78.2	inappropriate fire regimes, weed invasion
665	Coastal Mallee Scrub	R2, V2	32.4	clearing, grazing, inappropriate fire regimes, weed invasion
670	Limestone Woodland	R2	100.0	
673	Dune Soak Woodland	R2, E2, E3	4.3	clearing, grazing,
674	Sandy Stream Woodland	R2, V1	0.1	clearing, grazing, weed invasion, hydrological alteration

EVC No	EVC Name	Criteria	Approximate % Reservation in Conservation Parks and Reserves[1]	Threatening Processes
676	Salt Paperbark Woodland 741 Salt Paperbark Woodland / Inland Saltmarsh	R2, V1	9.3	clearing, grazing, weed invasion, hydrological alteration
677	Inland Saltmarsh 741 Salt Paperbark Woodland / Inland Saltmarsh	R2, E2, E3	2.2	clearing, grazing, weed invasion, hydrological alteration
679	Drainage-line Woodland	R2, E2, E3	5.1	clearing, weed invasion, hydrological alteration
680	Freshwater Meadow	R2, E2, E3	0.4	drainage, raised bed cropping, grazing, weed invasion
681	Deep Freshwater Marsh	V1	12.0	drainage, raised bed cropping
704	Lateritic Woodland	V1	1.4	gravel extraction, clearing, weed invasion, grazing, minor forest produce
705	Basalt Creekline Shrubby Woodland	R2, E2, E3	0.0	clearing, weed invasion, hydrological alteration
707	Sedgy Swamp Woodland	R2, V1	0.0	clearing, plantation development, weed invasion, inappropriate fire regimes
709	Scree-slope Grassland/Woodland	R2, V1	22.2	recreation, altered fire regimes, weed invasion
736	Limestone Rise Grassland/Limestone Rise Woodland Mosaic	R1, R2, R3	0.0	
793	Damp Heathy Woodland 786 Heathy Woodland / Heathy Herb-rich Woodland / Damp Heathy Woodland 650 Heathy Woodland / Damp Heathy Woodland / Damp Heathland 713 Damp Sands Herb-rich Woodland / Damp Heathland / Damp Heathy Woodland 734 Damp Heathland / Damp Heathy Woodland / Wet Heathland 763 Damp Heathland / Damp Heathy Woodland / Seasonally Inundated Shrubby Woodland 746 Damp Heathland / Damp Heathy Woodland	V1, V2	1.7	clearing, altered fire regimes, plantation development, hydrological alteration, weed invasion
803	Plains Woodland 787 Plains Woodland/Damp Sands Herb-rich Woodland 660 Plains Woodland/Plains Grassy Wetland 724 Plains Woodland/Plains Sedgy Woodland/Damp Sands Herb-rich Woodland	E2, E3	0.2	clearing, grazing, weed invasion, salinity, utility services, road construction and maintenance
858	Calcarenite Dune Woodland	V2	20.7	clearing, recreation, grazing, weed invasion
876	Spray-zone Coastal Shrubland	R2, V2	11.8	recreation pressures, inappropriate revegetation
882	Shallow Sands Woodland 748 Shallow Sands Woodland / Heathy Woodland 711 Shallow Sands Woodland / Plains Sedgy Woodland 749 Shallow Sands Woodland / Plains Sedgy Woodland / Seasonally Inundated	V1	5.8	clearing, grazing, minor forest produce, weed invasion

EVC No	EVC Name	Criteria	Approximate % Reservation in Conservation Parks and Reserves[1]	Threatening Processes
	Shrubby Woodland			
894	Scoria Cone Woodland	R2, E2, E3	1.4	clearing, weed invasion, mining
895	Escarpment Shrubland 669 Escarpment Shrubland / Damp Sands Herb-rich Woodland / Riparian Woodland / Swamp 675 Escarpment Shrubland / Damp Sands Herb-rich Woodland / Swamp Scrub 662 Escarpment Shrubland / Grassy Woodland / Riparian Woodland 668 Riparian Woodland / Escarpment Shrubland 666 Riparian Shrubland / Escarpment Shrubland / Grassy Woodland	R2, E2	1.8	clearing, grazing, pest animals, weed invasion

Notes: [1.] Percent Reservation in Conservation Parks and Reserves is an estimate of the extent of the primary EVC (including the proportional contribution of the most important component mosaic and complex units) and is based on pre-1750 extent.
[2] Current extent of Coastal Heathland is underestimated due to mapping methodology
EVC mosaics and complexes are included under their component EVCs where their pre-1750 or extant extent contributes significantly to threat status.
Further information on disturbances and management actions is provided in section 12.7 of Volume 1.

Management mechanisms currently available to address the threatening processes tabulated above include: the Code of Practice for Fire Management on Public Land, Native Vegetation Retention Controls, weed control, fencing and the Land for Wildlife scheme. Further details are included in section 12.7 of Volume 1.

Several relatively common EVCs are subject to a variety of threatening processes but are not judged to be impacted to a sufficiently significant degree (i.e. in extent and/or severity) to be considered endangered, vulnerable or rare in accordance with the JANIS criteria. For example, EVCs with heathy and herb-rich understories (Heathy Woodland, Hills Herb-rich Woodland and Heathy Herb-rich Woodland) are particularly sensitive to altered fire regimes and weed invasion. Management of these EVCs needs to consider ways of minimising any long-term impacts.

12.5 FLORA SPECIES ASSESSMENT

Introduction

Assessment of the West region flora has involved analysing the distribution and viability of individual plant species and their populations in the region. The purpose of this assessment is to assist in determining whether:

- viable populations of all terrestrial and aquatic plant species are maintained throughout their natural range in the region;
- representative populations of each species are included in the reserve system; and
- populations and their habitats both within and outside the reserve system are subject to management appropriate for their long-term maintenance.

Priority Species Information

A total of approximately 2900 species of vascular plants have been recorded for the West region, including 519 species of conservation significance and approximately 850 exotic species. However, the amount and quality of information on particular species is highly variable and only 366 have post-1950 records that can be substantiated. Rare taxa, extinct taxa, or taxa where the conservation status was not known, were deleted from the list of 366

plants with post-1950 records – as were those taxa not known to occur within woodland or forest communities – leaving 101 plants that were, in the context of this report, treated as priority flora. Fifty one of these priority flora species are listed (or recommended for listing) as Threatened in Victoria under Schedule 2 of the *Flora and Fauna Guarantee Act* 1988 (FFG Act) and/or listed as nationally Endangered or Vulnerable under Schedule 1 of the Commonwealth *Endangered Species Protection Act* 1992 (ESP Act) (see Table 12.17). A complete list of the 366 species of conservation significance will be contained in the Biodiversity Assessment Report (VicRFASC in prep.a).

Table 12.17: West Region Plant Species Listed (or Recommended for Listing) under the FFG Act and/or ESP Act

Species Name	Common Name	FFG Act Listing	Action Statement (FFG)	ESP Act Status	Recovery Plan (ESP)
Acacia glandulicarpa	Hairy-pod Wattle	listed	yes	V	no
Allocasuarina luehmannii	Buloke	listed	no	-	-
Astelia australiana	Tall Astelia	listed	yes	V	draft
Asterolasia phebalioides	Downy Star-Bush	listed	no	V	no
Caladenia calcicola	Limestone Spider-orchid	listed	yes	V	no
Caladenia concolor	Crimson Spider-orchid	listed	no	V	no
Caladenia formosa	Elegant Spider-orchid	listed	no	V	no
Caladenia fulva	Tawny Spider-orchid	listed	no	E	no
Caladenia hastata	Mellblom's Spider-orchid	listed	in prep.	E	draft
Caladenia tensa	Rigid Spider-orchid	-	-	E	no
Caladenia versicolor	Candy Spider-orchid	-	-	V	no
Caladenia xanthochila	Yellow-lip Spider-orchid	listed	no	E	no
Caleana sp. aff. *nigrita* (Horsham)	Grampians Duck-orchid	prelim. rec.	-	-	-
Comesperma polygaloides	Small Milkwort	listed	in prep.	-	-
Cullen parvum	Small Scurf-pea	listed	yes	E	yes
Cullen tenax	Tough Scurf-pea	listed	in prep.	-	-
Cyathea cunninghamii	Slender Tree-fern	listed	in prep.	-	-
Daviesia laevis	Grampians Bitter-pea	-	-	V	no
Discaria pubescens	Hairy Anchor Plant	listed	yes	-	no
Diuris palustris	Swamp Diuris	final rec.	-	-	-
Diuris punctata var. *punctata*	Purple Diuris	listed	no	-	-
Dodonaea procumbens	Trailing Hop-bush	-	-	V	no
Eucalyptus aff. *cypellocarpa* (Anglesea)	Otway Grey Gum	-	-	-	-
Eucalyptus aggregata	Black Gum	listed	yes	-	-
Eucalyptus leucoxylon ssp. *connata*	Yellow Gum	-	-	-	-
Euphrasia collina ssp. *muelleri*	Purple Eyebright	final rec.	-	E	no
Glycine latrobeana	Clover Glycine	listed	no	V	yes
Grevillea floripendula	Drooping Grevillea	final rec.	-	-	-
Grevillea infecunda	Anglesea Grevillea	-	-	V	no
Grevillea williamsonii	Mt. William Grevillea	-	-	E	yes
Isolepis congrua	Slender Club-sedge	final rec.	-	-	-
Leptorhynchos gatesii	Wrinkled Buttons	final rec.	-	V	no
Olearia pannosa ssp. *cardiophylla*	Velvet Daisy-bush	listed	no	-	-
Prasophyllum diversiflorum	Gorae Leek-orchid	listed	in prep.	E	draft
Prasophyllum fitzgeraldii	Fitzgerald's Leek-orchid	final rec.	-	-	-
Prasophyllum frenchii	Maroon Leek-orchid	final rec.	-	V	no
Prasophyllum lindleyanum	Green Leek-orchid	-	-	-	-
Prasophyllum subbisectum	Pomonal Leek-orchid	listed	no	E	no
Pterostylis cheraphila	Floodplain Rustyhood	listed	no	-	-
Ptilotus erubescens	Hairy Tails	listed	in prep.	-	-
Pultenaea graveolens	Scented Bush-pea	listed	no	-	-
Rutidosis leptorhynchoides	Button Wrinklewort	listed	yes	E	yes
Senecio macrocarpus	Large-fruit Fireweed	listed	yes	V	no
Swainsona brachycarpa	Slender Swainson-pea	listed	no	-	-
Swainsona swainsonioides	Downy Swainson-pea	prelim. rec.	-	-	-
Taraxacum cygnorum	Coast Dandelion	listed	no	V	no
Thelymitra epipactoides	Metallic Sun-orchid	listed	no	E	no
Thelymitra mackibbinii	Brilliant Sun-orchid	-	-	V	no
Thelymitra matthewsii	Spiral Sun-orchid	listed	no	V	no
Thelymitra merraniae	Merran's Sun-orchid	listed	in prep.	-	-
Thelymitra sp. aff. *pauciflora* (Anglesea)	Anglesea Sun-orchid	-	-	-	-

Both the ESP Act and the FFG Act include provisions for the preparation of management plans for listed taxa. Action Statements and Recovery Plans outline the actions necessary to maximise the long-term prospects for survival of the species in the wild. The status of Action Statements and Recovery Plans for FFG/ESP Act listed species is indicated in Table 12.17. It should be noted that the implementation of management actions is dependent on available resourcing and priorities within and between species.

The distribution of plants of conservation significance is often associated with particular habitats or other environmental factors. Some groupings have been identified for plants of conservation significance based on their abundance, distribution and habitats (Table 12.18).

Table 12.18: Plant Groupings of Conservation Significance in the West Region

Plant Grouping	Species of conservation significance
Plants of restricted, highly localised and naturally rare habitat types	**Cool Temperate Rainforest** Cool Temperate Rainforest is highly localised in Victoria and is restricted (within the West region) to steeply dissected gullies and valleys in the Otway Ranges where the wettest and most sheltered niches occur. The overstorey is dominated by Myrtle Beech *Nothofagus cunninghamii*, with Soft Tree-fern *Dicksonia antarctica*, Prickly Currant-bush *Coprosma quadrifida*, Austral Mulberry *Hedycarya angustifolia*, Banyalla *Pittosporum bicolor*, Musk Daisy-bush *Olearia argophylla* and Blackwood *Acacia melanoxylon* forming a dense understorey. This Ecological Vegetation Class is characterised by a diversity and abundance of obligate epiphytes. Eight priority taxa are known to occur within this EVC. These are Tall Astelia *Astelia australiana,* Slender Tree-fern *Cyathea cunninghamii,* Beech Finger-fern *Grammitis magellanica* ssp. *nothofageti,* Long Clubmoss *Huperzia varia,* Slender Fork-fern *Tmesipteris elongata* ssp. *elongata,* Slender Tree-fern *Cyathea cunninghamii,* Beech Finger-fern *Grammitis magellanica* ssp. *nothofageti* and Long Clubmoss *Huperzia varia*.
	Shallow depressions or swamps Shallow depressions or swamps can be found in all shapes and sizes throughout the West region. Due to the restricted nature of this habitat it is rarely sampled or mapped. For example, gilgai - shallow depressions in clay soils caused by expansion and contraction of the clay – are rarely over a 1 m wide and yet can be quite floristically and structurally distinct from adjacent grassland areas. These areas provide important microhabitat for water-dependent species in otherwise dry landscapes. Fourteen priority taxa are known to occur within shallow depressions or swamps. These are Purple Diuris *Diuris punctata* var. *punctata*, Small Nut-heads *Haegiela tatei*, Slender Club-sedge *Isolepis congrua*, Gorae Leek-orchid *Prasophyllum diversiflorum*, Swamp Buttercup *Ranunculus undosus*, Downy Swainson-pea *Swainsona swainsonioides*, Naked Sun-orchid *Thelymitra circumsepta*, Floodplain Rustyhood *Pterostylis cheraphila*, Ornate Pink Fingers *Caladenia carnea* var. *ornata*, Swamp Billy-buttons *Craspedia paludicola*, Pale Swamp Everlasting *Helichrysum* aff. *rutidolepis* (Lowland Swamps), Swamp Fireweed *Senecio psilocarpus*, Swamp Flax-lily *Dianella callicarpa* and Gellibrand Midge-orchid *Genoplesium* sp. aff. *nudiscapum*.
	Riparian habitats Seven priority taxa are known to occur within riparian habitats. These are Tall Astelia *Astelia australiana*, Mountain Bertya *Bertya findlayi*, Candy Spider-orchid *Caladenia versicolor*, Long Rope-rush *Calorophus elongatus*, Square Raspwort *Haloragis exalata* ssp. *exalata* var. *exalata*, Button Immortelle *Leptorhynchos waitzia* and Lime Fern *Pneumatopteris pennigera.*
Plants localised to natural regions of the West region	**Otway Ranges** The Otway Ranges occur close to the coast along the southern edge of the West region. It is formed from volcanolithic sandstone and siltstone laid down and elevated in the Cretaceous. The terrain is deeply dissected throughout most of the range with the altitude varying from sea-level to 670 m ASL. The proximity to the coast and steep terrain result in high rainfall with up to 2000 mm being recorded. Eight priority taxa have over 80% of their regional population within the Otway Ranges. These are Tall Astelia *Astelia australiana,* Slender Tree-fern *Cyathea cunninghamii,* Snow-berry *Gaultheria hispida,* Beech Finger-

Plant Grouping	Species of conservation significance
	Otway Ranges (cont.) fern *Grammitis magellanica* ssp. *nothofageti,* Long Clubmoss *Huperzia varia,* Merran's Sun-orchid *Thelymitra merraniae,* Wrinkled Buttons *Leptorhynchos gatesii* and Slender Fork-fern *Tmesipteris elongata* ssp. *elongata.* Wrinkled Buttons *Leptorhynchos gatesii* is endemic to this natural region.
	Coastal and inland dunes Throughout the southwest of the West region a series of parallel dunes can be found extending from the coast inland for several hundred kilometres. These extensive sand deposits have been laid down by wind and waves as the sea level has receded since the Pleistocene. The extensive lagoon and swamp deposits that alternate with these dunes are not included in this natural region. The rainfall ranges from 500 mm inland to 1000 mm near the coast and the altitude ranges from sea level to 200 m ASL further inland. Eight priority taxa have over 80% of their regional population within this natural region. These are Limestone Spider-orchid *Caladenia calcicola*, Scented Spider-orchid *Caladenia fragrantissima* ssp. *fragrantissima*, Coast Gum *Eucalyptus diversifolia* ssp. *megacarpa*, Green-leaf Mallee *Eucalyptus phenax*, Small Nut-heads *Haegiela tatei*, Sweet Quandong *Santalum acuminatum*, Coast Dandelion *Taraxacum cygnorum* and Heathy Guinea-flower *Hibbertia sessiliflora.* Limestone Spider-orchid *Caladenia calcicola* and Coast Gum *Eucalyptus diversifolia* ssp. *megacarpa* are endemic to this natural region. Twenty-one other priority taxa have been recorded within this natural region.
	Fluvial deposits surrounding the Grampians Ranges The characteristic sandstone escarpments associated with the mountainous regions of the Grampians form the focal point for the surrounding plains that form this natural region. For the most part the altitude varies between 100m to 200m ASL and the rainfall ranges between 500 and 750 mm . The region extends for up to 20km east of the Serra Range and 40km north of the Mount Difficult Range. Fluvial deposits also occur in the Victoria Valley. Formed by the erosion of softer siltstones and sandstones, these areas support extensive forested areas that have in the past been heavily harvested. All harvesting in the Grampians National Park ceased in June 1994. Seven priority taxa have over 80% of their regional population within this natural region. These are Rigid Spider-orchid *Caladenia tensa,* Candy Spider-orchid *Caladenia versicolor*, Yellow-lip Spider-orchid *Caladenia xanthochila*, Umbrella Grass *Digitaria divaricatissima*, Clustered Daisy-bush *Olearia suffruticosa,* Floodplain Rustyhood *Pterostylis cheraphila* and Swamp Buttercup *Ranunculus undosus.* Twenty-seven other priority taxa have been recorded within this natural region.
	Plants of the Otway Plain The Otway Plain occurs northwest of the Otway Ranges and extends from the Bellarine Peninsula through to Warrnambool, with a small outlier between Bessiebelle and Kirkstall. The plain extends between 10 km and 40 km inland and has been derived from both Tertiary marine sediments and outwash sediments. The rainfall throughout the bulk of the natural region varies between 500 mm and 1000 mm and the altitude between sea level and 200 m ASL. Six priority taxa have over 80% of their regional population within this natural region. These are Wine-lipped Spider-orchid *Caladenia lindleyana*, Robust Spider-orchid *Caladenia valida,* Long Rope-rush *Calorophus elongatus,* Otway Grey Gum *Eucalyptus* aff. *cypellocarpa* (Anglesea), Anglesea Grevillea *Grevillea infecunda* and Anglesea Sun-orchid *Thelymitra* sp. aff. *pauciflora* (Anglesea). The last three taxa are endemic to this natural region and 40 other priority taxa have been recorded within this natural region.
	Plants of the Volcanic Plain This natural region is clearly defined by geology and landform. A result of 'recent' volcanic activity, the plain consists of basalt and scoria that forms reddish brown or sometimes black fertile soils. Due to very low rainfall, the bulk of the plain is only able to support grasslands or grassy woodlands dominated by Kangaroo Grass *Themeda triandra*, Wallaby-grasses *Austrodanthonia* spp., Tussock-grasses *Poa* spp. and Spear-grasses *Austrostipa* spp. Trees are limited to the edge of

Plant Grouping	Species of conservation significance
	Plants of the Volcanic Plain (cont.) watercourses or the moist environments that are associated with stony rises or the moister margins of the plain to the west. The rainfall mostly varies between 500 mm and 750 mm although it can reach up to 1500 mm in the foothills. The volcanic plains vary in altitude between sea-level in the far southwest to 800 m ASL in the Victorian Midlands. Six priority taxa have over 80% of their regional population within this natural region. These are Kidney Saltbush *Atriplex stipitata,* Tough Scurf-pea *Cullen tenax*, Pale Flax-lily *Dianella longifolia* var. *grandis*, Hairy Anchor Plant *Discaria pubescens* , Pale Swamp Everlasting *Helichrysum* aff. *rutidolepis* (Lowland Swamps) and Leafless Bluebush *Maireana aphylla*. Thirty-two other priority taxa have been recorded within this natural region.
Plants endemic to the West region	Out of the threatened species identified as priority taxa, 19 were found to be endemic to the West region. These are Limestone Spider-orchid *Caladenia calcicola,* Tawny Spider-orchid *Caladenia fulva,* Mellblom's Spider-orchid *Caladenia hastata,* Grampians Bitter-pea *Daviesia laevis,* Swamp Flax-lily *Dianella callicarpa,* Otway Grey Gum *Eucalyptus* aff. *cypellocarpa* (Anglesea), Coast Gum *Eucalyptus diversifolia* ssp. *megacarpa,* Gellibrand Midge-orchid *Genoplesium* sp. aff. *nudiscapum,* Enfield Grevillea *Grevillea bedggoodiana,* Drooping Grevillea *Grevillea floripendula,* Anglesea Grevillea *Grevillea infecunda,* Langi Ghiran Grevillea *Grevillea montis-cole* ssp. *brevistyla,* Mt. William Grevillea *Grevillea williamsonii,* Square Raspwort *Haloragis exalata* ssp. *exalata* var. *exalata,* Wrinkled Buttons *Leptorhynchos gatesii,* Gorae Leek-orchid *Prasophyllum diversiflorum,* Pomonal Leek-orchid *Prasophyllum subbisectum,* Williamson's Bush-pea *Pultenaea williamsoniana* and Anglesea Sun-orchid *Thelymitra* sp. aff. *pauciflora* (Anglesea). A number of other other taxa that are endemic to Victoria also occur within the West region. These include the Tall Astelia *Astelia australiana,* Ornate Pink Fingers *Caladenia carnea* var. *ornata*, Black Gum *Eucalyptus aggregata,* Yellow Gum *Eucalyptus leucoxylon* ssp. *connata,* Floodplain Rustyhood *Pterostylis cheraphila,* Scented Bush-pea *Pultenaea graveolens* and Brilliant Sun-orchid *Thelymitra mackibbinii.* Of these taxa Black Gum *Eucalyptus aggregata,* Scented Bush-pea *Pultenaea graveolens* and Brilliant Sun-orchid *Thelymitra mackibbinii* had the largest proportion of their Australian distribution occurring within the West region. A more comprehensive list of taxa endemic to the West region will be included in the National Estate Report (VicRFASC in prep.b) for the RFA region.

Species Vulnerability Assessment

A vulnerability assessment was undertaken for all plant species of conservation significance in the West region. It was designed to identify those rare or threatened plants that are at greatest risk of further significant decline and extinction as a result of activities, ongoing threatening processes and catastrophic events in the region. As the assessment is confined to each species' West region distribution, the results do not necessarily accord with the national or statewide status of species shown in Table 12.17.

Quantitative criteria such as those endorsed by the IUCN (IUCN 1994) provide an internationally recognised framework to assess the risk of extinction. Three categories of threatened taxa are defined; Critically Endangered (CR), Endangered (E) and Vulnerable (V). Categories are determined using rule sets based on population size, distributional range and rates of decline. A taxon is considered Lower Risk (LR) when it does not satisfy the criteria for any of the above categories, or Data Deficient (DD) when there is inadequate information to make an assessment. The IUCN criteria were developed primarily for fauna and there are several difficulties in applying them for flora. Recently Keith (1998) critically reviewed the IUCN criteria and suggested modifications, developing a system called 'RARE' (Rules for the Assessment of the Risk of Extinction in vascular plants).

There was sufficient information in the West region to make an assessment of risk of extinction using both the IUCN and RARE rule sets for all but one of the rare or threatened plants considered in this assessment. Those species which were ranked as Critically Endangered or Endangered against the IUCN rule set are listed in Table 12.19. In the following discussion of the results, precedence is given to the IUCN rating as RARE is recently published and has not been canvassed within the broader scientific community.

Table 12.19: Plants Occurring in the West Region which are rated as Critically Endangered or Endangered according to the IUCN and RARE Rule Sets

(a) Critically Endangered

TAXON	IUCN	RARE	TAXON	IUCN	RARE
Allocasuarina luehmannii	CR	EN	*Eucalyptus* aff. *cypellocarpa* (Anglesea)	CR	EN
Bertya findlayi	CR	CR	*Euphrasia collina* ssp. *muelleri*	CR	VU
Caladenia concolor	CR	CR	*Gaultheria hispida*	CR	CR
Caladenia formosa	CR	EN	*Genoplesium* sp. aff. *nudiscapum*	CR	CR
Caladenia fragrantissima ssp. *fragrantissima*	CR	CR	*Haegiela tatei*	CR	EN
Caladenia hastata	CR	VU	*Leptorhynchos elongatus*	CR	VU
Caladenia lindleyana	CR	CR	*Maireana aphylla*	CR	CR
Caladenia reticulata s.s.	CR	VU	*Prasophyllum fitzgeraldii*	CR	VU
Caladenia tensa	CR	CR	*Prasophyllum subbisectum*	CR	CR
Caladenia valida	CR	CR	*Pterostylis cheraphila*	CR	CR
Caladenia versicolor	CR	CR	*Rutidosis leptorhynchoides*	CR	DD
Caladenia xanthochila	CR	CR	*Sporobolus creber*	CR	CR
Caleana sp. aff. *nigrita* (Horsham)	CR	CR	*Swainsona brachycarpa*	CR	EN
Discaria pubescens	CR	VU	*Swainsona swainsonioides*	CR	EN
Diuris behrii	CR	VU	*Thelymitra mackibbinii*	CR	VU
Diuris punctata var. *punctata*	CR	VU	*Thelymitra merraniae*	CR	EN

(b) Endangered

TAXON	IUCN	RARE	TAXON	IUCN	RARE
Acacia glandulicarpa	EN	VU	*Grevillea williamsonii*	EN	VU
Aphanes australiana	EN	DD	*Helichrysum* aff. *rutidolepis* (Low. Swps.)	EN	VU
Atriplex stipitata	EN	VU	*Huperzia varia*	EN	VU
Caladenia calcicola	EN	VU	*Olearia suffruticosa*	EN	EN
Caladenia fulva	EN	EN	*Pneumatopteris pennigera*	EN	VU
Callitris glaucophylla	EN	DD	*Prasophyllum diversiflorum*	EN	VU
Calorophus elongatus	EN	VU	*Prasophyllum frenchii*	EN	DD
Comesperma polygaloides	EN	LR	*Prasophyllum lindleyanum*	EN	DD
Craspedia paludicola	EN	LR	*Ptilotus erubescens*	EN	VU
Cullen parvum	EN	VU	*Pultenaea graveolens*	EN	VU
Cullen tenax	EN	VU	*Ranunculus undosus*	EN	EN
Deyeuxia imbricata	EN	VU	*Senecio macrocarpus*	EN	VU
Dianella callicarpa	EN	VU	*Senecio psilocarpus*	EN	DD
Dipodium campanulatum	EN	VU	*Taraxacum cygnorum*	EN	EN
Diuris palustris	EN	DD	*Thelymitra benthamiana*	EN	LR
Dodonaea procumbens	EN	VU	*Thelymitra circumsepta*	EN	VU
Eucalyptus aggregata	EN	LR	*Thelymitra epipactoides*	EN	VU
Eucalyptus leucoxylon ssp. *megalocarpa*	EN	VU	*Thelymitra matthewsii*	EN	VU
Grammitis magellanica ssp. *nothofageti*	EN	CR	*Thelymitra* sp. aff. *pauciflora* (Anglesea)	EN	VU

CR = Critically Endangered, EN = Endangered, VU = Vulnerable, LR = Lower Risk, DD=Data Deficient

Of the 100 taxa assessed, 32 were rated as 'Critically Endangered' under the IUCN criteria. This category signifies the highest risk of extinction in the wild. Most of these ratings were based on the very small extent of occurrence or area of occupancy and fragmented population or continuing decline in habitat for each species. Of these species, those with an important part of their distribution in the West region include: Mountain Bertya *Bertya findlayi*, Elegant Spider-orchid *Caladenia formosa*, Scented Spider-orchid *Caladenia fragrantissima* ssp. *fragrantissima*, Mellblom's Spider-orchid *Caladenia hastata*, Yellow-lip Spider-orchid *Caladenia xanthochila*, Golden Cowslips *Diuris behrii*, Purple Diuris *Diuris punctata* var. *punctata*, Otway Grey Gum *Eucalyptus* aff. *cypellocarpa* (Anglesea), Gellibrand Midge-orchid *Genoplesium* sp. aff. *nudiscapum*, Fitzgerald's Leek-orchid *Prasophyllum fitzgeraldii*, Pomonal Leek-orchid *Prasophyllum subbisectum*, Floodplain Rustyhood *Pterostylis cheraphila*, Button Wrinklewort *Rutidosis leptorhynchoides*, Slender Swainson-pea

Swainsona brachycarpa, Downy Swainson-pea *Swainsona swainsonioides* and Brilliant Sun-orchid *Thelymitra mackibbinii*.

The 'Endangered' category signifies that a taxon is facing a very high risk of extinction in the wild. Thirty eight of the taxa were rated as Endangered under the IUCN criteria, based on their low population numbers or their low extent of occurrence with a continuing decline in habitat. For 25 of these species, the West region forms a major part of their distribution. These are: Limestone Spider-orchid *Caladenia calcicola*, Tawny Spider-orchid *Caladenia fulva*, Small Milkwort *Comesperma polygaloides*, Swamp Billy-buttons *Craspedia paludicola*, Swamp Flax-lily *Dianella callicarpa*, Bell-flower Hyacinth-orchid *Dipodium campanulatum*, Swamp Diuris *Diuris palustris*, Black Gum *Eucalyptus aggregata*, Yellow Gum *Eucalyptus leucoxylon* ssp. *megalocarpa*, Beech Finger-fern *Grammitis magellanica* ssp. *nothofageti*, Mt. William Grevillea *Grevillea williamsonii*, Pale Swamp Everlasting *Helichrysum* aff. *rutidolepis* (Lowland Swamps), Lime Fern *Pneumatopteris pennigera*, Gorae Leek-orchid *Prasophyllum diversiflorum*, Maroon Leek-orchid *Prasophyllum frenchii*, Green Leek-orchid *Prasophyllum lindleyanum*, Hairy Tails *Ptilotus erubescens*, Scented Bush-pea *Pultenaea graveolens*, Large-fruit Fireweed *Senecio macrocarpus*, Coast Dandelion *Taraxacum cygnorum*, Blotched Sun-orchid *Thelymitra benthamiana*, Naked Sun-orchid *Thelymitra circumsepta*, Metallic Sun-orchid *Thelymitra epipactoides*, Spiral Sun-orchid *Thelymitra matthewsii* and Anglesea Sun-orchid *Thelymitra* sp. aff. *pauciflora* (Anglesea).

In addition to the plants listed in Table 12.19, 29 taxa were rated as Vulnerable under the IUCN criteria. The 'Vulnerable' category signifies that a taxon is facing a high risk of extinction in the wild in the medium-term future. Most of the 29 were rated as Vulnerable based on their low population numbers or their low area of occupancy.

Species Reservation Analysis

A reservation analysis has been undertaken to assess the extent to which plant species of conservation significance in the West region are protected in the reserve system. In this analysis the reserve system includes only conservation reserves (National Parks, State Parks, Wilderness Parks, Reference Areas, Flora Reserves, Flora and Fauna Reserves, Wildlife Reserves). The assessment was based on a combination of expert opinion and site records and other information available in NRE databases and the scientific literature. Each species was evaluated according to the proportion of its Australian distribution that occurs within the West region, and the proportion that occurs in conservation reserves, other public land and private property (see Table 12.20 for ESP/FFG Act listed species, and see the West region Biodiversity Assessment Report for other species).

Table 12.20: Tenure in the West Region of Populations of Plant Species Listed under the FFG Act and/or the ESP Act

Species Name	Conservation Status		% of Australian Range	Tenure		
	ESP	FFG		Conservation Reserve (%)	Other Public Land (%)	Private Land (%)
Acacia glandulicarpa	V	listed	0-25%	20	-	80
Allocasuarina luehmannii	-	listed	0-25%	30	20	50
Aphanes australiana	V	-	0-25%	30	30	40
Astelia australiana	V	listed	26-50%	-	100	-
Asterolasia phebalioides	V	listed	76-100%	50	30	20
Caladenia calcicola	V	listed	100%	50	-	50
Caladenia concolor	V	listed	0-25%	-	100	-
Caladenia formosa	V	listed	51-75%	20	-	80
Caladenia fulva	E	listed	100%	50	50	-
Caladenia hastata	E	listed	100%	50	-	50
Caladenia tensa	E	-	0-25%	-	100	-
Caladenia versicolor	V	-	0-25%	-	100	-
Caladenia xanthochila	E	listed	26-50%	-	-	100

Species Name	Conservation Status		% of Australian Range	Tenure		
	ESP	FFG		Conservation Reserve (%)	Other Public Land (%)	Private Land (%)
Caleana sp. aff. *nigrita* (Horsham)	-	prelim. rec.	unknown	100	-	-
Comesperma polygaloides	-	listed	26-50%	20	20	60
Cullen parvum	E	listed	0-25%	-	-	100
Cullen tenax	-	listed	0-25%	-	-	100
Cyathea cunninghamii	-	listed	0-25%	50	50	-
Daviesia laevis	V	-	100%	10	60	30
Discaria pubescens	-	listed	0-25%	-	100	-
Diuris palustris	-	final rec.	26-50%	10	30	60
Diuris punctata var. *punctata*	-	listed	26-50%	-	70	30
Dodonaea procumbens	V	-	0-25%	20	50	30
Eucalyptus aggregata	-	listed	51-75%	-	30	70
Euphrasia collina ssp. *muelleri*	E	final rec.	0-25%	50	-	50
Glycine latrobeana	V	listed	51-75%	30	10	60
Grevillea floripendula	-	final rec.	100%	20	50	30
Grevillea infecunda	V	-	100%	60	30	10
Grevillea williamsonii	E	-	100%	50	-	50
Isolepis congrua	-	final rec.	0-25%	80	20	-
Leptorhynchos gatesii	V	final rec.	100%	50	20	30
Olearia pannosa ssp. *cardiophylla*	-	listed	26-50%	60	10	30
Prasophyllum diversiflorum	E	listed	100%	-	-	100
Prasophyllum fitzgeraldii	-	final rec.	51-75%	70	-	30
Prasophyllum frenchii	V	final rec.	26-50%	-	10	90
Prasophyllum subbisectum	E	listed	100%	100	-	-
Pterostylis cheraphila	-	listed	26-50%	-	-	100
Ptilotus erubescens	-	listed	26-50%	20	20	60
Pultenaea graveolens	-	listed	76-100%	10	-	90
Rutidosis leptorhynchoides	E	listed	26-50%	-	20	80
Senecio macrocarpus	V	listed	51-75%	10	10	80
Swainsona brachycarpa	-	listed	26-50%	70	30	-
Swainsona swainsonioides	-	prelim. rec.	26-50%	-	-	100
Taraxacum cygnorum	V	listed	51-75%	100	-	-
Thelymitra epipactoides	E	listed	76-100%	80	20	-
Thelymitra mackibbinii	V	-	51-75%	50	50	-
Thelymitra matthewsii	V	listed	51-75%	60	20	20
Thelymitra merraniae	-	listed	0-25%	?	?	?

Other Public Land includes State forest, lands leased and licensed for plantations, and other public land. ? indicates distribution of the species is unknown.

Of the 101 rare or threatened plants in the West region, 61 have more than 25 per cent of their geographic range within the region – the subsequent discussion is based on these 61. For 39 of these taxa, over half their known distribution occurs within the West region, and consequently effective conservation measures within the West region are critical for their long-term survival.

Of the 61 taxa, 25 have the largest proportion (or equal largest proportion) of their West region population within conservation reserves. Eleven of the 19 taxa endemic to the West region fall into this category; Limestone Spider-orchid *Caladenia calcicola,* Tawny Spider-orchid *Caladenia fulva,* Mellblom's Spider-orchid *Caladenia hastata,* Otway Grey Gum *Eucalyptus* aff. *cypellocarpa* (Anglesea), Anglesea Grevillea *Grevillea infecunda,* Mt. William Grevillea *Grevillea williamsonii*, Wrinkled Buttons *Leptorhynchos gatesii*, Pomonal Leek-orchid *Prasophyllum subbisectum,* Gellibrand Midge-orchid *Genoplesium* sp. aff. *nudiscapum,* Langi Ghiran Grevillea *Grevillea montis-cole* ssp. *brevistyla* and Williamson's Bush-pea *Pultenaea williamsoniana.*

Of the remaining 36 taxa, 12 have the largest proportion of their West region population on other public land. Three of these taxa, viz. Anglesea Sun-orchid *Thelymitra* sp. aff. *pauciflora*

(Anglesea), Grampians Bitter-pea *Daviesia laevis* and Swamp Flax-lily *Dianella callicarpa*, are endemic to the region.

Twenty-four taxa, or 39 per cent of the 61 taxa with more than 25 per cent of their geographic range within the region, have greater than 50 per cent of their regional population occurring on private land. Seven of these taxa are known to occur only on private land and one of these, Gorae Leek-orchid *Prasophyllum diversiflorum*, is endemic to the region.

Priorities for Management

Species with a high priority for management in the West region based on the above vulnerability assessment are listed in Table 12.21. Species have been included in this list if the region represents a major part of their distribution and they have been rated Critically Endangered, Endangered, or Vulnerable in the region.

For 18 of the species listed in Table 12.21 at least 50 per cent of their population is within conservation reserves and for 25 species the majority of the occurrence is on private land. Five species have at least 50 per cent of their occurrence on other public land.

The Department of Natural Resources and Environment has developed a simple form and database for monitoring populations of rare and threatened plants, envisaged for widespread use in regularly monitoring major populations of all threatened plant species in Victoria. Active habitat management (environmental weed control, exclusion of predators or browsers, and ecological burning) is the most common form of management being implemented for species whose habitat is degrading or where direct external threats are operating. Where populations have declined to critical levels, active population management techniques (population reinforcement, reintroduction, translocation and artificial pollination) are sometimes recommended. Action Statements have been or are being prepared for nine of the species in Table 12.21. Section 12.7 of Volume 1 provides a more detailed discussion of potentially threatening processes affecting flora, including aspects of management.

Table 12.21: Plant Species with High Regional Priority for Management Action

TAXON	IUCN	RARE	VROTS	FFG	Action Statement	ROTAP	ESP	Recovery Plan
Astelia australiana	VU	CR	v	listed	yes	V	V	RP Research phase 1992
Asterolasia phebalioides	VU	DD	v	listed	no	V	V	no
Bertya findlayi	CR	CR	v	-	-	R	-	-
Caladenia calcicola	CR	CR	e	listed	yes	V	V	no
Caladenia carnea var. *ornata*	VU	EN	v	-	-	-	-	-
Caladenia formosa	VU	EN	v	listed	no	V	V	no
Caladenia fragrantissima ssp. *fragrantissima*	VU	EN	e	-	-	R	-	-
Caladenia fulva	EN	VU	e	listed	no	E	E	no
Caladenia hastata	VU	EN	e	listed	in prep.	E	E	draft
Caladenia xanthochila	VU	EN	e	listed	no	E	E	no
Caleana sp. aff. *nigrita* (Horsham)	VU	EN	e	prelim. rec.	-	-	-	-
Comesperma polygaloides	EN	LR	v	listed	in prep.	-	-	-
Craspedia paludicola	VU	EN	v	-	-	-	-	-
Daviesia laevis	VU	EN	v	-	-	V	V	no
Dianella callicarpa	VU	EN	v	-	-	-	-	-
Dipodium campanulatum	VU	EN	e	-	-	K	-	-
Diuris behrii	CR	VU	v	-	-	-	-	-
Diuris palustris	EN	DD	v	final rec.	-	-	-	-
Diuris punctata var. *punctata*	CR	VU	v	listed	no	-	-	-
Eucalyptus aff. *cypellocarpa* (Anglesea)	VU	EN	v	-	-	-	-	-
Eucalyptus aggregata	EN	LR	e	listed	yes	-	-	-
Eucalyptus diversifolia ssp. *megacarpa*	VU	VU	v	-	-	-	-	-
Eucalyptus leucoxylon ssp. *connata*	VU	EN	v	-	-	-	-	-

TAXON	IUCN	RARE	VROTS	FFG	Action Statement	ROTAP	ESP	Recovery Plan
Eucalyptus leucoxylon ssp. *megalocarpa*	VU	EN	e	-	-	-	-	-
Genoplesium sp. aff. *nudiscapum*	VU	EN	e	-	-	-	-	-
Glycine latrobeana	LR	LR	v	listed	no	V	V	yes
Grammitis magellanica ssp. *nothofageti*	EN	VU	v	-	-	-	-	-
Grevillea bedggoodiana	EN	VU	v	-	-	R	-	-
Grevillea floripendula	VU	VU	v	final rec.	-	R	-	-
Grevillea infecunda	EN	VU	v	-	-	V	V	no
Grevillea montis-cole ssp. *brevistyla*	VU	EN	v	-	-	R	-	-
Grevillea williamsonii	EN	VU	e	-	-	E	E	yes
Haloragis exalata ssp. *exalata* var. *exalata*	VU	VU	v	-	-	-	-	-
Helichrysum aff. *rutidolepis* (Lowland Swamps)	VU	EN	v	-	-	-	-	-
Hibbertia sessiliflora	VU	LR	v	-	-	-	-	-
Leptorhynchos gatesii	DD	LR	v	final rec.	-	V	V	no
Olearia pannosa ssp. *cardiophylla*	VU	VU	v	listed	no	R	-	-
Pneumatopteris pennigera	EN	VU	v	-	-	-	-	-
Pomaderris halmaturina ssp. *continentis*	EN	VU	v	-	-	R	-	-
Prasophyllum diversiflorum	EN	VU	e	listed	in prep.	E	E	draft
Prasophyllum fitzgeraldii	VU	EN	e	final rec.	-	-	-	-
Prasophyllum frenchii	EN	DD	e	final rec.	-	V	V	no
Prasophyllum lindleyanum	EN	DD	v	-	-	-	-	-
Prasophyllum subbisectum	CR	CR	e	listed	no	E	E	no
Pterostylis cheraphila	EN	VU	v	listed	no	R	-	-
Ptilotus erubescens	EN	VU	0	listed	in prep.	-	-	-
Pultenaea graveolens	EN	VU	v	listed	no	-	-	-
Pultenaea williamsoniana	VU	LR	v	-	-	R	-	-
Rutidosis leptorhynchoides	CR	DD	e	listed	yes	E	E	yes
Senecio macrocarpus	EN	VU	e	listed	yes	V	V	no
Senecio psilocarpus	VU	EN	v	-	-	-	-	-
Swainsona brachycarpa	CR	EN	v	listed	no	-	-	-
Swainsona swainsonioides	CR	EN	e	prelim. rec.	-	-	-	-
Taraxacum cygnorum	EN	EN	e	listed	no	V	V	no
Templetonia stenophylla	VU	DD	v	-	-	-	-	-
Thelymitra benthamiana	EN	VU	v	-	-	-	-	-
Thelymitra circumsepta	EN	VU	v	-	-	-	-	-
Thelymitra epipactoides	EN	VU	e	listed	no	E	E	no
Thelymitra ixioides var. *subdifformis*	VU	EN	e	-	-	-	-	-
Thelymitra mackibbinii	CR	VU	e	-	-	V	V	no
Thelymitra matthewsii	EN	VU	v	listed	no	V	V	no
Thelymitra sp. aff. *pauciflora* (Anglesea)	EN	VU	v	-	-	-	-	-
Tmesipteris elongata ssp. *elongata*	VU	EN	v	-	-	-	-	-

CR = Critically Endangered, EN = Endangered, VU = Vulnerable, LR = Lower Risk, DD = Data Deficient
K = Unknown

12.6 TERRESTRIAL FAUNA SPECIES ASSESSMENT (CONT.)

Terrestrial Invertebrates

The region is of considerable biogeographical interest as a zone of faunal interchange for a number of invertebrate groups. The Otway Ranges, for example, provides a terminus for many eastern Australian taxa, while the relative isolation of the Grampians has resulted in localised endemism.

Land-snails (Pulmonata)

A rich assemblage of land-snails is found within the region, occurring in a wide range of habitats from deep litter in rainforest and wet sclerophyll to drier sclerophyll and woodland situations. The Otway forest, for example, contain approximately 70 species of non-marine mollusc (Smith, 1977), four of which are endemic (all exclusive to wetter habitats). This endemic group includes the distinctive black Otway snail, *Victaphanta compacta*.

Earthworms (Oligochaeta)

There are sparse records of earthworm species from the region. The Grampians region contains a varied, but as yet largely undescribed fauna, including new species of *Oreoscolex* (G. Dyne, pers. com.). Horsham is the type locality for *Heteroporodrilus shephardi.* The far west of the region is an area of faunal overlap between the Victorian *Diporochaeta* and the South Australian *Gemascolex*-dominated fauna.

Velvet-worms (Onycophora)

The single known regional endemic is *Ooperipatellus parvus*, which is recorded only from the type locality: Mt William in the Grampians National Park. The lack of any recorded taxa from the Otway Ranges is surprising, given the suitable habitat present, and may reflect low sampling effort.

Spiders (Arachnida)

The region forms a biogeographical overlap zone between eastern Australian genera and their western counterparts. Some faunal associations terminate in the region; for example, the Otway forests contain representatives of the genera *Dyarcyops*, *Atrax*, *Paramatachia* and *Stiphidium* but this is the last area to the west where all these genera co-exist. Regional endemics include an undescribed genus of Migidae from the Grampians and an unusual cave-dwelling Linyphiid from near Hamilton.

Insecta

Members of the Gondwanan relict family Peloriidae (Hemiptera), usually associated with hepatics in *Nothofagus*-dominated rainforest and the dampest wet sclerophyll forests, are recorded from the Otway forests.

A number of butterfly species have endemic subspecies within the region, this phenomenon being particularly characteristic of the Grampians. *Heteronympha solandri angela* , for example, is restricted to Mt Rosea.

Details of the insect fauna are provided in the Biodiversity Technical report.

17. OLD-GROWTH FOREST

17.1 INTRODUCTION

Under the 1992 National Forest Policy Statement (NFPS), the Commonwealth and State Governments agreed to a strategy to conserve and manage areas of old-growth forest across Australia as a part of a comprehensive, adequate and representative forest reserve system. To clarify its objectives, national criteria were established for the conservation of old-growth forests (JANIS 1997, Section 1.1.4). This chapter includes an assessment of the extent of old-growth forest in the West region and the application of the nationally agreed reserve criteria.

The first comprehensive regional assessment of old-growth forest in Australia was completed in East Gippsland by Woodgate *et al*. (1994) and it has become the benchmark for a series of regional old-growth forest studies in Victoria. The Woodgate study developed working definitions of old-growth forest and a standard methodology for assessing and mapping forest of different age classes and 'ecological vegetation classes' (EVCs). Ecological vegetation classes are part of a hierarchy of floristic vegetation descriptions.

As part of the West Comprehensive Regional Assessment (CRA) that is required to complete a Regional Forest Agreement (RFA), the Commonwealth and Victorian Governments agreed to jointly undertake an assessment of the extent of old-growth forest in the West region.

The Characteristics of Old-growth Forest

Old-growth forests are significant to the Australian community because of their high nature conservation, aesthetic and cultural values, and lack of disturbance. The attributes of old-growth forest include:

- the presence of relatively large trees and other associated understorey species in the wetter forest types to stunted and gnarled trees in drier forest types;
- relatively old trees and other plants in terms of development stage;
- the presence of large crown gaps (in some forest types);
- presence of tree hollows and/or fallen trees;
- characteristic biotic composition;
- presence of certain growth forms, for example epiphytes in some forest types;
- stable nutrient cycles and high litter (in some vegetation classes); and
- low rates of change in species, forest structure and ecosystem functioning.

Old-growth Forest Definitions

The old-growth forest study of East Gippsland (Woodgate *et al*. 1994) analysed a range of attributes and found that old-growth forests were characterised by having the oldest possible growth stage and are negligibly disturbed. The West region old-growth forest study uses the same definition:

> *Old-growth forest is forest which contains significant amounts of its oldest growth stage in the upper stratum - usually senescing trees - and has been subjected to any disturbance, the effect of which is now negligible.*

This definition is consistent with the nationally agreed operational definition of old-growth forest for application in the RFA process, which is:

> *Old-growth forest is ecologically mature forest where the effects of disturbances are now negligible* (JANIS 1997).

In applying this interpretation to a forest ecosystem within a region, the following principles will apply:

- ecological maturity is defined by the characteristics of the older growth stages;
- if data are available on the structural, floristic and functional qualities that would be expected to characterise an ecologically mature forest ecosystem, these data should be used in the assessment of the significance of disturbance effects; and
- negligible disturbance effects will be evident in most forests by a significant proportion of trees with age-related features and a species composition characteristic of the ecologically mature forest ecosystem.

Old Growth National Reserve Criteria

The following National Reserve Criteria have been established for the conservation of old-growth forests (JANIS 1997).

Where old-growth forest is rare or depleted (generally less than 10 per cent of extant distribution) within a forest ecosystem, all viable examples should be protected, wherever possible. In practice, this would mean that most of the rare or depleted old-growth forest would be protected. Protection should be afforded through the range of mechanisms outlined in the National Reserve Criteria.

For other forest ecosystems, 60 per cent of the old-growth forest identified at the time of assessment would be protected, consistent with a flexible approach where appropriate, increasing to the levels of protection necessary to achieve the following objectives:

- the representation of old-growth forest across the geographic range of the forest ecosystem;
- the protection of high quality habitat for species identified under the biodiversity criterion;
- appropriate reserve design;
- protection of the largest and least fragmented areas of old growth; and
- specific community needs for recreation and tourism.

17.2 ASSESSMENT METHODOLOGY

The old-growth forest survey methodology for the West region essentially followed that developed by Woodgate *et al*. (1994) for East Gippsland and subsequently used for the Central Highlands and North East studies (NRE 1996, NRE 1998). This methodology was independently assessed by a joint Commonwealth/State Scientific Advisory Group, which considered that it is an appropriate and effective means of identifying old-growth stands in eucalypt forests.

Woodgate *et al.* (1994) identified attributes that contribute to the forest description, and disturbances that influence the state of old-growth forest. These are discussed in the following section.

The characteristics and extent of old-growth forest attributes in the West region were gathered using the following methods:

- assessing relative forest age from aerial photographs and field observation;
- analysing historic data within archival records;
- mapping and assessing the nature and degree of disturbance since European settlement;
- mapping and classifying EVCs using aerial photographs, floristic survey and field inspection for all lands; and

- modelling old-growth values for public native vegetation using digital spatial analysis techniques.

All data collected for this project were captured digitally. Information such as floristic vegetation, forest type, land tenure, land systems and land use (including records on the occurrence of historic and contemporary timber harvesting, grazing and agricultural clearing, mining and fire) are stored in an NRE geographic information system (GIS) database.

Results of the old-growth analysis are reported only for public land. Most freehold land in West has been extensively disturbed through agricultural clearing, timber and minor forest produce harvesting, grazing or fire. Accordingly, freehold land and lands leased or licensed for plantation and other purposes were not considered as part of the West region old-growth study.

Ecological Vegetation Classes

Vegetation in the region was classified into EVCs. EVCs consist of one or a number of floristic communities that appear to be associated with a recognisable environmental condition. Each EVC was described through a combination of floristics, lifeform and reproductive strategy profiles.

In the West region, 372 EVCs have been identified on public land, and of these 289 were eucalypt dominated. Forty seven are restricted to private land.

Forest Age

Introduction

For a particular site and vegetation class, old-growth forests are deemed to have attained their oldest, naturally achievable growth stage. Growth stage refers to the developmental stage of the tree based on its physical form. Distinctive features of tree crowns at different growth stages allow key growth stages to be identified from aerial photographs. The oldest growth stage is usually the senescing growth stage and to qualify as old-growth forest, this stage must be present as a substantial component of the stand.

The eucalypt forests, which are the dominant forest type in the West region, were assessed for the presence of senescing growth stage using aerial photograph interpretation supported by field validation. Crown form characteristics of trees were used to establish growth stage categories for forest stands. The growth stage category was used as a surrogate for the age of forest stands.

Crown Form, Growth Stage and Crown Cover Projection

Crown cover and crown form were mapped from aerial photographs and were used to determine the forest growth stages. Forest growth stage is a term initially described by Jacobs (1955) and is now related to the Statewide Forest Resource Inventory (SFRI, see NRE 1999 for details) crown form (Figure 17.1).

The West region old-growth assessment considers that eucalypt forests pass through three growth stages:

- regrowth;
- mature; and
- senescing.

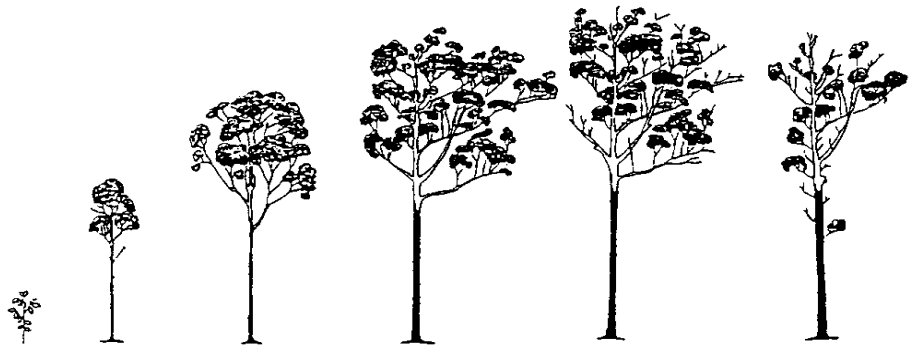
In forest stands on high environmental quality sites (fertile sites), the crown forms were consistent with the growth stages described by Jacobs and could be readily mapped from aerial photographs.

However, not all eucalypt and non-eucalypt species conform to the typical Jacobsian growth habit. For some species on low quality sites, the characteristics of a senescing crown were not

detectable from aerial photographs (for example *E. willisii*). For other species, the regular crown form is characterised by a healthy crown but represents the final growth stage before death (e.g. *E. baxteri*).

All eucalypt stands were classified as Jacobsian or non-Jacobsian by using potential stand height, mapped from aerial photographs, and whether they occurred on high or low quality sites. This was defined at <15m for low site quality (non-Jacobsian) and >15m for high site quality (Jacobsian). The SFRI crown form and the forest growth stages used for the old-growth analysis is presented in Figure 17.1.

Figure 17.1: Relationship between the Typical Eucalypt Growth Stages Described by Jacobs (1955) and Those Considered by the West Region Old-growth Study



Jacobs (1955) growth stages	**Juvenile & Sapling**	**Pole**	**Mature (early)**	**Mature**	**Mature (late)**	**Overmature**
SFRI crown forms	**Regeneration**	**Regrowth**	**Regular**			**Irregular**
			Highly Regular	**Equally Regular**	**Moderately Regular**	
Jacobsian Growth Stage (>15m)	**Regrowth**		**Mature**	**Senescing**		
Non-Jacobsian Growth Stage (<15m)	**Regrowth**		**Senescing**			

The equally regular crown form class defined by SFRI contains approximately equal proportions of the highly regular and moderately regular crown forms, and can only be defined for a forest stand. However, this category contains sufficient moderately regular trees to be classified as senescing under the old-growth forest definition.

Tree Ages

In the West region much of the Midlands forests had been cleared by the turn of the century to meet the rapid expansion of gold mining and agricultural activities in the surrounding area. As the gold mining activity diminished, commercial harvesting activity in the forest was established. This promoted a relatively young forest aged 50-80 years, with some remnant forest aged 80-120 years.

The Otways has an extensive history of timber cutting, which commenced as early as 1849. More than 40 per cent of the forest is in excess of 100 years old with some forest exceeding

250 years of age. Successive major fire events have established regrowth forests of age 16, 48, 60, 80 and 113 years.

The Grampians forests were first utilised when European settlers arrived in 1830. The beginning of gold mining in the 1850s saw much of the foothill forests harvested. This harvesting continued through to the 1940s. The 1939 fires swept through most of the Grampians leaving principally a regrowth forest of 60 years of age.

Sawmilling in the Heywood area commenced as early as 1856 and continued at a low level until 1924. Since then the forests have been managed continually for commercial purposes. Today's forest is multi-aged, no older than 75 years, with scattered veteran trees. The Wimmera forests around Edenhope have experienced intensive activity post-World War II, creating a mixed age forest as young as 50 years.

Forest Disturbance

Introduction

Forest disturbance mapping was undertaken to identify the presence and scale of disturbance in West region forests, and whether or not the effect of past and present disturbance events is now negligible.

Human settlement and land use has been an important factor in shaping the current distribution and condition of the native vegetation in the study area. Most clearing of the natural vegetation on the plains and foothills has been for agriculture, but some has also been cleared for urban and industrial purposes, roads, recreation and other uses. Private land in the study area is predominantly agricultural. Public land has generally retained a cover of native vegetation, which has been disturbed to a greater or lesser extent. The fragmented nature of the remaining public land has resulted in an extensive private-public land interface and increased disturbance.

Disturbance is a primary characteristic which diminishes, or detracts from, old-growth forest status. Significant disturbance renders a forest ineligible as old growth. The many disturbances known to alter the primary attributes, such as floristics, structure or growth stage, of the forests in the region were investigated and quantified. Disturbances were described according to their cause - either natural disturbance such as wildfire, or unnatural disturbance such as human induced agricultural clearing or timber harvesting. The location of disturbances through occupation by indigenous people before European settlement is unknown but has been regarded as being natural for the purposes of the old-growth forest assessment.

Research covering historical and contemporary records was undertaken to delineate and map the extent and severity of these disturbances.

The effect of disturbance varied from one vegetation class to another. The significance of each disturbance was classified according to the following levels:

- areas with no record of disturbance were described as 'undisturbed';
- 'negligible disturbance' was defined as a disturbance for which there is an authentic record, but which is unlikely to have altered the structure of the usual composition of species for that EVC, or, if a disturbance did occur in the past, its effect is no longer significant; and
- 'significant disturbance' was defined as a disturbance regime for which there is an authentic record and which is likely to have altered the growth stage ratios or crown cover projection of the usual floristic composition of that EVC, and which is detectable at the time of the survey.

As discussed later in this section, there were some difficulties in determining the level of disturbance in some areas. These difficulties relate to the level of geographic detail in disturbance records in the West because of the long history of settlement compared to other Victorian regions, as well as the nature of forest regrowth characteristics.

Agricultural Clearing

Agricultural settlement was a key factor in the clearing of forests in the West region. It dramatically altered the landscape of the region. Information about those areas of agricultural clearing within the West region that are now classified as public land was extracted from archival files. Data on the location, extent and approximate period of clearing for each selection were recorded.

Grazing

Historical and current data on the location and extent of grazing licences were extracted from maps, parish plans, files and archival records. Data recorded included extent and period of licence. The earliest grazing licences, and the pastoral (or squatting) runs were excluded from this study because of inconsistency of available information or poor quality of data relating to the location of the runs.

The impact of grazing varies for each vegetation class. It is unlikely to have an appreciable long-term effect on EVCs with vegetation unpalatable to livestock, which tended only to be grazed during periods of severe drought. Unpalatable EVCs were considered negligibly disturbed. However, grazing in areas that contained 'palatable' vegetation classes was considered to be a significant disturbance. One hundred and eighty nine palatable EVCs were identified on public land in the West region including, for example, Plains Grassy Woodland and Herb-rich Foothill Forest. Therefore the grazed areas, palatability of the grazed EVC and the period over which it was grazed were key factors in determining the level of disturbance.

Wildfire

Eucalypt forests are extremely fire-prone and major bushfires are a feature of the West region. Major fires occurred in the region in 1851, 1876, 1886, 1898, 1919, 1926, 1939, 1951, 1962, 1977, 1983 and 1995.

Since 1945, the Forests Commission of Victoria and subsequent forest management agencies have mapped the outer boundaries of wildfires. The areal extent of contemporary and historic wildfires was recorded from existing documentation.

Where aerial photograph interpretation confirmed significant disturbance to the growth stage or canopy within these areas, this was classified as significant natural disturbance.

Fuel Reduction Burning

Since the mid-1920s, fire has been used to reduce the amount of flammable material on the forest floor and reduce the risk of intense wildfire. Fuel reduction burns differ from wildfires. They are deliberately ignited on days that produce a cool burn.

Records of fuel reduction burning varied in quality, accuracy and completeness. Areas recorded for each fuel reduction burn were considered as an indication of its extent. In areas where crown cover and growth stage mapping from aerial photographs revealed no damage, fuel reduction burning was classified as a negligible unnatural disturbance.

Mining

Significant areas of forest in Western Victoria were cleared as part of the gold mining activities late last century. The location and extent of disturbances associated with mining were identified from archival records and aerial photographs. Disturbance due to mining was determined by a buffer of differing sizes around particular mining activities, dependent on the assumed extent of the activity.

Timber Harvesting

Detailed information on the geographic extent of timber harvesting was obtained from historical records and maps and, for more recent harvesting, from aerial photographs. Sawlog allocation records of the Forests Commission covering the period 1936 to 1980 were also used to determine the extent of historic timber harvesting, both clearfelling and selective harvesting. When these mapped sources of disturbance were confirmed by the crown cover or growth stage mapping, the disturbance level was classified as significant and unnatural.

Other Disturbances

Conifer plantations, hardwood plantations and cleared/severely disturbed land (where weeds constituted >50 per cent of cover or 50 per cent of species by composition) were also identified. Native forest and other vegetation cleared or otherwise disturbed for the establishment of softwood and hardwood plantations were identified and mapped from plantation map records. Other disturbances including clearing of power easements were also mapped. Such areas were not included in the analysis to identify old growth and were classified as significant unnatural disturbance.

17.3 ANALYSIS OF DATA AND RESULTS

Introduction

The objective was to identify areas of old-growth forest in the West region by using the data gathered from the assessment of growth stage, the collection of disturbance data, field assessment and expert knowledge. Through a process eliminating areas of forest with significant disturbances using these datasets, areas of undisturbed or insignificantly disturbed forest dominated by their older growth stages, or old-growth forest, were identified.

Old-growth Database

Each forest stand was assessed and ranked for old-growth status. Crown cover projection, crown form, vegetation classes and disturbances were all compiled and entered into a GIS database. The resource data utilised were:

- EVCs grouped into Jacobsian or non-Jacobsian growth characteristics;
- forest growth stage grouped into three classes according to the proportions of crown form;
- structural vegetation based on tree height and grouped as above or below 15 metres; and
- disturbance level categories.

Wherever possible, datasets were validated against other datasets using rules to eliminate possible errors.

Assignment of Old-growth Forest Status

Using the forest growth stage class, disturbance and EVC datasets, old-growth forest status was identified according to the old-growth forest definition. That is, old-growth forest was identified as forest which:

- contains senescing trees present in the upper canopy (at least 10 per cent of total crown cover for the stand);
- has regrowth present in sparse proportion (less than 10 per cent of total crown cover); and
- has negligible or no disturbances identified.

Younger forest dominated by mature growth stages with a lower proportion of old-growth forest structural characteristics, but which had negligible evidence of disturbance, was recognised as a separate class – 'negligibly disturbed forest'.

Disturbance data collected during the study did not account for the significant disturbance observed during field inspection along the public-private land interface. To take into account this disturbance, a buffer was applied to the public-private land interface, or to public land adjoining plantation or the Cleared/ Severely Disturbed EVC. The distance of this buffer was based on the presence or absence of forest on the private land and the steepness of slope (20^o threshold) on the adjoining public land. Within the buffer, the vegetation classes were considered to be disturbed.

Extent of Old-growth Forest

The West region covers approximately one million hectares of public land, of which approximately 123 200 ha, or 12 per cent, has been identified as old-growth forest (see Map 3, Vol. 2). However, in applying the old growth model methodology to the West region forests, it became apparent that the model identified forest that contains both old growth, and additional areas that have old trees in the overstorey but are not necessarily old growth as defined by the National Reserve Criteria.

The absence of comprehensive disturbance information and the nature of regrowth in the West region forests means that the application of the old growth modelling rules overstates the extent of old growth. Historic and anecdotal disturbance information suggests that most of the forested area in the western region of Victoria has experienced some form of disturbance. In addition, the regrowth established as a result of disturbance is often either masked by the overstorey in the wetter forests or becomes suppressed in the drier forests. Candidate old growth in the modelling process requires validation against disturbance and growth stage information. The combination of difficulties in identification of regrowth, the nature and extent of past disturbances, the response of the forests to disturbance and the limited historic disturbance information proved to be a significant impediment to reliable validation.

Specific technical difficulties in modelling old-growth forest in West region included:

- The established model does not sufficiently address the impacts of repeated cycles of disturbance (such as timber harvesting and grazing) over a long period of time. Disturbances of this nature are common in the West region, in comparison to the more remote and contiguous forests in eastern Victoria where the model was developed.
- Extensive areas of non-Jacobsian forest, defined as candidate old growth in accordance with the modelling process, have characteristics that prevent reliable validation.
- Regrowth in dry forest is difficult to identify using aerial photo interpretation techniques (depending on photo scale), limiting the ability to identify disturbance and hence preventing reliable validation.
- Past selection harvesting in wetter forests often failed to initiate eucalypt regeneration, which in turn leads to these stands developing stand characteristics that appear similar to old-growth forest, notwithstanding the significant disturbance of harvesting.
- Historic records of disturbances at a detailed geographic level are not comprehensive in some parts of the region, however there is considerable anecdotal evidence of a long history of disturbance despite the absence of formal records. There are some inconsistencies between the extent of modelled old growth and the recorded presence of disturbances such as timber tramways or roads, which have been identified on old aerial photographs and maps. This reduces the reliability of the application of the validation rules in the model.

Redesign of the model to address these technical difficulties was not considered desirable or feasible. The old growth model is well established in Victoria and has been used as the basis for old growth mapping elsewhere in Australia. The forests of the West region and their associated disturbances have proved to be different to other Victorian forests, however, the established modelling processes provide an important benchmark. Following consideration of

the outcomes of the modelling process, the model has been adopted recognising that it probably overstates the extent of old-growth forest in the West region.

In this context, it should be noted that some past record of disturbance (whether it be anecdotal or confirmed) is not of itself sufficient grounds to eliminate an area from consideration as old growth where other old growth characteristics are present. The effects of the disturbance, must, however, now be negligible. For this reason, areas formerly disturbed through selective logging, for example, may still be considered old growth under the NFPS definition if the forest retains floristic and structural features consistent with ecological maturity and the impact(s) of the former disturbance(s) were relatively minor and have abated over time.

Old-growth forest occurs in 110 EVCs within the region. Almost sixty per cent of all old-growth forest identified in the West region occurs within the Heathy Woodland EVC and 80 per cent of all old growth occurs within six EVCs: Heathy Woodland, Heathy Dry Forest, Heathy Woodland/Damp Heathy Woodland/Damp Heathland Mosaic, Heathy Herb-rich Woodland, Hills Herb-rich Woodland and Shrubby Woodland.

Information on the area of negligibly and significantly disturbed forest will be provided in the Biodiversity Technical Report.

Old-growth Reservation Levels

Table 17.1 provides information on the reservation status of the old-growth forest in each EVC. This table shows the amount of old-growth forest in legislated parks and reserves (conservation reserves), State forest and other public land.

Table 17.1: Representation and Reservation of Old Growth in the West Region

Ecological Vegetation Class (EVC) (i)	Area of EVC (ha) (ii)	%EVC as Old Growth (iii)	Area of Old Growth	Conservation Reserves		State Forest		Other Parks & Reserves (iv)		Other Public Land	
				Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%
3 Damp Sands Herb-rich Woodland	43356	3.4	1474	1069	73	348	24			57	4
16 Lowland Forest	89763	4.7	4236	3596	85	637	15			3	0
18 Riparian Forest	5314	1.6	85	77	91	8	9				
20 Heathy Dry Forest	98480	14.8	14579	12144	83	2193	15	10	0	232	2
21 Shrubby Dry Forest	8888	5.8	517	509	98					8	2
22 Grassy Dry Forest	50121	4.2	2102	1436	68	528	25	71	3	67	3
23 Herb-rich Foothill Forest	70226	0.2	124	108	87	16	13				
29 Damp Forest	2171	1.3	28	28	100						
30 Wet Forest	41740	6.3	2630	1814	69	816	31				
45 Shrubby Foothill Forest	69167	1.9	1296	1073	83	223	17				
47 Valley Grassy Forest	7585	18.5	1403	1386	99	9	1			8	1
48 Heathy Woodland	153356	45.8	70187	33658	48	35009	50			1520	2
134 Sand Forest	381	3.4	13			13	100				
164 Creekline Herb-rich Woodland	2640	0.5	13	11	85	1	8			1	8
174 Grassy Dry Forest/Rocky Outcrop Shrubland/Herbland Mosaic	30	23.3	7	7	100						
175 Grassy Woodland	10931	0.1	13	13	100						
178 Herb-rich Foothill Forest/Shrubby Foothill Forest Complex	8102	0.1	8			8	100				
179 Heathy Herb-rich Woodland	21778	13.2	2881	1072	37	1617	56			192	7
195 Seasonally Inundated Shrubby Woodland	5486	3.8	206	135	66	57	28			14	7
198 Sedgy Riparian Woodland	6800	15.2	1035	945	91	55	5			35	3

Ecological Vegetation Class (EVC) (i)	Area of EVC (ha) (ii)	%EVC as Old Growth (iii)	Area of Old Growth	Conservation Reserves		State Forest		Other Parks & Reserves (iv)		Other Public Land	
				Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%
201 Shrubby Wet Forest	32493	2.0	655	108	16	547	84				
278 Herb-rich Heathy Forest	428	93.7	401	401	100						
282 Shrubby Woodland	7898	31.1	2459	2432	99	18	1			9	0
283 Plains Sedgy Woodland	2278	3.0	68	17	25	51	75				
285 Dry Creekline Woodland	349	23.5	82	26	32	56	68				
351 Rocky Outcrop Shrubland/Herbland Mosaic /Grassy Dry Forest Complex	1641	2.6	43	43	100						
357 Rocky Outcrop Shrubland/Heathy Dry Forest Complex	144	80.6	116	116	100						
358 Rocky Outcrop Shrubland/Heathy Woodland Complex	5	100.0	5	5	100						
361 Rocky Outcrop Shrubland/Grassy Dry Forest Complex	16	75.0	12	12	100						
371 Damp Forest/Herb-rich Foothill Forest Complex	146	18.5	27	27	100						
376 Shrubby Foothill Forest/Lowland Forest Complex	415	3.6	15	15	100						
379 Herb-rich Foothill Forest/Damp Sands Herb-rich Woodland Complex	51	13.7	7	7	100						
382 Lowland Forest/Heathy Dry Forest Complex	742	41.1	305	305	100						
383 Lowland Forest/Valley Grassy Forest Complex	1147	12.5	143	143	100						
385 Lowland Forest/Riparian Forest Complex	24	50.0	12	12	100						
386 Lowland Forest/Riparian Scrub Complex	9	55.6	5	5	100						

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Ecological Vegetation Class (EVC) (i)	Area of EVC (ha) (ii)	%EVC as Old Growth (iii)	Area of Old Growth	Conservation Reserves		State Forest		Other Parks & Reserves (iv)		Other Public Land	
				Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%
388 Lowland Forest/Grassy Dry Forest Complex	59	78.0	46	46	100						
390 Heathy Dry Forest/Valley Grassy Forest Complex	432	39.4	170	170	100						
391 Heathy Dry Forest/Damp Sands Herb-rich Woodland Complex	260	6.2	16	3	19					13	81
392 Heathy Dry Forest/Shrubby Woodland Complex	57	94.7	54	53	98					1	2
393 Heathy Dry Forest/Heathy Woodland Complex	1562	13.3	207	126	100						
396 Heathy Dry Forest/Sedgy Riparian Woodland Complex	6	83.3	5	2	40					3	60
401 Hills Herb-rich Woodland/Heathy Woodland Complex	745	3.6	27	27	100						
408 Valley Grassy Forest/Herb-rich Foothill Forest Complex	8	100.0	8	8	100						
409 Valley Grassy Forest/Heathy Woodland Complex	155	52.9	82	82	100						
410 Valley Grassy Forest/Sedgy Riparian Woodland Complex	36	61.1	22	22	100						
411 Valley Grassy Forest/Damp Sands Herb-rich Woodland Complex	53	35.8	19	19	100						
413 Valley Grassy Forest/Shrubby Woodland Complex	22	100.0	22	22	100						
414 Damp Sands Herb-rich Woodland/Shrubby Woodland Complex	348	12.1	42	39	93					3	7
421 Damp Sands Herb-rich Woodland/Sedgy Riparian Woodland Complex	157	29.9	47	46	98					1	2

Ecological Vegetation Class (EVC) (i)	Area of EVC (ha) (ii)	%EVC as Old Growth (iii)	Area of Old Growth	Conservation Reserves		State Forest		Other Parks & Reserves (iv)		Other Public Land	
				Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%
437 Shrubby Woodland/Shrubby Woodland Complex	25	28.0	7	7	100						
438 Shrubby Woodland/Alluvial Terraces Herb-rich Woodland Mosaic	169	21.9	37	37	100						
439 Shrubby Woodland/Alluvial Terraces Herb-rich Woodland Complex	69	46.4	32	32	100						
441 Shrubby Woodland/Heathy Woodland Complex	288	54.9	158	158	100						
444 Shrubby Woodland/Hills Herb-rich Woodland Complex	58	24.1	14	14	100						
449 Shrubby Woodland/Riparian Scrub Complex	72	25.0	18	9	50					9	50
450 Shrubby Woodland/Sedgy Riparian Woodland Complex	93	7.5	7	6	86					1	14
464 Heathy Woodland/Valley Grassy Forest Complex	40	65.0	26	26	100						
468 Heathy Woodland/Sedgy Riparian Woodland Complex	6	100.0	6	4	67					2	33
466 Heathy Woodland/Heathy Woodland Complex	1562	28.9	451	375	83	76	17				
475 Heathy Woodland/Sedgy Riparian Woodland Mosaic	5	100.0	5	5	100						
477 Heathy Woodland/Sand Heathland Complex	35	57.1	20	20	100						
478 Heathy Woodland/Damp Heathland Complex	8	100.0	8	8	100						
480 Heathy Woodland/Sand Heathland Mosaic	169	2.4	4	4	100						

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Ecological Vegetation Class (EVC) (i)	Area of EVC (ha) (ii)	%EVC as Old Growth (iii)	Area of Old Growth	Conservation Reserves		State Forest		Other Parks & Reserves (iv)		Other Public Land	
				Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%
481 Heathy Woodland/Heathy Dry Forest Complex	1292	19.5	252	252	100						
488 Heathy Woodland/Grassy Dry Forest Complex	81	37.0	30	38	100						
492 Heathy Woodland/Plains Grassy Woodland Complex	517	10.6	55	8	15	47	85				
510 Riparian Scrub/Sedgy Riparian Woodland Complex	351	33.3	117	106	91					11	9
515 Sedgy Riparian Woodland/Rocky Riparian Shrubland Complex	17	23.5	4	4	100						
531 Seasonally Inundated Shrubby Woodland/Sedge-rich Wetland Complex	10	30.0	3	3	100						
545 Plains Grassy Woodland/Plains Grassy Woodland Complex	31	3.2	1			1	100				
547 Shrubby Woodland/Damp Sands Herb-rich Woodland Complex	132	34.1	45	43	96					2	4
55 Plains Grassy Woodland	50694	0.3	155	55	35	99	64			1	1
587 Valley Grassy Forest/Grassy Dry Forest Complex	138	59.4	82	82	100						
590 Lowland Forest/Shrubby Woodland Complex	25	20.0	5	5	100						
596 Riparian Scrub/Sedgy Riparian Woodland Mosaic	34	52.9	18	18	100						
61 Box Ironbark Forest	8601	1.2	99	41	41	58	59				
617 Damp Forest/Riparian Scrub Complex	10	100.0	10	9	100						
623 Lowland Forest/Damp Sands Herb-rich Woodland Complex	5	100.0	5	5	100						

Ecological Vegetation Class (EVC) (i)	Area of EVC (ha) (ii)	%EVC as Old Growth (iii)	Area of Old Growth	Conservation Reserves		State Forest		Other Parks & Reserves (iv)		Other Public Land	
				Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%
629 Shrubby Woodland/Riparian Scrub Mosaic	19	31.6	6	6	100						
634 Heathy Dry Forest/Riparian Scrub Mosaic	28	82.1	23	21	91					2	9
64 Rocky Chenopod Woodland	757	17.7	134	134	100						
645 Wet Heathland / Heathy Woodland	4485	21.0	944	933	99	11	1				
650 Heathy Woodland / Damp Heathy Woodland / Damp Heathland	12828	38.4	4924	607	12	4199	85			118	2
67 Alluvial Terraces Herb-rich Woodland	4716	2.3	107	100	93	7	7				
704 Lateritic Woodland	1418	3.9	56	46	82	10	18				
71 Hills Herb-rich Woodland	17460	14.7	2562	2482	97	41	2			39	2
711 Shallow Sands Woodland / Plains Sedgy Woodland Mosaic	1876	2.4	45	41	91	4	9				
713 Damp Sands Herb-rich Woodland / Damp Heathland / Damp Heathy Woodland Mosaic	2932	0.5	14			14	100				
725 Damp Sands Herb-rich Woodland / Riparian Woodland / Swamp Scrub Mosaic	281	3.6	10	10	100						
726 Rocky Outcrop Shrubland/Herbland / Heathy Woodland Mosaic	399	32.3	129	129	100						
734 Damp Heathland / Damp Heathy Woodland / Wet Heathland Mosaic	632	4.0	25			10	40			15	60
737 Heathy Woodland / Limestone Woodland Mosaic	3212	2.8	89	85	96	4	4				
740 Damp Sands Herb-rich Woodland / Heathy Woodland / Sand Heathland Mosaic	967	39.5	382	382	100						
746 Damp Heathland / Damp Heathy Woodland Mosaic	4004	8.7	347	104	30	237	68			6	2

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Ecological Vegetation Class (EVC) (i)	Area of EVC (ha) (ii)	%EVC as Old Growth (iii)	Area of Old Growth	Conservation Reserves		State Forest		Other Parks & Reserves (iv)		Other Public Land	
				Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%
748 Shallow Sands Woodland / Heathy Woodland Mosaic	784	1.8	14	10	71	4	29				
749 Shallow Sands Woodland / Plains Sedgy Woodland / Seasonally Inundated Shrubby Woodland Mosaic	905	2.7	24	2	8	22	92				
750 Shallow Sands Woodland / Plains Sedgy Woodland / Seasonally Inundated Shrubby Woodland / Damp Sands Herb-rich Woodland Mosaic	5695	1.7	97	4	4	93	96				
751 Seasonally Inundated Shrubby Woodland / Plains Sedgy Woodland Mosaic	1251	24.5	307	26	8	281	92				
753 Rocky Outcrop Shrubland/Herbland / Broombush Mallee Mosaic	166	30.7	51	51	100						
756 Heathy Woodland / Seasonally Inundated Shrubby Woodland Mosaic	177	27.1	48			48	100				
757 Damp Sands Herb-rich Woodland / Seasonally Inundated Shrubby Woodland Mosaic	339	21.2	72	72	100						
780 Plains Sedgy Woodland / Shallow Sands Woodland / Heathy Woodland Mosaic	363	6.6	24			24	100				
783 Grassy Dry Forest / Heathy Woodland Complex	189	11.1	21	21	100						
785 Heathy Herb-rich Woodland / Damp Sands Herb-rich Woodland Mosaic	714	9.4	67	67	100						
786 Heathy Woodland / Heathy Herb-rich Woodland / Damp Heathy Woodland Mosaic	2621	10.1	266			266	100				
793 Damp Heathy Woodland	829	7.8	65	1	2	61	94			3	5
803 Plains Woodland	4428	0.3	12	3	25	8	67			1	8

Ecological Vegetation Class (EVC) (i)	Area of EVC (ha) (ii)	%EVC as Old Growth (iii)	Area of Old Growth	Conservation Reserves		State Forest		Other Parks & Reserves (iv)		Other Public Land	
				Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%
881 Damp Sands Herb-rich Woodland / Heathy Woodland	4819	21.4	1033	1030	100	3	0				
882 Shallow Sands Woodland	8594	1.8	155	57	37	98	63				

Notes: For the old-growth analysis in the West region, it was considered that old-growth only occurs on public land, due to the generally high levels of disturbances on private land. (i) Only those EVCs that contain old-growth are shown in this table. (ii) The total area of each EVC includes extant forest on both public and private land. (iii) The proportion of old growth forest in each EVC has been derived using the total area of extant forest on both public and private land. (iv) Includes 'Other Parks and Reserves' area that may be available for timber harvesting.

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APPENDIX 1: DESCRIPTIONS OF ECOLOGICAL VEGETATION CLASSES (EVCS) OCCURRING IN THE WEST VICTORIA RFA REGION

Notes:

- EVC mapping for the West region was carried out as four separate projects, each covering part of the region. EVC descriptions are provided separately for each study area and indexed below for convenience.
- A vegetation **mosaic** consists of discrete floristic entities (EVCs) which were unable to be distinguished in the mapping due to the scale used (i.e. 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.
- Mosaics and complexes where all components are individually described in this appendix have not been described separately.
- * denotes alien species
- Categories of rare or threatened plants in Victoria:
  - **E** Species presumed endangered in Australia
  - **e** Species presumed endangered in Victoria
  - **V** Species presumed vulnerable in Australia
  - **v** Species presumed vulnerable in Victoria
  - **R** Species presumed rare in Australia
  - **r** Species presumed rare in Victoria
  - **K** Species presumed poorly known in Australia
  - **k** Species presumed poorly known in Victoria
  - **d** Species that are not rare in Victoria in the wild state, yet are considered threatened as their regeneration is problematic or less than necessary to replace losses and the populations are continuing to decrease

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Floristic Community 16-02 *Feldspar Porphyry* Lowland Forest
EVC 18 Riparian Forest
EVC 19 Riparian Shrubland
Floristic Community 19--01 *Grampians Rocky* Riparian Shrubland
EVC 20 Heathy Dry Forest
Floristic Community 20-08 *Grampians* Heathy Dry Forest
EVC 22 Grassy Dry Forest
EVC 23 Herb-rich Foothill Forest
Floristic Community 23-10 *Grampians 1* Herb-rich Foothill Forest
Floristic Community 23-11 *Grampians Montane* Herb-rich Foothill Forest
EVC 28 Rocky Outcrop Shrubland
Floristic Community 28-01 *Grampians* Rocky Outcrop Shrubland
EVC 29 Damp Forest
Floristic Community 29-02 *Grampians* Damp Forest
EVC 30 Wet Forest
Floristic Community 30-03 *Grampians* Wet Forest
EVC 37 Montane Grassy Woodland
Floristic Community 37-03 *Grampians* Montane Grassy Woodland
EVC 45 Shrubby Foothill Forest
Floristic Community 45-02 *Grampians* Shrubby Foothill Forest
EVC 47 Valley Grassy Forest
Floristic Community 47-03 *Grampians* Valley Grassy Forest
EVC 48 Heathy Woodland
Floristic Community 48-01 *Plains Lateritic* Heathy Woodland
Floristic Community 48-02 *Gully Outwash* Heathy Woodland
Floristic Community 48-03 *Grampians Desert* Heathy Woodland
Floristic Community 48-05 *Slopes Lateritic* Heathy Woodland
Floristic Community 48-08 *Sandy Outwash* Heathy Woodland
Floristic Community 48-09 *Sand* Heathy Woodland
EVC 55 Plains Grassy Woodland
Floristic Community 55-02 *Greater Grampians* Plains Grassy Woodland
Floristic Community 55-04 *Western Basalt* Plains Grassy Woodland
EVC 67 Alluvial Terraces Herb-rich Woodland
Floristic Community 67-02 *Grampians* Alluvial Terraces Herb-rich Woodland
EVC 71 Hills Herb-rich Woodland
Floristic Community 71-01 *Granitic* Hills Herb-rich Woodland
Floristic Community 71-02 *Fertile* Hills Herb-rich Woodland
EVC 134 Sand Forest
Floristic Community 134-02 *Grampians* Sand Forest
EVC 136 Sedge Wetland
EVC 184 Montane Wet Heathland
Floristic Community 184-01 *Grampians* Montane Wet Heathland
EVC 191 Riparian Scrub
EVC 192 Montane Rocky Shrubland
Floristic Community 192-01 *Mt. William* Montane Rocky Shrubland
Floristic Community 192-02 *Grampians* Montane Rocky Shrubland
Floristic Community 192-03 *Gully* Montane Rocky Shrubland
Floristic Community 192-04 *Escarpment* Montane Rocky Shrubland
EVC 193 Rocky Outcrop Herbland
Floristic Community 193-01 *Grampians* Rocky Outcrop Herbland
EVC 195 Seasonally Inundated Shrubby Woodland
Floristic Community 195-01 *Valley* Seasonally Inundated Shrubby Woodland
Floristic Community 195-02 *Plains* Seasonally Inundated Shrubby Woodland
Floristic Community 195-03 *Rocklands* Seasonally Inundated Shrubby Woodland
EVC 198 Sedgy Riparian Woodland
EVC 200 Shallow Freshwater Marsh
EVC 278 Herb-rich Heathy Forest
Floristic Community 278-01 *Metamorphic* Herb-rich Heathy Forest
EVC 279 Heathland Thicket
Floristic Community 279-01 *Grampians* Heathland Thicket
EVC 280 Floodplain Thicket
Floristic Community 280-01 *Grampians* Floodplain Thicket
EVC 281 Sedge-rich Wetland
Floristic Community 281-01 *Grampians* Sedge-rich Wetland
EVC 282 Shrubby Woodland
Floristic Community 282-01 *Grampians* Shrubby Woodland
Floristic Community 282-02 *Sand* Shrubby Woodland
EVC 283 Plains Sedgy Woodland
EVC 284 Claypan Ephemeral Wetland
EVC 285 Dry Creekline Woodland
Floristic Community 285-01 *Grampians* Dry Creekline Woodland
EVC 292 Red Gum Wetland
EVC 300 Reed Swamp
EVC 710 Damp Heathland

PORTLAND - WIMMERA VEGETATION DESCRIPTIONS

EVC 3 Damp Sands Herb-rich Woodland
Glenelg Plain Damp Sands Herb-rich Woodland
Goldfields Damp Sands Herb-rich Woodland
Grampians Damp Sands Herb-rich Woodland
Victorian Volcanic Plain Damp Sands Herb-rich Woodland
Warrnambool Plain Damp Sands Herb-rich Woodland
Wimmera Damp Sands Herb-rich Woodland
EVC 6 Sand Heathland
Glenelg Plain Sand Heathland
Goldfields Sand Heathland
Grampians Sand Heathland
Wimmera 1 Sand Heathland
Wimmera 2 Sand Heathland
EVC 8 Wet Heathland
EVC 10 Estuarine Wetland
Lower Estuary Estuarine Wetland
Upper Estuary Estuarine Wetland
EVC 13 Brackish Sedgeland
EVC 16 Lowland Forest
Glenelg Plain Lowland Forest
Victorian Volcanic Plain Lowland Forest
Warrnambool Plain Lowland Forest
EVC 18 Riparian Forest
Glenelg Plain Riparian Forest
Victorian Volcanic Plain Riparian Forest
Warrnambool Plain Riparian Forest
EVC 19 Riparian Shrubland
EVC 20 Heathy Dry Forest
Goldfields Heathy Dry Forest
Wimmera Heathy Dry Forest
EVC 22 Grassy Dry Forest
EVC 23 Herb-rich Foothill Forest
Glenelg Plain Herb-rich Foothill Forest
Victorian Volcanic Plain 1 Herb-rich Foothill Forest
Victorian Volcanic Plain 2 Herb-rich Foothill Forest
Warrnambool Plain Herb-rich Foothill Forest
EVC 28 Rocky Outcrop Shrubland
EVC 30 Wet Forest
Glenelg Plain Wet Forest
EVC 47 Valley Grassy Forest
Grampians Valley Grassy Forest
EVC 48 Heathy Woodland
Glenelg Plain Heathy Woodland
Goldfields Heathy Woodland
Grampians 1 Heathy Woodland
Grampians 2 Heathy Woodland
Grampians 3 (*Mount Arapiles*) Heathy Woodland
Victorian Volcanic Plain Heathy Woodland
Wimmera Sand Sheet Heathy Woodland
Wimmera Western Goldfields Heathy Woodland
EVC 50 Coastal Heathland
EVC 53 Swamp Scrub
Dundas Tablelands 1 Swamp Scrub
Dundas Tablelands 2 Swamp Scrub
Glenelg Plain Swamp Scrub
Victorian Volcanic Plain Swamp Scrub
Warrnambool Plain Swamp Scrub
EVC 55 Plains Grassy Woodland
Dundas Tablelands Plains Grassy Woodland
Glenelg Plain Plains Grassy Woodland
Goldfields 1 Plains Grassy Woodland
Goldfields 2 Plains Grassy Woodland
Grampians Plains Grassy Woodland
Victorian Volcanic Plain Plains Grassy Woodland
EVC 56 Floodplain Riparian Woodland
EVC 61 Box Ironbark Forest
Goldfields Box Ironbark Forest
Wimmera Box Ironbark Forest
Wimmera Box Ironbark Forest
EVC 67 Alluvial Terraces Herb-rich Woodland
Goldfields Alluvial Terraces Herb-rich Woodland
Grampians Alluvial Terraces Herb-rich Woodland
EVC 68 Creekline Grassy Woodland
EVC 71 Hills Herb-rich Woodland

Dundas Tablelands Hills Herb-rich Woodland
Goldfields Hills Herb-rich Woodland
Grampians Hills Herb-rich Woodland
Wimmera Hills Herb-rich Woodland
EVC 83 Swampy Riparian Woodland
EVC 93 Broombush Mallee
Wimmera Broombush Mallee
EVC 103 Riverine Grassy Chenopod Woodland
Wimmera Riverine Grassy Chenopod Woodland
EVC 124 Grey Clay Drainage Line Herbland/Sedgeland
EVC 125 Plains Grassy Wetland
Victorian Volcanic Plain 1 Plains Grassy Wetland
Victorian Volcanic Plain 2 Plains Grassy Wetland
Wimmera 1 Plains Grassy Wetland
Wimmera 2 Plains Grassy Wetland
EVC 132 Plains Grassland
Victorian Volcanic Plain 1 Plains Grassland
Victorian Volcanic Plain 2 Plains Grassland
Victorian Volcanic Plain 3 Plains Grassland
Wimmera Plains Grassland
EVC 133 Limestone Pomaderris Shrubland
Glenelg Plain Limestone Pomaderris Shrubland
EVC 136 Sedge Wetland
Group 1 Sedge Wetland
Group 2 Sedge Wetland
EVC 155 Bird Colony Succulent Herbland
EVC 160 Coastal Dune Scrub
EVC 161 Coastal Headland Scrub
Glenelg Plain Coastal Headland Scrub
Glenelg Plain Coastal Headland Scrub
EVC 163 Coastal Tussock Grassland
Headland Coastal Tussock Grassland
Estuarine Flats Coastal Tussock Grassland
EVC 164 Creekline Herb-rich Woodland
Goldfields Creekline Herb-rich Woodland
EVC 175 Grassy Woodland
Goldfields Low Rises Grassy Woodland
Wimmera Low Rises Grassy Woodland
EVC 179 Heathy Herb-Rich Woodland
Glenelg Plain Heathy Herb-rich Woodland
Wimmera Heathy Herb-rich Woodland
EVC 191 Riparian Scrub
EVC 193 Rocky Outcrop Herbland
EVC 195 Seasonally Inundated Shrubby Woodland
Glenelg Plain Seasonally Inundated Shrubby Woodland
Grampians Seasonally Inundated Shrubby Woodland
Wimmera 1 Seasonally Inundated Shrubby Woodland
Wimmera 2 Seasonally Inundated Shrubby Woodland
EVC 198 Sedgy Riparian Woodland
Grampians Sedgy Riparian Woodland
Victorian Volcanic Plain Sedgy Riparian Woodland
Warrnambool Plain Sedgy Riparian Woodland
EVC 200 Shallow Freshwater Marsh
EVC 203 Stony Rises Woodland
EVC 264 Sand Ridge Woodland
Wimmera Sand Ridge Woodland
EVC 279 Heathland Thicket
Grampians Heathland Thicket
EVC 280 Floodplain Thicket
Grampians and Dundas Tablelands Floodplain Thicket
EVC 282 Shrubby Woodland
Grampians Shrubby Woodland
EVC 283 Plains Sedgy Woodland
Grampians Plains Sedgy Woodland
Wimmera 1 Plains Sedgy Woodland
Wimmera 2 Plains Sedgy Woodland
Wimmera 3 Plains Sedgy Woodland
EVC 285 Dry Creekline Woodland
Grampians Dry Creekline Woodland
EVC 291 Cane Grass Wetland
EVC 292 Red Gum Wetland
Grampians Red Gum Wetland
Wimmera 1 Red Gum Wetland
Wimmera 2 Red Gum Wetland
Wimmera 3 Red Gum Wetland
EVC 295 Riverine Grassy Woodland
Wimmera Riverine Grassy Woodland
EVC 298 Riverine Sedgy Forest
Wimmera Riverine Sedgy Forest
EVC 636 Brackish Lake Mosaic
Brackish Lake Mosaic (Brackish Aquatic Herbland component)
EVC 640 Creekline Sedgy Woodland
EVC 641 Riparian Woodland
Glenelg Plain and Dundas Tablelands Riparian Woodland
Victorian Volcanic Plain Riparian Woodland
Wimmera Riparian Woodland
EVC 642 Basalt Shrubby Woodland
EVC 643 Brackish Drainage Line Herbland/Sedgeland
EVC 644 Cinder Cone Woodland
EVC 647 Plains Sedgy Wetland
Dundas Tablelands Plains Sedgy Wetland
Victorian Volcanic Plain Plains Sedgy Wetland
EVC 648 Saline Lake Verge Herbland/Sedgeland
EVC 649 Stony Knoll Shrubland
EVC 651 Plains Swampy Woodland
EVC 652 Lunette Woodland
EVC 653 Aquatic Herbland
EVC 654 Creekline Tussock Grassland
EVC 655 Lignum Cane Grass Swamp
EVC 656 Brackish Wetland
Victorian Volcanic Plains Brackish Wetland
Wimmera Brackish Wetland
EVC 657 Freshwater Lignum Shrubland
EVC 659 Plains Riparian Shrubby Woodland
EVC 663 Black Box Lignum Woodland
Glenelg Plain Limestone Ridge Woodland
EVC 665 Coastal Mallee Scrub
EVC 670 Limestone Woodland
Glenelg Plain 1 Limestone Woodland
Glenelg Plain 2 Limestone Woodland
Glenelg Plain 2 Limestone Woodland
Glenelg Plain Limestone Rise Grassland
EVC 673 Dune Soak Woodland
EVC 674 Sandy Stream Woodland
EVC 676 Salt Paperbark Woodland
Wimmera Salt Paperbark Woodland
EVC 677 Inland Salt Marsh
Wimmera Inland Salt Marsh
EVC 679 Drainage Line Woodland
EVC 680 Freshwater Meadow
EVC 681 Deep Freshwater Marsh
EVC 682 Permanent Open Freshwater
EVC 683 Semi-permanent Saline
EVC 684 Permanent Saline
EVC 704 Lateritic Woodland
Dundas Tablelands Lateritic Woodland
Goldfields Lateritic Woodland
Grampians Lateritic Woodland
Wimmera Lateritic Woodland
EVC 705 Basalt Creekline Shrubby Woodland
EVC 706 Limestone Rise Woodland
Glenelg Plain Limestone Rise Woodland
EVC 707 Sedgy Swamp Woodland
EVC 708 Hypersaline Inland Saltmarsh
Wimmera Hypersaline Inland Saltmarsh
EVC 709 Scree Slope Woodland/Grassland
EVC 710 Damp Heathland
Group 1 Damp Heathland
Group 1 Damp Heathland
EVC 717 Saline Lake Mosaic
EVC 718 Freshwater Lake Mosaic
EVC 783 Grassy Dry Forest / Heathy Woodland Complex
Grampians Grassy Dry Forest / Heathy Woodland Complex
EVC 789 Hills Herb-rich Woodland/Grassy Dry Forest Complex
Grampians Hills Herb-rich Woodland / Grassy Dry Forest Complex
EVC 792 Stony Rises Woodland/Stony Knoll Shrubland Complex
EVC 793 Damp Heathy Woodland
Glenelg Plain Damp Heathy Woodland
Warrnambool Plain Damp Heathy Woodland
EVC 801 Basalt Shrubby Woodland/Plains Swampy Woodland Complex
EVC 803 Plains Woodland
EVC 858 Calcarenite Dune Woodland
EVC 876 Spray-zone Coastal Shrubland
Glenelg Plain Spray-zone Coastal Shrubland
EVC 882 Shallow Sands Woodland
Dundas Tablelands Shallow Sands Woodland
Glenelg Plain Shallow Sands Woodland
Goldfields Shallow Sands Woodland
Grampians Shallow Sands Woodland
Wimmera Shallow Sands Woodland
EVC 885 Damp Sands Herb-rich Woodland/Plains Grassy Woodland Complex
EVC 894 Scoria Cone Woodland
EVC 895 Escarpment Shrubland
Glenelg Plain Escarpment Shrubland
Victorian Volcanic Plain Escarpment Shrubland
EVC 897 Plains Grassland/Plains Grassy Woodland Complex

MIDLANDS AND OTWAYS EXTANT VEGETATION DESCRIPTIONS

EVC 1 Coastal Dune Scrub Mosaic

This EVC was often mapped in mosaic with Coastal Tussock Grassland. Due to limitations of scale (i.e. 100 000) it was often not possible to separate these two EVCs in the floristic vegetation mapping exercise so they were mapped as a mosaic. They also have floristic affinities with each other.

Coastal Dune Scrub/Coastal Tussock Grassland Mosaic occurs on exposed fore-dunes or on more protected secondary dunes extending from west of Port Campbell to the Bellarine Peninsula. Wind-blown calcareous sands form the dune system behind the rocky headland. The average altitude is 10-30m asl and average annual rainfall is 900mm.

There are two forms of this mosaic. The first is predominantly treeless, with the occasional Swamp Gum *Eucalyptus ovata* or Messmate *E. obliqua*. The shrub layer may be dense or patchy and is characterised by Coast Beard-heath *Leucopogon parviflorus* with Coast Daisy-bush *Olearia axillaris,* Seaberry Saltbush *Rhagodia candolleana* ssp. *Candolleana,* the rare *Exocarpos syrticola*, the rare Velvet Correa *Correa backhouseana* and the scrambling Bower Spinach *Tetragonia implexa.*

The dominant lifeforms are tussock forming graminoids and forbs. Blue Tussock-grass *Poa poiformis* and Knobby Club-sedge *Isolepis nodosa* dominate this layer, with Coast Sword-sedge *Lepidosperma gladiatum* and Black-anther Flax-lily *Dianella brevicaulis/revoluta* s.l. often interspersed. On the fore dune the tussock-dominated grassland is often dominated by the introduced Marram Grass **Ammophila arenaria* which replaces the native sand-binding grass Hairy Spinifex *Spinifex sericeus*. Forbs are common and include Yellow Wood-sorrel *Oxalis corniculata* ssp. agg., Branched Centaury **Centaurium tenuiflorum*, Pimpernel **Anagallis arvensis*, Bidgee-widgee *Acaena novae-zelandiae*, Coast Groundsel *Senecio spathulatus*, Ivy-leaf Violet *Viola hederacea* and Cat's Ear **Hypochoeris radicata*. Both floristic alliances are easily disturbed due to the proximity to beaches and subsequently weeds comprise a large proportion of species present.

The second form of this mosaic grows on exposed fore dunes of the Bellarine Peninsula at Breamlea Spit. It is less diverse than the previous form.

Coast Tea-tree *Leptospermum laevigatum* is the dominant shrub with Coast Beard-heath *Leucopogon parviflorus*, Coast Wattle *Acacia sophorae*, Cushion Bush *Leucophyta brownii*, Seaberry Saltbush *Rhagodia candolleana* ssp. *candolleana* comprising the remaining shrub layer. The dominance of Coast Tea-tree *Leptospermum laevigatum* is one of the main differences between the two forms. Forbs and grasses comprise a large percentage of the ground layer and include Coast Sow-thistle *Actites megalocarpa*, Beach Rocket **Cakile maritima* ssp. *maritima*, Hairy Spinifex *Spinifex sericeus*, Marram Grass **Ammophila arenaria*, Sea Celery *Apium prostratum* ssp. *prostratum*, Bidgee-widgee *Acaena novae-zelandiae*, Pimpernel **Anagallis arvensis*, Angled Pigface **Carpobrotus aequilaterus* and Knobby Club-sedge *Isolepis nodosa*. This form also carries a diverse array of weeds.

EVC 3 Damp Sands Herb-rich Woodland

Within the Midlands and Otways region Damp Sands Herb-rich Woodland occurs on deep sandy loams, usually associated with adjacent creeks or seasonal lakes and swamps. In the Midlands region it is only mapped in the Langi Ghiran State Park and in small patches around the Upper Stony Creek Reservoirs (near the Brisbane Ranges) at altitudes ranging from 350-600m above sea level (asl). In the Otways region it occurs on public land only near the coast with an average altitude of 70m asl. It does occur further inland in this area however, but mostly on private land. It grows in areas of average to high annual rainfall ranging from 650-700mm in the Midlands to 1000mm in the Otway Ranges. Effective rainfall is increased by the shallow water tables associated with the creeks that provide adequate moisture to support a rich ground layer of forbs and grasses, including many weed species.

Due to a long history of and continuing land clearance and disturbance Damp Sands Herb-rich Woodland carries a high proportion of weed species. In addition, density of the overstorey has been significantly reduced in many areas. The high proportion of weed species is exacerbated by continued disturbance, proximity to farmland and good site quality.

The overstorey is dominated by Manna Gum *Eucalyptus viminalis*. In the drier Midlands region this grows in association with Scentbark *E. aromaphloia* or Candelbark *E. rubida* and with scattered Black Wattle *Acacia mearnsii* and Blackwood *A. melanoxylon*. In the higher rainfall areas of the Otways region it grows in association with Messmate *E. obliqua* and Swamp Gum *E. ovata*.

A few scattered shrubs may be present including Coast Beard-heath *Leucopogon parviflorus*, Prickly Moses *Acacia verticillata*, Sweet Bursaria *Bursaria spinosa*, Prickly Tea-tree *Leptospermum continentale*, Tree Everlasting *Ozothamnus ferrugineus,* Small-leaf Bramble *Rubus parvifolius,* Matted Rice-flower *Pimelea biflora* and Coast Pomaderris *Pomaderris oraria* ssp. *oraria* and Large-leaf Bush-pea *Pultenaea daphnoides.*

The ground stratum is dominated by dense Austral Bracken *Pteridium esculentum* above a diversity of forbs, grasses and other graminoids. Common forbs include Bidgee-widgee *Acaena novae-zelandiae*, Cat's Ears **Hypochoeris radicata*, , Austral Cranesbill *Geranium solanderi*, Common Raspwort *Gonocarpus tetragynus*, Common Centaury **Centaurium erythraea*, Kidney-weed *Dichondra repens*, Yellow Wood-sorrel *Oxalis corniculata* spp. agg., Pimpernel **Anagallis arvensis*, Grassland Wood-sorrel *Oxalis perennans*, Prickly Starwort *Stellaria pungens* and Grass Trigger-plant *Stylidium graminifolium,* Common Lagenifera *Lagenifera stipitata,* Hairy Pennywort *Hydrocotyle hirta*, Ivy-leaf Violet *Viola hederacea,* Hairy Speedwell *Veronica calycina,* and Greenhoods *Pterostylis* spp.. Common graminoids include Weeping Grass *Microlaena stipoides,* Common Tussock-grass *Poa labillardierei,* Hare's Tail **Lagurus ovatus*, Spiny headed Mat-rush *Lomandra longifolia* and Black-anther Flax-lily s.l. *Dianella brevicaulis/revoluta*

EVC 6 Sand Heathland

Within the Midlands Sand Heath is restricted to very small areas surrounded by Lowland Forest in the Brisbane Ranges National Park. It grows on flat to gently undulating topography, at altitudes of 290-340m asl and has an average annual rainfall of approximately 700mm. Soils are Tertiary sands over an impervious clay layer which are periodically very dry or waterlogged on flat to gently undulating country. Due to these conditions, the tree layer is often absent.

When present, the overstorey carries sparse and spindly Messmate *Eucalyptus obliqua*. The shrub layer is very dense to 2m high and is dominated by Heath Tea-tree *Leptospermum myrsinoides* Prickly Tea- tree *L. continentale*, Silver Banksia *Banksia marginata* Common Aotus *Aotus ericoides* and Red-fruit Saw-sedge *Gahnia sieberiana*. The ground layer is sparse and includes Blue Squill *Chamaescilla corymbosa,* Milk-maids *Burchardia umbellata* and Sundew *Drosera* spp.

EVC 8 Wet Heathland

Wet Heathland, occurs within the Otways region, predominantly on flats and depressions with impeded drainage within Carlisle State Park, on Hanson Plain and on the coastal plains of the Otways National Park. The soils have varying depths of tertiary sandy loams, layered over clay loams. The clay layer impedes further drainage, creating an organic soil of low fertility. Such drainage lines are frequent in Carlisle State Park and Hanson Plain, north of the Otway Range.

Wet Heathland is most often treeless but Brown Stringybark *Eucalyptus baxteri*, Shining Peppermint *E. willisii* and Swamp Gum *E. ovata*, may occur as sparse, short (less than 20m tall) and scattered individuals.
The shrub layer is characterised by two shorter layers. The taller one is 1-2m tall and consists of a sometimes patchy and relatively dense thicket of shrubs including Prickly Tea-tree *Leptospermum continentale*, Scrub She-oak *Allocasuarina paludosa*, Scented Paperbark *Melaleuca squarrosa*, Smooth Parrot-pea *Dillwynia glaberrima* and Silver Banksia *Banksia marginata* (shrub form). The lower shrub stratum is characterised by epacrids including Pink Swamp-heath *Sprengelia incarnata*, Woolly-style Heath *Epacris lanuginosa* and Common Heath *Epacris impressa*. The climbers and scramblers Slender Dodder-laurel *Cassytha glabella* and Spreading Rope-rush *Empodisma minus* are usually present below and within this stratum. Wiry Bauera *Bauera rubioides* and Pouched Coral-fern *Gleichenia dicarpa* are also present.
Dense Button Grass *Gymnoschoenus sphaerocephalus* dominates and is characteristic of this EVC. Other tussock forming species include Tall Yellow-eye *Xyris operculata*, Austral Grass-tree *Xanthorrhoea australis* and Red-fruit Saw-sedge *Gahnia sieberiana*. Due to the low fertility of the soil and dense understorey, the ground cover is virtually non-existent, with the exception of Swamp Selaginella *Selaginella uliginosa* and Screw Fern *Lindsaea linearis* that may form in patches. Weeds are uncommon due to a lack of disturbance and the infertile, wet soils.

EVC 10 Estuarine Wetland

Estuarine Wetland is limited in occurrence within the Otways region being confined to lower reaches of streams near the coast. This EVC receives saline water from tidal movements and fresh water flows from inland. The inundating waters are usually salty, sometimes brackish and occasionally fresh over the period of a year depending upon river flooding regimes. Soils are anaerobic peat-rich muds. Rainfall is between 800-1000 mm per annum. Elevation is 0-2 m asl.

Estuarine Wetland is dominated by the Common Reed *Phragmites australis*, Creeping Monkey-flower *Mimulus repens*, Water Buttons **Cotula coronopifolia*, Streaked Arrow grass *Triglochin striatum*, Club Sedge *Bolboschoenus spp.* and Shiny Swamp-mat *Selliera radicans.* An example of Estuarine Wetland can be found adjacent to Lake Craven and Lake Hordern around the lower reaches of the Aire River.

EVC 16 Lowland Forest
Lowland Forest is mapped in both the Midlands and Otways study areas and will be described separately (below).

Midlands study area:
Lowland Forest is a very restricted EVC in the Midlands study area. It occurs in two very small, disjunct localities, each representing a different floristic community

Floristic Community 16-10 *Midlands 1* Lowland Forest
Midlands 1 Lowland Forest occurs in the Brisbane Ranges National Park and the nearby Bamganie State Forest. Despite its narrow distributional range, it is floristically and structurally variable

This floristic community grows Tertiary sands/clays and the floristic and structural variation is possibly due to differing proportions of sand and clay in the soil. The land is flat and soils are often seasonally wet despite the low annual rainfall of less than 650mm. Altitude ranges from 300-380m asl.

The overstorey is a dense canopy of Messmate *Eucalyptus obliqua* to 15m tall. The shrub layer is highly variable in height, species diversity and types of shrubs present (either narrow-leaved mesic or ericoid). The most common species include Myrtle Wattle *Acacia myrtifolia*, Dusty Miller *Spyridium parvifolium*, Common Flat-pea *Platylobium obtusangulum*, Honey-pots *Acrotriche serrulata*, Erect Guinea-flower *Hibbertia riparia*, Silver Banksia *Banksia marginata,* Rusty Pomaderris *Pomaderris ferruginea* Heath Tea-tree *Leptospermum myrsinoides* and
Furze Hakea *Hakea ulicina.*

The ground layer may be sparse but diverse in sedges, lilies, forbs and grasses. Species include Thatch Saw-sedge *Gahnia radula*, Tortuous Rapier-sedge *Lepidosperma semiteres*, Blue Squill *Chamaescilla corymbosa*, Reed Bent-grass *Deyeuxia quadriseta*, Button Everlasting *Helichrysum scorpioides*, Trailing Goodenia *Goodenia lanata* and Wallaby-grasses *Austrodanthonia* spp.

Austral Grass-tree *Xanthorrhoea australis* was once common in this EVC, however it has declined due to the infestation of the Cinnamon fungus *Phytophthora cinnamomi*. It is still common in the adjacent better-drained soils that support Heathy Dry Forest.

Floristic Community 16-11 *Midlands 2* Lowland Forest
Midlands 2 Lowland Forest is found in the Mt Charlie Flora Reserve (north of Riddells Creek) and in the nearby Mt Teneriffe and T Hill Flora Reserves. It occurs on soils derived from sandstones and shales, on mainly sheltered aspects of both steep and gentle slopes. Annual rainfall is 700-800 mm, altitude is 450-700m asl which is generally higher than Lowland Forest elsewhere in the State.

The overstorey is dominated by medium height Messmate *Eucalyptus obliqua* with Manna Gum *E. viminalis* and Narrow-leaf Peppermint *E. radiata.* The shrub stratum is very open and diverse with no defined layers. Common species include Silver Wattle *Acacia dealbata*, Blackwood *A. melanoxylon*, Prickly Moses *A. verticillata*, Cluster Pomaderris *Pomaderris racemosa*, Austral Grass-tree *Xanthorrhoea australis*, Bushy Hakea, *Hakea sericea*, Handsome Flat-pea *Platylobium formosum* and Silver Banksia *Banksia marginata.*

The ground layer is diverse though often visually dominated by Silvertop Wallaby-grass *Joycea pallida*. Other species include Bracken *Pteridium esculentum*, Stinking Pennywort *Hydrocotyle laxiflora*, Tall Sword-sedge *Lepidosperma elatius*, Forest Wire-grass *Tetrarrhena juncea*, Ivy-leaf Violet *Viola hederacea*, Running Postman *Kennedia prostrata*, Creeping Bossiaea *Bossiaea prostrata* and Grey Tussock-grass *Poa sieberiana*.

Otway study area:
Within the Otway study area there are two forms of Lowland Forest. The first occurs on sandy loam to sandy orange clay loam soils in high rainfall areas, averaging 1100mm per annum and at moderate altitudes, averaging 150m asl. These areas are mostly concentrated in the vicinity of Cape Otway on duplex soils (sand/clay) and Carlisle State Park. Prior to European settlement Lowland Forest is presumed to have occurred extensively on the undulating terrain overlying the Gellibrand Marl geology. Limited examples of this remain.

The characteristic feature of Lowland Forest is a diversity of species and lifeforms. The overstorey is usually dominated by Brown Stringybark *Eucalyptus baxteri* but occasionally Messmate *E. obliqua,* Narrow-leaf Peppermint *E. radiata* and the rare Bog Gum *Eucalyptus kitsoniana* may co-occur.

The understorey is includes a combination of drier, ericoid species due to the sandier soils. Characteristic species are Prickly Tea-tree *Leptospermum continentale*, Silver Banksia *Banksia marginata,* Prickly Moses *Acacia verticillata*, Common Heath *Epacris impressa*, Honey-pots *Acrotriche serrulata*, Common Correa *Correa reflexa*, Broom Sedge *Amperea xiphoclada*, Large-leaf Bush-pea *Pultenaea daphnoides* and Austral Grass-tree *Xanthorrhoea australis*. On sites with a higher proportion of clay in the soil, species such as Narrow-leaf Wattle *Acacia mucronata*, Dusty Miller *Spyridium parvifolium*, Hop Goodenia *Goodenia ovata,* Pink-bells *Tetratheca ciliata*, Red-fruit Saw-sedge *Gahnia sieberiana* and Tall Sword-sedge *Lepidosperma elatius* occur.

The ground layer consists of Spreading Rope-rush *Empodisma minus*, Common Raspwort *Gonocarpus tetragynus*, Ivy-leaf Violet *Viola hederacea*, Trailing Goodenia *Goodenia lanata*, Screw Fern *Lindsaea linearis* and climbers such as Common Apple-berry *Billardiera scandens* and Downy Dodder-laurel *Cassytha pubescens*. Austral Bracken *Pteridium esculentum* and Forest Wire-grass *Tetrarrhena juncea* are also quite common. Weed species are not common.

The second form of Lowland Forest differs in the dominance of species normally associated with EVC 48 Heathy Woodland and the higher diversity of tussock-forming plants. This form occurs on gentle to moderate slopes of the Otway Plain Natural Region. Here soils are early to late Tertiary sediments of sandy loams and silty clay loams. Rainfall is lower at around 900mm per annum.

The overstorey includes Narrow-leaf Peppermint *Eucalyptus radiata* ssp. *radiata*, Messmate *E. obliqua* and Scentbark *E. aromaphloia*. The shrub layer includes Common Heath *Epacris impressa*, Honey-pots *Acrotriche serrulata*, Prickly Geebung *Persoonia juniperina*, Pink-bells *Tetratheca ciliata* and Common Aotus *Aotus ericoides*. The ground strata include Common Raspwort *Gonocarpus tetragynus*, Trailing Goodenia *Goodenia lanata*, Reed Bent-grass *Deyeuxia quadriseta*, Black-anther Flax-lily *Dianella revoluta* and Spreading Rope-rush *Empodisma minus*. Sedges are also common and include Wattle Mat-rush *Lomandra filiformis*, Many-flowered Mat-rush *L. multiflora* and Spiny-headed Mat-rush *L. longifolia*.

EVC 17 Riparian Scrub Complex
Riparian Scrub is restricted to parts of the Otways study area with an underlying geology of Tertiary sands. The most well developed examples occur in drainage lines where stream alluvium is present. This EVC typically forms in broad, gently sloping drainage lines and is commonly surrounded by EVC 48 Heathy Woodland or EVC 8 Wet Heathland. The altitude range is between 20 and 170 m asl and average annual rainfall varies from approximately 650mm in the Anglesea area to 900-1300mm in the Carlisle River area. During the pre-1750 vegetation mapping exercise extensive areas of Riparian Scrub Complex were modelled on alluvial flood-plain deposits. It was modelled extensively along the Gellibrand River, at and near the junction with Carlisle River and further downstream on the flood-plain sections of the Gellibrand River.

Structurally, Riparian Scrub is a closed scrub 2.5 to 6 metres tall. Species diversity is low due to the dense cover of Scented Paperbark *Melaleuca squarrosa* and less commonly Prickly Tea-tree *Leptospermum continentale*. Scattered overstorey trees are often present, usually Manna Gum *Eucalyptus viminalis* and Messmate *E. obliqua*. Common species in the understorey include Red-fruit Saw-sedge *Gahnia sieberiana*, Spreading Rope-rush *Empodisma minus* and Variable Sword-sedge *Lepidosperma laterale* var. *majus, which* may be locally common.

EVC 18 Riparian Forest
Riparian Forest is mapped in both the Midlands and Otways study areas and will be described separately (below).

Midlands study area:
Riparian Forest is scattered throughout the study area as narrow bands along the banks and alluvial terraces of (usually) perennial streams. Soils are well-drained and alluvial and a constant supply of moisture supports a tall, high biomass, multi-layered, species-rich forest.

The overstorey is usually patchy in cover. It is dominated by Manna Gum *Eucalyptus viminalis* with Blue Gum *E. globulus* ssp. *bicostata*, Narrow-leaf Peppermint *E. radiata*, Messmate *E. obliqua* and Swamp Gum *E. ovata* also occurring. The small tree layer includes Blackwood *Acacia melanoxylon,* Silver Wattle *Acacia dealbata* and Hazel Pomaderris *Pomaderris aspera.*
The tall shrub stratum includes Prickly Currant-bush *Coprosma quadrifida,* Hop Goodenia *Goodenia ovata* and Austral Mulberry *Hedycarya angustifolia*.

The field layer is diverse in water-dependent species including sedges, forbs and ferns. Species present include Fishbone Water-fern *Blechnum nudum*, Water-ribbons *Triglochin procerum,* Austral Brooklime *Gratiola peruviana,*

Tall Sedge *Carex appressa,* Swamp Club-sedge *Isolepis inundata* and Rushes *Juncus* spp.

Due to a history of disturbance in many of these areas and the moist, fertile nature of the soils weeds such as Blackberry **Rubus fruticosus* and Yorkshire Fog-grass **Holcus lanatus* are common and may dominate the field layer.

Otway study area:
Within the Otway study area Riparian Forest occurs along rivers and creeks, on alluvial terraces and occasionally in the heads of gullies leading into creeks and rivers. The rainfall of is high, averaging 1250mm per annum and average altitude is 200m asl. Soils are alluvial, fine grey sand at the surface, gradually changing to a mottled orange clay loam at depth.

The overstorey is dominated by Blackwood *Acacia melanoxylon*, Manna Gum *Eucalyptus viminalis* occurring in less than half of the sites surveyed. The rare Brooker's Gum *Eucalyptus brookeriana* may also be present.

The understorey includes a variety of tall shrubs including Austral Mulberry *Hedycarya angustifolia*, Prickly Currant-bush *Coprosma quadrifida*, Musk Daisy-bush *Olearia argophylla*, Hazel Pomaderris *Pomaderris aspera,* Banyalla *Pittosporum bicolor* and Privet Mock-olive *Notelaea ligustrina*.

The ground layer is dominated by a high diversity of moisture-dependent ferns. Taller ferns and epiphytes include Kangaroo Fern *Microsorum pustulatum*, Soft tree-fern *Dicksonia antarctica*, the rare Skirted Tree-fern *Cyathea X marcescens,* the rare Slender Tree-fern *Cyathea cunninghamii* and Rough Tree-fern *Cyathea australis*. Ground ferns include Mother Shield-fern *Polystichum proliferum*, Bat's Wing Fern *Histiopteris incisa*, Fishbone water-fern *Blechnum nudum*, Lance Water-fern *B. chambersii,* Hard Water-fern *B. wattsii*, the rare Bristly Shield-fern *Lastreopsis hispida* and the rare Ground Spleenwort *Asplenium terrestre* ssp. *terrestre*. Other species in the ground layer include Scrub Nettle *Urtica incisa*, Shade Nettle *Australina pusilla* ssp. *muelleri,* the rare Tufted Club-sedge *Isolepis wakefieldiana,* the rare Snowdrop Wood-sorrel *Oxalis magellanica*, Forest Starwort *Stellaria flaccida*, Tall Sedge *Carex appressa* and Blackberry *Rubus fruticosus* spp. agg.

EVC 20 Heathy Dry Forest
Heathy Dry Forest is widespread across the Midlands study area, particularly at lower elevations in the lower rainfall areas, where it grows on gentle slopes and on all aspects. In higher rainfall areas it is restricted to exposed slopes and ridge tops. It occurs on Ordovician shales and sandstones that produce skeletal soils with low fertility and water-holding capacities.

The largest areas of Heathy Dry Forest in the study area are on the broad flat ridges of the Brisbane Ranges National Park and the Lerderderg and Enfield State Parks, the more exposed slopes and ridges in the southern part of the Wombat State Forest, the areas immediately north of Daylesford and the gentle lower slopes of the Pyerenees State Forest and Ararat Hills State Forest.

Heathy Dry forest has a similar structure throughout the Midlands though floristics and diversity of the understorey vary greatly. The overstorey is a low open forest though it may often tend toward a woodland in tree density and tree form. Messmate *Eucalyptus obliqua* and Brown Stringybark *E. baxteri* dominate in the Brisbane Ranges while Broad-leaf Peppermint *E. dives,* Red Stringybark *E. macrorhyncha* and Red Box *E. polyanthemos* are common in other areas.

The shrub layer is extremely variable floristically and structurally , depending on site characteristics and management history. Many sites have been subject to a long history of disturbance by burning, clearing and mining. Generally this stratum is dominated by low ericoid shrubs of the Fabaceae, Proteaceae and Epacridaceae. Species present may include Daphne Heath *Brachyloma daphnoides* and Common Beard-heath *Leucopogon virgatus* in the northern areas, Common Heath *Epacris impressa*, Bushy Hakea *Hakea sericea* and Bushy Parrot-pea *Dillwynia ramosissima* in Lerderderg State Park, Golden Bush-pea *Pultenaea gunnii* and Small Grass-tree *Xanthorrhoea* minor in Enfield State Park and Austral Grass-tree *Xanthorrhoea australis* and Matted Bush-pea *Pultenaea pedunculata* in the Brisbane Ranges National Park.

The ground layer is generally sparse with a low diversity of scattered forbs and grasses. The most common species are Common Raspwort *Gonocarpus tetragynus*, Mat-rushes *Lomandra* spp. Variable Stinkweed *Opercularia varia*, Black-anther Flax-lily *Dianella revoluta,* Common Hovea *Hovea linearis*, Grey Tussock-grass *Poa sieberiana* and Silvertop Wallaby-grass, *Joycea pallida*.

Within the Midlands region many areas identified as Heathy Dry Forest are floristically depauperate. These tend to be areas with a long history of disturbance by frequent fires and clearing and massive soil disturbance for mining which have resulted in a severe reduction in species diversity. The shrub layer is sparse to non-existent and the ground layer is often dominated by Silvertop Wallaby-grass *Joycea pallida* with few other species present. Although the species present all commonly occur in Heathy Dry Forest, most characteristic species are absent, particularly in the shrub layer which is the characteristic feature of Heathy Dry Forest.

EVC 21 Shrubby Dry Forest
Shrubby Dry Forest is mapped in both the Midlands and Otway study areas and will be described separately (below).

Midlands study area:
Within the Midlands region three floristic communities of Shrubby Dry Forest are currently recognised. In general, Shrubby Dry Forest is a low, open forest with a diverse though sometimes sparse shrub layer and sparse and species-poor ground layer.

Floristic Community 21-05 *Midlands Escarpments* Shrubby Dry Forest
Midlands Escarpments Shrubby Dry Forest occurs on very steep, exposed, rocky slopes in the Brisbane Ranges National Park, Lerderderg State Park and Werribee Gorge State Park. The soils are infertile and skeletal (to virtually non-existent), derived from Ordovician shale and sandstones. The steepness and lack of soil combined with an annual rainfall of less than 600mm create an extremely low effective rainfall and harsh site quality. In its most extreme habitats this floristic community may structurally resemble a Rocky Outcrop Shrubland.

The overstorey may contain any combination of Brown Stringybark *Eucalyptus baxteri*, Red Ironbark *E. tricarpa*, Long-leaf Box *E. goniocalyx* and Red Box *E. polyanthemos.* These are low, often less than five metres tall and spreading in form.

The shrubby stratum is diverse and sparse though Golden Wattle *Acacia pycnantha* may occasionally form a dense layer. Other species include Shiny Cassinia *Cassinia longifolia*, Large-leaf Bush-pea *Pultenaea daphnoides,* Prunus Pomaderris *Pomaderris prunifolia*, Shrubby Platysace *Platysace lanceolata*, Digger's Speedwell *Derwentia perfoliata* and Fragrant Saltbush *Rhagodia parabolica*.

The ground layer is sparse and low in diversity, most species restricted to crevices and rocky shelves. Species present include Black-anther Flax-lily *Dianella revoluta*, Many-flowered Mat-rush *Lomandra multiflora*, Fireweed Groundsel *Senecio linearis*, Australian Stonecrop *Crassula sieberiana*, Karkalla *Carpobrotus rossii*, and Pink Purslane *Calandrinia calyptrata*.

Floristic Community 21-06 *Midlands Depauperate* Shrubby Dry Forest
Midlands Depauperate Shrubby Dry Forest occurs on dry ridges on the northern and western edges of the Wombat State Forest. Soils are infertile, derived from Ordovician shales and sandstones. Rainfall is higher than the other two floristic communities of Shrubby Dry Forest at around 750mm per annum. Topography is gently sloping to flat.

The overstorey is dominated by Messmate *Eucalyptus obliqua* to 20m tall.

The understorey is very low and sparse or totally bare. Narrow-leaf Hop-bush *Daviesia leptophylla*, Narrow-leaf Wattle *Acacia mucronata*, Thin-leaf Wattle *A. aculeatissima*, Common Hovea *Hovea linearis*, Black-anther Flax-lily *Dianella revoluta,* Common Heath *Epacris impressa* and Trailing Ground-berry *Acrotriche serrulata* are common. Silvertop Wallaby-grass *Joycea pallida* may dominate.

Floristic Community 21-07 *Lerderderg* Shrubby Dry Forest
Lerderderg Shrubby Dry Forest occurs in the Lerderderg State Park on steep slopes and narrow, exposed ridge tops. Soils are similar to *Midlands Escarpments* Shrubby Dry Forest, but slopes are less steep producing a slightly better site quality. Vegetation is more dense but generally more species poor.

The overstorey is dominated by low Red Stringybark *Eucalyptus macrorhyncha*, 4-10m tall with Broad-leaf Peppermint *E. dives*, Red Ironbark *E. tricarpa* and Long-leaf Box *E. goniocalyx*.

The shrub stratum is often dominated by dense stands of Narrow-leaf Hop-bush *Daviesia leptophylla*. Other shrubs include Golden Wattle *Acacia pycnantha*, Large-leaf Bush-pea *Pultenaea daphnoides*, Common Heath *Epacris impressa* and Daphne Heath *Brachyloma daphnoides*.

The ground layer is sparse and rarely includes more than Common Raspwort *Gonocarpus tetragynus*, Silvertop Wallaby-grass *Joycea pallida* and Black-anther Flax-lily *Dianella revoluta*.

Otway study area:
Within the Otway study area Shrubby Dry Forest has a limited distribution centred near the boundary of the lower Cretaceous and late Tertiary sediments near Aireys Inlet. The most well developed examples occur on exposed western and northern aspects on moderate slopes. The soils are orange-brown silty loams to silty clay loams. The average annual rainfall is 650-800mm and altitude is approximately 10-200 m asl.

The overstorey is an open forest dominated by Messmate *Eucalyptus obliqua*, Blue Gum *E. globulus*, Scentbark *E. aromaphloia* and Red Ironbark *E. tricarpa*.

The shrub stratum is diverse and dense and includes Large-leaf Bush-pea *Pultenaea daphnoides* Common Heath *Epacris impressa*, Prickly Moses *Acacia verticillata*, Narrow-leaf Wattle *A. mucronata* and Netted Daisy-bush *Olearia speciosa*.

The ground stratum may vary in density and includes a number of grasses, the more common being Grey-tussock Grass *Poa sieberiana*, Silver-top Wallaby-grass *Joycea pallida* and Short-hair Plume-grass *Dichelachne micrantha*. Sedges are strongly represented by Wattle Mat-rush *Lomandra filiformis*, Many-flowered Mat-rush *L. multiflora*, Spiny-headed Mat-rush *L. longifolia* and Thatch Saw-sedge *Gahnia radula*. Other common species include Trailing Goodenia *Goodenia lanata*, Honey-pots *Acrotriche serrulata* and Love Creeper *Comesperma volubile*.

EVC 22 Grassy Dry Forest
Grassy Dry Forest is mapped in both the Midlands and Otway study areas and will be described separately (below).

Midlands study area:
Grassy Dry Forest occurs across the drier sections of the Midlands study area. Further sampling is required to define the variation of this EVC within the study area.

In general, Grassy Dry Forest occurs on moderately fertile soils derived from Ordovician shales and sandstones. It is more common on sheltered aspects, slopes may be steep or gentle. Rainfall is less than 700mm per annum.

The overstorey is a low forest 6-15m tall and trees may grow in a spreading 'woodland' form.
Long-leaf Box *Eucalyptus goniocalyx*, Red Box, *E. polyanthemos*, Red Stringybark *E. macrorhyncha*, Yellow Box *E. melliodora* and Candelbark *E. rubida* are common in the north and west of the study area with Messmate *E. obliqua* and Yellow gum *E. leucoxylon* more common in the south.

There is little or no shrub layer, though disturbance by fire may encourage dense stands of Narrow-leaf Bitter-pea *Daviesia leptophylla*.

The ground layer is dominated by a diversity of grasses and forbs though in dry periods many species retreat to rootstock or soil-stored seed. Common grasses include Grey Tussock-grass *Poa sieberiana,* Plume-grasses *Dichelachne* spp. Wallaby grasses *Austrodanthonia* spp., Hair grasses **Aira* spp. and Quaking-grass **Briza maxima*. A few areas, such as Mt Toowong near Macedon and Napoleons Ridge at Ararat are dominated by Kangaroo Grass *Themeda triandra*. Common associated species include Wattle Mat-rush *Lomandra filiformis*, Rock-fern *Cheilanthes* spp., Variable Plantain *Plantago varia*, Blue Pincushion *Brunonia australis*, Yam Daisy *Microseris lanceolata*, Cotton Fireweed *Senecio quadridentatus* and Magenta Stork's-bill *Pelargonium rodneyanum*. Many species are area-specific such as Clustered Everlasting *Chrysocephalum semipapposum* that dominates many Grassy Dry Forest sites in the Pyrenees Ranges but was not present in Grassy Dry Forest elsewhere in the Midlands.

Langi Ghiran State Park carries a variant of Grassy Dry Forest. Here it occurs on potentially more fertile soils derived from granodiorite. The ground cover is more dense and there is significant shrub component where the EVC abuts Rocky Outcrop Shrubland. Common shrubs are Sticky Hop-Bush *Dodonea viscosa*, Grey Everlasting *Ozothamnus obcordatus* and Myrtle Wattle *Acacia myrtifolia*.

Grassy Dry Forest often occurs in association with Heathy Dry Forest and in frequently burnt or disturbed areas where diagnostic species may be missing the two EVCs can be difficult to distinguish as only the hardy species common to both EVCs remain. In such areas (eg. in Waterloo State Forest near Beaufort) the vegetation is mapped as EVC 320 Heathy Dry Forest/Grassy Dry Forest Complex.

Otway study area:
Within the Otway study area Grassy Dry Forest was only identified in an area just west of Lorne. Average annual rainfall is 800-950mm and elevation is 80-250m asl. Soils are shallow and rocky and are less weathered and have a higher iron content than soils of the adjacent EVC 21 Shrubby Foothill Forest. Grassy Dry Forest is confined to northern and western aspects on gentle to moderately steep slopes and ridges.

The overstorey is a low forest 15-20m tall dominated by Scentbark *Eucalyptus aromaphloia*, Blue Gum *E. globulus* and Mountain Grey Gum *E. cypellocarpa*.

The shrub stratum is low in diversity and sparse, except in areas affected by 1983 wildfires, which are dominated by dense stands of Hop Wattle *Acacia stricta* and Hop Goodenia *Goodenia ovata*. These are behaving as post-fire regenerators, which take advantage of conditions during and immediately following a wildfire to dominate for a short period and are now senescing.

The diversity of grasses in the ground stratum characterises this EVC. Common species are Wallaby grasses *Austrodanthonia* spp, Plume-grasses *Dichelachne* spp, Silvertop Wallaby-grass *Joycea pallida*, Soft tussock-grass *Poa morrisii,* Grey Tussock-grass *P. sieberiana* and Weeping grass *Microlaena stipoides.* Sweet Vernal-grass **Anthoxanthum odoratum* and Common Tussock-grass *P. labillardierei* occur in sites with increased moisture availability. Common herbaceous species include Variable Stinkweed *Opercularia varia*, *Lagenifera* spp., Common Centaury **Centaurium erythraea*, Blue Pincushion *Brunonia australis*, Milkmaids *Burchardia umbellata* and Small St. John's Wort *Hypericum gramineum*

EVC 23 Herb-rich Foothill Forest
Herb-rich Foothill Forest is mapped in both the Midlands and Otway study areas and will be described separately (below). Further sampling is required to define the variation of this EVC within both the Midlands and Otway study areas.

Within the Midlands region many areas identified as Herb-rich Foothill Forest are floristically depauperate. These areas lack the species rich herb layer that characterises this EVC.

Midlands study area:
Herb-rich Foothill Forest is widespread across the Midlands though most is on or north of Great Dividing Range. It occurs in areas with high rainfall and fertile soils, though it also occurs on some moderately fertile soils. The main occurrences within the study area are Mt Cole and Cobaw State Forests and Mt Buangor State Park on fertile loams and sandy loams derived from granodiorite, at Mt Macedon Regional Park on rhyodacite, in the Wombat State Forest on both fertile soils derived from basalt and much less fertile soils derived from Odovician shales and sandstone and in the Pyrenees State Forest on less fertile soils similar to the Wombat State Forest. Altitude is usually 600-900m asl and the annual rainfall is 800-1000mm.

In general, Herb-rich Foothill Forest is a medium to tall open forest with a sparse to non-existent shrub layer and a diverse ground layer of forbs and grasses. In the east of the study area the overstorey is dominated by Messmate *Eucalyptus obliqua* with some Manna Gum *E. viminalis* and Narrow-leaf Peppermint *E. radiata* while in the west, Eurabbie *E. globulus* ssp. *bicostata* dominates. Silver Wattle *Acacia dealbata* is often the only shrub present though Narrow-leaf Wattle *A. mucronata* and Prickly Currant-bush *Coprosma quadrifida* may be present.

The most common forbs and grasses are Ivy-leaf Violet *Viola hederacea*, Bidgee-widgee *Acaena novae-zelandiae,* Kidney-weed *Dichondra repens,* Hairy Pennywort *Hydrocotyle hirta,* Prickly Starwort *Stellaria pungens,* Small Poranthera *Poranthera microphylla,* Mountain Clematis *Clematis aristata,* Spiny-headed Mat-rush *Lomandra longifolia* ssp. *longifolia* Common Tussock-grass *Poa labillardierei* (Sword Tussock-grass *P. ensiformis* in the west) Weeping Grass *Microlaena stipoides,* and Forest Wire-grass *Tetrarrhena juncea*. Austral Bracken *Pteridium esculentum* is also very common and often dominates the understorey.

Otway study area:
Within the Otways study area Herb-rich Foothill Forest occurs inland from the coast, in the Angahook Lorne State Park, Lorne State Forest and east of Carlisle State Park. The soils are gradational clay loams over mottled clays. This EVC occurs at an average altitude of 290m asl and mean annual rainfall of is 1100mm.

The overstorey is dominated by Messmate *Eucalyptus obliqua* with Mountain Grey Gum *E. cypellocarpa* often co-dominant. Other species may include Narrow-leaf Peppermint *E. radiata,* Blue Gum *E. globulus*, Scentbark *E. aromaphloia* and Swamp Gum *E. ovata*. Blackwood *Acacia melanoxylon* is occasional as an understorey tree.

The shrub layer is unusually diverse and this may be in response to disturbance from frequent burning or high visitor pressure in recreational areas. Species present may include Tree Everlasting *Ozothamnus ferrugineus*, Narrow-leaf Wattle *Acacia mucronata*, Prickly Moses *A. verticillata*, Snow Daisy-bush *Olearia lirata*, Prickly Currant-bush *Coprosma quadrifida* and Hop Goodenia *Goodenia ovata*. Austral Bracken *Pteridium esculentum* is nearly always found beneath the shrubs.

The ground stratum is diverse in forbs and grasses, many of them weeds. Species present include the vulnerable Wrinkled Buttons *Leptorhynchos gatesii,* Austral Cranesbill *Geranium solanderi*, Ivy-leaf Violet *Viola hederacea*, Cat's Ears **Hypochoeris radicata*, Yellow Wood-sorrel *Oxalis corniculata* spp. agg., Bidgee-widgee *Acaena novae-zelandiae*, Prickly Starwort *Stellaria pungens*, Common Raspwort *Gonocarpus tetragynus,* Matted Pratia *Pratia pedunculata,* Grasses Slender Tussock-grass *Poa tenera*, Common Tussock-grass *P. labillardierei* and Weeping Grass *Microlaena stipoides* var *stipoides.* Wire Grass *Tetrarrhena juncea* is common and may intertwine through the shrubs and along the ground.

EVC 29 Damp Forest
Damp Forest is restricted within the study area, occurring on moderate to steep slopes within the highest rainfall areas of the Midlands region. It is mostly found in the Wombat State Forest in sheltered gullies on alluvial deposits at altitudes of 650-800m asl and an annual rainfall of 950-1150mm. Damp Forest also occurs at Mt Macedon on well-developed soils derived from rhyodacite soils at altitudes of 600-950m asl. At lower elevations it is only found in sheltered gullies, but over 900m asl it is found on all aspects.

The tall overstorey (to 35m) is dominated by Messmate *Eucalyptus obliqua* with a lower tree layer of Blackwood *Acacia melanoxylon* to 20m.

This EVC is characterised by the dense shrub layer in the understorey dominated by Musk Daisy-bush *Olearia argophylla* with Prickly Moses *Acacia verticillata* Prickly Currant-bush *Coprosma quadrifida* and Hazel Pomaderris *Pomaderris aspera*.

The groundcover carries a diversity of ferns, forbs and grasses including Mother Shield-fern *Polystichum proliferum*, Fishbone Water-fern *Blechnum nudum*, Black-anther Flax-lily *Dianella revoluta,* Bidgee-widgee *Acaena novae-zelandiae,* Turquoise Berry *Drymophila cyanocarpa* and Forest Wire-grass *Tetratheca juncea*. Within the Midlands region Damp Forest differs from Wet Forest by the absence of tree-ferns and the higher proportion of moisture dependent species.

In the Wombat State Forest, Damp Forest occurs in association with Shrubby Foothill Forest while at Macedon it is to Herb-rich Foothill Forest and Wet Forest.

EVC 30 Wet Forest
Wet Forest is mapped in both the Midlands and Otway study areas and will be described separately (below).

Midlands study area:
Wet Forest has a very limited distribution in the Midlands Study area. It is confined to sheltered south-facing gullies on fertile, deep alluvial soils in the higher rainfall and higher altitude areas of the Mt Buangor State Park, Mt Cole State Forest and the Macedon Regional Park. Altitude is above 700m asl and annual rainfall exceeds 1000mm. Cloud cover and fog drip further enhance the effective rainfall.

The overstorey is a tall forest dominated by Mountain Ash *Eucalyptus regnans* in the Macedon area with Messmate *E. obliqua* and Manna Gum *E. viminalis* ssp. *viminalis* while Eurabbie *Eucalyptus globulus* ssp. *bicostata* dominates in the Mt. Cole and Mt Buangor areas. Under this is a layer of understorey trees/tall shrubs including Blackwood *Acacia melanoxylon,* Silver Wattle *A. dealbata*, Austral Mulberry *Hedycarya angustifolia* and Musk Daisy-bush *Olearia argophylla*.

The ground is characteristically rich in ferns including Rough Tree-fern *Cyathea australis*, Soft Tree-fern *Dicksonia antarctica*, Austral King-fern *Todea barbara*, Fishbone Water-fern *Blechnum nudum*, Hard Water-fern *B. wattsii* and often dense Mother Shield-fern *Polystichum proliferum*. The non-vascular bryophytes (mosses and liverworts) are also an important component of the ground cover and, among which are found forbs such as Forest Starwort *Stellaria flaccida*, Prickly Starwort *S. pungens* and the climber Mountain Clematis *Clematis aristata*.

Otway study area:
Within the Otway study area there are two forms of Wet Forest. The first is distributed along the Otway Range from the northern section of the Otway National Park and north of the Great Ocean Road to the Beech Forest Water Catchment. It has an extremely high annual rainfall or 1550mm and occurs in gullies or on protected south and south east-facing slopes of the Otway Range. In addition, it may extend out of more sheltered situations and on to ridges due to the protected nature of the topography and high rainfall and low cloud cover. Geology is mostly non-marine, early cretaceous sediments and soils are fertile loams, where slumping and erosion is common.

The overstorey is a tall forest dominated by pure stands of Mountain Ash *Eucalyptus regnans* on wetter sites and mixed stands of Mountain Ash with Mountain Grey Gum *Eucalyptus cypellocarpa* and Messmate *Eucalyptus obliqua*, the latter more frequent at lower altitudes. Blackwood *Acacia melanoxylon* forms a tall secondary tree layer.

The shrub layer is well established and is dominated by mesic shrubs including Musk Daisy-bush *Olearia argophylla,* Prickly Currant-bush *Coprosma quadrifida,* Austral Mulberry *Hedycarya angustifolia* and Blanket-leaf *Bedfordia arborescens.* Sclerophyllous, non-ericoid species, such as Bootlace Bush *Pimelea axiflora,* Hazel Pomaderris *Pomaderris aspera,* Banyalla *Pittosporum bicolor,* Satinwood *Phebalium squameum and* Privet Mock-olive *Notelaea ligustrina* are also common.

There is an abundance and diversity of ferns in all strata as ground ferns, tree ferns or epiphytes. Epiphytic ferns, fern allies and filmy ferns include the vulnerable Beech Finger-fern *Grammitis magellanica* ssp. *nothofageti*, Kangaroo Fern *Microsorum pustulatum,* Common Finger-fern *Grammitis billardieri,* Gipsy Fern *Ctenopteris heterophylla,* Austral Filmy Fern *Hymenophyllum cupressiforme* Leathery Shield-fern *Rumohra adiantiformis.* Ground ferns include Mother Shield-fern *Polystichum proliferum,* Hard Water-fern *Blechnum wattsii and* Bat's Wing Fern *Histiopteris incisa.* Soft Tree-fern *Dicksonia antarctica* is nearly always present, with the rare Slender Tree-fern *Cyathea cunninghamii* and Rough Tree-fern *Cyathea australis* sometimes co-occurring.

The ground stratum is usually sparse with a high cover of leaf litter. Common forbs include the vulnerable Tall Astelia *Astelia australiana,* Forest Starwort *Stellaria flaccida*, Tall Sword-sedge *Lepidosperma elatius* and Shade Nettle *Australina pusilla ssp. muelleri*.

The second form of Wet Forest in the Otway study area is more wide spread and is located in the northern section of Otway National Park both south and north of the Great Ocean Road. This form occurs on more exposed northerly slopes and ridges at lower altitudes, averaging 330m asl and average annual rainfall is 1450mm. Geology is of cretaceous sediments and soils are moderate to high in fertility and less moist than the previous form of this EVC.

The overstorey is dominated by Mountain Ash *Eucalyptus regnans* overstorey over 40m tall. On drier sites this co-dominates with Messmate *E. obliqua*, Mountain Grey Gum *E. cypellocarpa* and Victorian Blue Gum *E. globulus* ssp. *bicostata*. Blackwood *Acacia melanoxylon* often forms a tall secondary tree layer.

The understorey is more open and species-rich in shrubs than the previous form and includes Musk Daisy-bush *Olearia argophylla*, Snow Daisy-bush *Olearia lirata*, Hazel Pomaderris *Pomaderris aspera*, Prickly Currant-bush *Coprosma quadrifida*, Satinwood *Phebalium squameum*, Privet Mock-olive *Notelaea ligustrina*, Austral Mulberry *Hedycarya angustifolia* and Victorian Christmas-bush *Prostanthera lasianthos*.

Ferns are neither common nor abundant. Those that are present include Soft Tree-fern *Dicksonia antarctica*, Kangaroo Fern *Microsorum pustulatum*, Austral Bracken *Pteridium esculentum*, Hard Water-fern *Blechnum wattsii*, Bat's Wing Fern *Histiopteris incisa* and Mother Shield-fern *Polystichum proliferum*. Other species in the ground stratum are more common and include Forest Starwort *Stellaria flaccida*, Hop Goodenia *Goodenia ovata*, Tall Sword-sedge *Lepidosperma elatius* and Mountain Clematis *Clematis aristata*. Forest Wire-grass *Tetrarrhena juncea* has a high cover and often dominates in response to disturbance.

EVC 31 Cool Temperate Rainforest
The following description is from Peel (1999).
On the southern fall of the Otway Ranges Cool Temperate Rainforest occurs in steeply dissected gullies and valleys which represent the wettest and most sheltered niches available. On the northern fall of the Ranges this EVC is restricted to the headwaters of streams near the main divide where rainfall is highest and cloud cover most persistent. Altitudes are low, averaging 250-350m asl and average annual rainfall is high at around 1000-1500mm. Generally soils are deep, well structured, reddish clays and sandy clay loams high in organic content but on alluvial terraces they are chocolate brown to grey silts and silty clay loams.

The overstorey is usually well developed Myrtle Beech *Nothofagus cunninghamii* to 30m tall.

The understorey is dominated by a dense canopy of Soft Tree-fern *Dicksonia antarctica* along with a diversity of understorey trees and tall, mesic shrubs including Prickly Currant-bush *Coprosma quadrifida*, Austral Mulberry *Hedycarya angustifolia*, Banyalla *Pittosporum bicolor*, Musk Daisy-bush *Olearia argophylla* and Blackwood *Acacia melanoxylon*. The rare Slender Tree-fern *Cyathea cunninghamii* is also commonly present. Other tree ferns commonly present include the rare Skirted Tree-fern Cyathea X marcescens and Slender Tree-fern Cyathea cunninghamii, which has a National threatened status of rare, and a State-wide status of vulnerable.

This EVC is characterised by the diversity and abundance of obligate epiphytes or species that are epiphytic at crucial stages in their life cycle. This includes vascular species (predominantly ferns) and non-vascular species (mosses, liverworts and lichens). The usual epiphytic substrates are the caudexes ('trunk' or stem) of Soft tree-fern *Dicksonia antarctica* and the trunks of Myrtle Beech. Epiphytic ferns are particularly prominent and include Leathery Shield-fern *Rumohra adiantiformis,* Kangaroo Fern *Microsorum pustulatum*, Austral Filmy Fern *Hymenophyllum australe*, Shiny Filmy Fern *H. flabellatum*, Common Filmy Fern *H. cupressiforme*, Narrow Filmy Fern *H. rarum*, Common Finger-fern *Grammitis billardieri*, Weeping Spleenwort *Asplenium flaccidum* ssp. *flaccidum*, Mother Spleenwort *A. bulbiferum* ssp. *gracillimum*, the rare Ground Spleenwort *Asplenium terrestre* ssp. *terrestre* and Veined Bristle-fern *Polyphlebium venosum*.

Ground ferns with the occasional forb dominate the ground stratum. Ferns include Mother Shield-fern *Polystichum proliferum*, Ray Water-fern *Blechnum fluviatile*, Lance Water-fern *B. chambersii,* Austral Lady-fern *Allantodia australis* and the rare Bristly Shield-fern *Lastreopsis hispida*. Shade Nettle *Australina pusilla* ssp. *muelleri* is commonly present.

Cool Temperate Rainforest in the Otway Ranges contains a number of Nationally and State-wide listed rare and vulnerable species. See Peel (1999.

EVC 37 Montane Grassy Woodland
Montane Grassy Woodland has a very limited distribution in the Midlands study. It is confined to small exposed, rocky areas of the Macedon Range where the harsh environment accentuates altitudinal effects. The altitude is 900-1000m asl with a mean annual rainfall over 1000mm.
The overstorey is dominated by short and stunted Snow Gum *Eucalyptus pauciflora* and Dwarf Silver Wattle *Acacia nano-dealbata*. Sword Tussock Grass Poa ensiformis and Slender Tussock Grass P. tenera dominate the rocky surface. Common herbs include Hairy Pennywort *Hydrocotyle hirta*, Bidgee-widgee *Acaena novae-zelandiae*, Grass Trigger-plant *Stylidium graminifolium*, Prickly Starwort *Stellaria pungens* and Groundsels *Senecio* spp. with clumps of Tasman Flax-lily *Dianella tasmanica*, Spiny-headed Mat-rush *Lomandra longifolia* ssp. *longifolia* scattered in sheltered rock crevices.

EVC 45 Shrubby Foothill Forest
Shrubby Foothill Forest is mapped in both the Midlands and Otway study areas and will be described separately (below).

Midlands study area:
Within the Midlands study area Shrubby Foothill Forest has been identified in the Wombat State Forest and adjacent areas where it is common and widespread. It is a drier form of the EVC than that in the Otways region. It occurs on moderately fertile soils derived from Ordovician shale and sandstones at elevations of 500-900m asl. In higher elevations it may occur on all slopes and aspects, while in drier areas it is restricted to sheltered slopes and gullies. Annual rainfall varies from 750-1150mm. This EVC has a long history of intense and repeated logging.

The overstorey is a medium forest usually dominated by Messmate *E. obliqua*, though Broad-leaved Peppermint *E. dives*, Narrow-leaf Peppermint *E. radiata*, Candlebark *E. rubida* and Mountain Grey Gum *E. cypellocarpa* may also be present.

The mid-stratum is diverse in narrow-leaved or ericoid shrubs, low and often structurally open. Species include Narrow-leaf Wattle *Acacia mucronata*, Common Heath *Epacris impressa*, Moth Daisy-bush *Olearia erubescens*, Mueller's Bush-pea *Pultenaea muelleri* var. *reflexifolia,* Golden Bush-pea *P. gunnii* and Gorse Bitter-pea *Daviesia ulicifolia*.

The ground layer is sparse and species poor and includes Ivy-leaf Violet *Viola hederacea* and Common Raspwort *Gonocarpus tetragynus*. Forest Wire-grass *Tetrarrhena juncea* and Austral Bracken *Pteridium esculentum* are common and may dominate the understorey in response to disturbance.

Otway study area:
Shrubby Foothill Forest occurs widely across the study area, on exposed aspects and slight to moderate slopes. It has been identified close to and remote from the coast, with an average annual rainfall greater than 1100mm. The soils are clay loams over medium to heavy clays. Closer to the coast the clay loams become more shallow over rock. Average altitude is 180m asl.

The overstorey is a medium forest dominated by Messmate *Eucalyptus obliqua* to 30m tall. Mountain Grey Gum *E. cypellocarpa* is also common. Occasional other species include Scentbark *E. aromaphloia,* Brown Stringybark *E. baxteri*, the rare Brooker's Gum *E. brookeriana*, Blue Gum *E. globulus*, Swamp Gum *E. ovata*, Narrow-leaf Peppermint *E. radiata* s.l., Mountain Ash *E. regnans* and Manna Gum *E. viminalis* s.l. There is no understorey tree layer.

A diverse shrub layer characterises this EVC. The most common species include Hop Goodenia *Goodenia ovata*, Prickly Moses *Acacia verticillata*, Snow Daisy-bush *Olearia lirata*, Prickly Currant-bush *Coprosma quadrifida*, Narrow-leaf Wattle *Acacia mucronata*, Privet Mock-olive *Notelaea ligustrina*, Tree Everlasting *Ozothamnus ferrugineus*, Prickly Tea-tree *Leptospermum continentale*, Hazel Pomaderris *Pomaderris aspera* and Large-leaf Bush-pea *Pultenaea daphnoides*.

The ground stratum lacks diversity and is often dominated by Austral Bracken *Pteridium esculentum* and Forest Wire-grass *Tetrarrhena juncea*, which may dominate in response to disturbance. Other species include Tall Sword-sedge *Lepidosperma elatius*, the rare Cluster-headed Mat-rush *Lomandra longifolia* ssp. *exilis,* the vulnerable Swamp Flax-lily *Dianella callicarpa* and Ivy-leaf Violet *Viola hederacea*. Mountain Clematis *Clematis aristata* is the only climber.

EVC 47 Valley Grassy Forest
Valley Grassy Forest generally occurs in small pockets scattered across the drier sections of the Midlands region. It usually grows on quaternary alluvium deposited on valley floors that may be totally dry or carry intermittent streams. Altitude is usually less than 600m asl and mean annual rainfall is below 700mm.

Within the study area there are two isolated basalt caps (surrounded by Ordovician Shales and sandstones supporting Heathy Dry Forest) which have been mapped as Valley Grassy Forest. Though they are not in the typical Valley Grassy Forest landform, they are floristically similar, have fertile soils and occur in the same altitude and rainfall range.

The overstorey may carry a variety of eucalypts, usually species that prefer moist or more fertile conditions as compared to the species in surrounding habitats. Most common are Yellow Box *Eucalyptus melliodora*, Red Box *E. polyanthemos*, Messmate *E. obliqua*, Narrow-leaf Peppermint *E. radiata* and Candelbark *E. rubida*. Apart from scattered Black Wattle *Acacia mearnsii* and Silver Wattle *A. dealbata* the shrub layer is virtually non-existent.

The ground is usually covered in a dense grassy sward with a high diversity of both grasses and forbs. Dominant species vary depending on moisture levels. The most common dominant species are Weeping Grass *Microlaena stipoides*, Common Tussock-grass *Poa labillardierei*, and Grey Tussock-grass *P. sieberiana*. Other grasses usually present are Sweet Vernal-grass **Anthoxanthum odoratum*, Silvertop Wallaby-grass *Joycea pallida*, Five-awned Spear-grass *Pentapogon quadrifidus*, Common Wheat-grass *Elymus scabrus*, Plume grasses *Dichelachne* spp. and Wallaby grasses *Austrodanthonia* spp.. Forbs include Blue Pincushion *Brunonia australis*, Ivy-leaf Violet *Viola hederacea*, Kidney-weed *Dichondra repens*, Common Lagenifera *Lagenifera stipitata*, Austral Bugle *Ajuga australis*, Chocolate-lily *Arthropodium strictum* and Austral Bracken *Pteridium esculentum.*

Valley Grassy Forest usually occurs adjacent to dry forests such as Grassy Dry Forest and Heathy Dry Forest though in the Macedon/Cobaw area it is adjacent to Herb-rich Foothill Forest.

EVC 48 Heathy Woodland
Heathy Woodland is mapped in both the Midlands and Otways study areas and will be described separately (below).

Midlands study area:
Heathy Woodland in the Midlands occurs in small patches scattered across the study area. Several floristic communities have been identified.

Floristic Community 48-09 *Sand* Heathy Woodland
Sand Heathy Woodland has been identified adjacent to the north-west corner of the Langi Ghiran State Park. Soils are granitic-outwash sands. Altitude is 360-420m asl and average annual rainfall is around 650mm.

The overstorey is very sparse and dominated by Long-leaf Box *Eucalyptus goniocalyx* with tree form Silver Banksia, *Banksia marginata* and Black She-oak *Allocasuarina littoralis*.

The understorey is dense and dominated by Small Grass-tree *Xanthorrhoea minor* and Heath Tea-tree *Leptospermum myrsinoides* with Daphne Heath *Brachyloma daphnoides*, Fringed Brachyloma *B. ciliatum*, Horny Cone-bush *Isopogon ceratophyllus* and Wire Rapier-sedge *Lepidosperma semiteres*.

The ground layer is sparse with scattered herbs and several tiny sedges including Pointed Centrolepis *Centrolepis aristata*, Hairy Centrolepis *C. strigosa*, Common Bog-sedge *Schoenus apogon* and Tiny Bog-sedge *S. nanus*.

Floristic Community 48-11 *Western Goldfields* Heathy Woodland
Western Goldfields Heathy Woodland has been identified in three tiny blocks of public land near Stawell and Amphitheatre. It is equivalent to the Heathy Woodland (Western Goldfields) as described by Muir *et al.* (1999). Soils are Tertiary sands/clays that have been locally altered to form quartzite gravel. Altitudes are 300-340m asl and average annual rainfall is between 500-600mm.

The overstorey is dominated by small, spreading Long-leaf Box *Eucalyptus goniocalyx* with some Red Stringy bark *E. macrorhyncha*. The lower strata include a shrub layer dominated by a dense cover of low heathy shrubs over scattered herb and grasses in the ground stratum. Common species include Flame Heath *Astroloma conostephioides*, Cranberry Heath *Astroloma humifusum,* Daphne Heath *Brachyloma daphnoides*, Black-anther Flax-lily *Dianella revoluta*, Cat's Claws Grevillea *Grevillea alpina*, Heath Tea-tree *Leptospermum myrsinoides*, Common Bog-sedge *Schoenus apogon*, Pointed Centrolepis *Centrolepis aristata* and Wallaby-grasses *Austrodanthonia* spp.

Floristic Community 48-12 *Steiglitz* Heathy Woodland
Steiglitz Heathy Woodland occurs on a tiny patch of Tertiary clays in the Steiglitz Historic Park. Altitude is 340m asl and average annual rainfall is 650mm.

The overstorey consists of Red Stringybark *Eucalyptus macrorhyncha* over an open understorey of Austral Grass-tree *Xanthorrhoea australis*, Dusty Miller *Spyridium parvifolium*, Heath Tea-tree *Leptospermum myrsinoides*, Dwarf Geebung *Persoonia chamaepeuce* and Golden Grevillea *Grevillea chrysophaea*. The ground layer is sparse and includes Sundew *Drosera peltata*, Button Everlasting *Helichrysum scorpioides* and Wallaby-grass *Austrodanthonia* spp.

Floristic Community 48-13 *Midlands* Heathy Woodland
Midlands Heathy Woodland occurs on narrow Tertiary cappings on ridge-tops in the Wombat and Pyrete State Forests. Soils are a very fine white clay. Altitudes in the Wombat State Forest are 600-830m asl and average annual rainfall is 900-1100mm. In the Pyrete State Forest altitude is 400-500m asl and average annual rainfall is 700mm.

The overstorey is dominated by Broad-leaf Peppermint *Eucalyptus dives,* which, in the Pyrete State Forest may be only two or three metres tall. The understorey may be dense or sparse and includes Dagger Wattle *Acacia oxycedrus*, Bushy Hakea *Hakea sericea*, Prickly Tea-tree *Leptospermum continentale*, Rosy Baeckea *Baeckea ramosissima*, Silver Banksia, *Banksia marginata*, Bundled Guinea-flower, *Hibbertia prostrata*, Common Rapier-sedge, *Lepidosperma filiforme* and Curly-wig *Caustis flexuosa*.

Otways study area:
Two forms of Heathy Woodland have been identified within the Otways study area. The first is the most widespread, occurring from sites near Port Campbell and Lower Gellibrand along the tertiary sand belt and in the Eastern View to Anglesea area.

The overstorey is dominated by Brown Stringybark *Eucalyptus baxteri*, Narrow-leaf Peppermint *E. radiata* s.l., Messmate *E. obliqua* and Shining Peppermint *E. willisii* s.l.

The shrub stratum is diverse and includes Prickly Tea-tree *Leptospermum continentale*, Common Heath *Epacris impressa*, Narrow-leaf Wattle *Acacia mucronata,* Prickly Geebung *Persoonia juniperina,* Common Beard-heath *Leucopogon virgatus,* Silver Banksia *Banksia marginata*, Pink Bells *Tetratheca ciliata*, Smooth Parrot-pea *Dillwynia glaberrima*, Western Furze Hakea *Hakea repullulans* Common Aotus *Aotus ericoides* and Slender Rice-flower *Pimelea linifolia*. Species in the ground stratum include Austral Grass-tree *Xanthorrhoea australis*, Tassel Rope-rush *Hypolaena fastigata,* Spreading Rope-rush *Empodisma minus*. Spiny-headed Mat-rush *Lomandra longifolia* and Swamp Selaginella *Selaginella uliginosa*.

The second form of Heathy Woodland in the Otways study area occurs on late Tertiary sediments between Eastern View and Point Addis of Anglesea. Average annual rainfall is 550-700mm. Distinguishing features of this form of Heathy Woodland are its relatively high species richness and the frequency of tussock forming species compared with the previous form.

Common overstorey species are Messmate *Eucalyptus obliqua*, Brown Stringybark *E. baxteri* and Scentbark *E. aromaphloia*. The diverse shrub layer includes Silver Banksia *Banksia marginata*, Common Flat-pea *Platylobium obtusangulum*, Common Heath *Epacris impressa*, Honey-pots *Acrotriche serrulata*, Prickly Tea-tree *Leptospermum continentale*, Heath Tea-tree *L. myrsinoides*, Erect Guinea Flower *Hibbertia riparia*, Prickly Geebung *Persoonia juniperina*, Pink-bells *Tetratheca ciliata*, Common Beard-heath *Leucopogon virgatus*, Dwarf Wedge-pea *Gompholobium ecostatum*, Myrtle Wattle *Acacia myrtifolia*, Common Rice-flower *Pimelea humilis*, Smooth Parrot-pea *Dillwynia glaberrima* and Leafless Globe-pea *Sphaerolobium vimineum.*

Common species in the ground stratum include Thatch Saw-sedge *Gahnia radula,* Bent Goodenia *Goodenia geniculata*, Wattle Mat-rush *Lomandra filiformis*, Blue Squill *Chamaescilla corymbosa* var. *corymbosa*, Wire Rapier-sedge, *Lepidosperma semiteres*, Variable Stinkweed *Opercularia varia*, Heath Xanthosia *Xanthosia pusilla*, Screw fern *Lindsaea linearis*, Button Everlasting *Helichrysum scorpioides* and Hidden Violet *Viola cleistogamoides*. Other common species include Austral Grass-tree *Xanthorrhoea australis*, Tassel Rope-rush *Hypolaena fastigata,* Common Rapier-sedge *Lepidosperma filiforme*, Tall Sundew *Drosera peltata* ssp *auriculata* and Milkmaids *Burchardia umbellata*.

EVC 52 Coastal Saltmarsh Complex
Coastal Saltmarsh Complex occurs on the Bellarine Peninsula, south-west of Anglesea along the Painkalac Creek and at Queenscliff in the Breamlea estuary and within the Port Campbell National Park. This EVC occurs at or just above sea level and has an average annual rainfall range of 600 - 780mm. Fertile clay loam soils and disturbance from recreation activities combine to encourage a high proportion of weeds. Species diversity is low, reflecting the saline nature of the estuarine environment.

There are two forms of Coastal Saltmarsh Complex mapped within the study area. Both are treeless with rushes, sedges, forbs and aquatic plants dominating. Within the Bramlea estuary dominant species include Beaded Glasswort *Sarcocornia quinqueflora*, Austral Seablite *Suaeda australis* and Shrubby Glasswort *Sclerostegia arbuscula* whilst elsewhere Creeping Brookweed *Samolus repens* is most common, co-occurring with Sea Rush *Juncus kraussii.* Grasses such as Australian Salt-grass *Distichlis distichophylla*, Blue Tussock-grass *Poa poiformis*, Annual Beard-grass *Polypogon monspeliensis* grow on the fringes of the estuary. Buck's-horn Plantain **Plantago coronopus*, Shiny Swamp-mat *Selliera radicans*, Beaded Glasswort *Sarcocornia quinqueflora*, Aster-weed **Aster subulatus*, Water Buttons **Cotula coronopifolia* and Smooth Willow-herb *Epilobium billardierianum* ssp. *billardierianum* also occur on the margins of this complex. Nodding Club-sedge *Isolepis cernua* and Knobby Club-sedge *Isolepis nodosa* are the most common sedges.

Examples of this EVC can be found at Painkalac Creek at Aireys Inlet, the estuarine flat of the Erskine River at Lorne and the wetland area south of the Old Great Ocean Road at Princetown, approximately 1km from its intersection with the Great Ocean Road.

EVC 53 Swamp Scrub
Swamp Scrub occurs close to the coast in the study area and has affinities with Shallow Freshwater Marsh. Both occupy similar swamp habitats, however the Swamp Scrub occurs on slight rises where the soil is deeper and better drained.

This EVC lacks an overstorey and is dominated by tall Woolly Tea-tree *Leptospermum lanigerum* that forms dense impenetrable thickets, out-competing other species. Coast Saw-sedge *Gahnia trifida* and Common Reed *Phragmites australis* are also common

EVC 55 Plains Grassy Woodland
Plains Grassy Woodland was once widespread across the study area in the vicinity of the volcanic plains, in some areas growing in association with Plains Grassland. Due to a long history of grazing and clearing for agriculture the majority of this EVC has disappeared and that which is left is often severely degraded. Of the areas remaining on public land the largest is around the Upper Stoney Creek Reservoirs, mainly on land managed by Barwon Water though some occurs in the adjacent Brisbane Ranges National Park. Other areas include the Dolly Creek State Forest, Bannockburn and Inverleigh Commons and a very small patch in the Langi Ghiran State Park.

There is great variation within these areas and it is likely that several different floristic communities exist. However, due to the paucity of sampling of intact remnants, distinctions at the floristic community level have not been made here. All sites are virtually flat, altitudes range from 350 to 380m asl except in the Bannockburn and Inverleigh areas which are 90 to 100m asl and annual rainfall is approximately 650mm. Soils are generally fertile, most sites occurring on Tertiary sands and clays though soils of the Inverleigh Common are aeolian sands and the Langi Ghiran State Park example is on granitic-outwash soils.

Tree density within the areas mapped varies from almost forest to very open woodland. Dominance within the overstorey varies with soil moisture, which is related to the proportions of sand and clay within the soil. Fire and management history may also influence overstorey structure and species composition.

Dominant species within this EVC may include Yellow Gum *Eucalyptus leucoxylon*, Swamp Gum *E. ovata,* Yellow Box *E. melliodora* or Manna Gum *E. viminalis* with Silver Banksia *Banksia marginata* (tree form), Black She-oak *Allocasuarina littoralis* Blackwood *Acacia melanoxylon* and Black Wattle *A. mearnsii*. There is no shrub layer apart from localised thickets of Hedge Wattle *A. paradoxa* in the Bannockburn and Inverleigh areas.

The ground layer is very species rich with a mixture of low ericoid shrubs, such as Peach Heath *Lissanthe strigosa*, Cranberry Heath *Astroloma humifusum* and Honey-pots *Acrotriche serrulata*, and a diversity of lilies, forbs and grasses. Common species include Yellow Rush-lily *Tricoryne elatior*, Milkmaids *Burchardia umbellata*, Running Postman *Kennedia prostrata*, Common Rice-flower *Pimelea humifusum*, Creeping Bossiaea *Bossiaea prostrata*, Wiry Buttons *Leptorhynchos tenuifolius*, Scaly Buttons *L. squamatus*, Kidney-weed *Dichondra repens*, Sundew *Drosera peltata*, Spear-grasses *Austrostipa* spp., Wallaby-grasses *Danthonia* spp., Reed Bent-grass *Deyeuxia quadriseta*, Weeping Grass *Microlaena stipoides* and Kangaroo Grass *Themeda triandra*. In some areas there are dense patches of Black-anther Flax-lily *Dianella revoluta* and Variable Sword-sedge *Lepidosperma laterale*.

EVC 61 Box Ironbark Forest
Box-Ironbark Forest covers large areas across north central Victoria, however it is very limited in the Midland study area. Two floristic

communities have been identified. Generally, this EVC is an open forest over sparse but often diverse lower strata. It occurs on low, gently undulating hills or the lower slopes of larger hills and ranges. Altitude is less than 350m asl and annual average rainfall is low at 500-600mm. Soils are derived from Ordovician shale and sandstones and are infertile with a low water-holding capacity.

Floristic Community 61-04 *Western Goldfields* Box Ironbark Forest
Western Goldfields Box Ironbark Forest occurs in the far northwest of the study area in the Dunneworthy and Joel State Forests and the northern tip of the Pyrenees State Forest.

The overstorey is dominated by Yellow Gum *Eucalyptus leucoxylon,* Grey Box *E. microcarpa,* Red Ironbark *E. tricarpa,* and Red Box *E. polyanthemos.* Common shrubs include Golden Wattle *Acacia pycnantha,* Grey Everlasting *Ozothamnus obcordatus,* Twiggy Bush-pea *Pultenaea largiflorens* and Peach Heath *Lissanthe strigosa.* The ground layer consists of Rough Spear-grass *Austrostipa scabra,* Bristly Wallaby-grass *Austrodanthonia setacea,* Hair-grass **Aira elegans,* Small Mat-rush *Lomandra sororia* and Narrow Groundsel *Senecio tenuiflorus* in addition to a number of tiny annuals such as Rayless Daisy *Brachyscome perpusilla,* Soft Millotia *Millotia tenuifolius,* Spoon Cudweed *Stuartina muelleri,* Yellow Pennywort *Hydrocotyle foveolata,* Small Pennywort *H. callicarpa* and Annual Bluebell *Wahlenbergia gracilenta.*

Floristic Community 61-06 *Toolernvale-Coimadai* Box Ironbark Forest
Toolernvale-Coimadai Box Ironbark Forest occurs on the gentle lower slopes of the hills in the Toolernvale and Coimadai areas, mostly on private land. Areas of public land with this floristic community are the southern edge of the Pyrete State Forest, the southeast corner of the Lerderderg State Park and parts of the Long Forest Flora Reserve and Werribee Gorge Sate Park.

The overstorey is similar to *Western Goldfields* Box Ironbark Forest with the addition of Red Stringybark *Eucalyptus macrorhyncha*. Shrubs include Golden Wattle *Acacia pycnantha*, Gold-dust Wattle *Acacia acinacea,* Saloop Saltbush *Einadia hastata*, and Shiny Cassinia *Cassinia longifolia* with Drooping Cassinia *Cassinia arcuata* in disturbed areas. The ground layer includes Wattle Mat-rush *Lomandra filiformis*, Silvertop Wallaby-grass *Joycea pallida*, Bristly Wallaby-grass *Austrodanthonia setacea,* Grey Tussock-grass *Poa sieberiana,* Cotton Fireweed *Senecio quadridentatus* and Small-leaf Clematis *Clematis microphylla*. The tiny annuals characteristic of the previous floristic community are not present.

EVC 64 Rocky Chenopod Woodland
Within the Midlands region Rocky Chenopod Woodland only occurs in the Werribee Gorge State Park and the Long Forest Flora Reserve. Altitude ranges from 100-250m asl and annual rainfall is low at 450- 550mm. Soils are infertile, have a high salt content and are fairly impermeable to water, thereby reducing effective rainfall. Prior to European settlement this EVC extended onto Permian glacial mudstones to an altitude of 360m asl.

In this EVC the overstorey is a low (6-10m tall) forest to woodland dominated by Bull Mallee *Eucalyptus behriana*, Yellow Gum *E. leucoxylon* or Grey *Box E. microcarpa.* In some areas, particularly those dominated by Bull Mallee in Long Forest and Yellow Gum in Werribee Gorge, the trees are mallee-form though this has been accentuated by timber cutting methods in the past which encouraged coppice regrowth.

The understorey and ground layers are characterised by a diversity of chenopods (saltbushes) and succulents including. Fragrant Saltbush *Rhagodia parabolica*, Saloop Saltbush *Einadia hastata*, Nodding Saltbush *E. nutans*, Ruby Saltbush *Enchylaena tomentosa*, Wingless Saltbush *Maireana enchylaenoides*, Frosted Goosefoot *Chenopodium desertorum* ssp. *microphyllum*, Inland Pigface *Carpobrotus modestus,* Pink Purslane *Calandrinia calyptrata* and Australian Stonecrop *Crassula sieberiana*. Projected foliage cover of these species varies and at times is minimal. Areas dominated by Grey Box tend to have the lowest number of chenopod species, which may reflect a slightly better site quality. Other shrubs present include Golden Wattle *Acacia pycnantha*, Moonah *Melaleuca lanceolata*, Turkey-bush *Eremophila deserti* and Drooping Cassinia *Cassinia arcuata.*

The ground layer is always sparse and may sometimes be virtually bare. Species diversity varies. Usual species include Wallaby-grasses *Austrodanthonia* spp., Spear-grasses *Austrostipa* spp., Annual Veldt-grass **Ehrharta longiflora*, Austral Tobacco *Nicotiana suaveolens* and Small-leaved Clematis *Clematis microphylla*.

EVC 67 Alluvial Terraces Herb-rich Woodland
Alluvial Terraces Herb-rich Woodland occurs in the northwest of the study area, in the Pyrenees Ranges, Waterloo and Dunneworthy State Forests and the Langi Ghiran State Park. It grows on low-lying alluvial terraces and plains and has been extensively cleared across its range, now only occurring in small pockets around the edges of public land. Soils are relatively fertile and have a higher water-holding capacity than the surrounding low hills. Altitudes are generally below 350m asl and the annual rainfall is below 650mm.

Within this EVC the overstorey is of tall woodland trees, mainly Yellow Box *Eucalyptus melliodora* with Candlebark *E. rubida*, River Red Gum *E. camaldulensis,* Red Box *E. polyanthemos* and Blue Gum *E. globulus* also occurring occasionally. There is no shrub layer, and the ground layer is diverse in forbs, lilies and grasses including many annuals. In dry seasons the ground may appear very bare, many species retreating to rootstock or existing as soil-stored weed. Common species include Scaly Buttons *Leptorhynchos squamatus*, Solenogyne *Solenogyne dominii*, Yellow Rush-lily *Tricoryne elatior*, Chocolate Lily *Arthropodium strictum*, Yam-daisy *Microseris lanceolata,* Common Bog-sedge *Schoenus apogon,* Common Wheat-grass *Elymus scabrus* and Wallaby-grasses *Austrodanthonia* spp.

Most areas of Alluvial Terraces Herb-rich Woodland have suffered a severe history of disturbance, from mining, grazing and timber cutting. As a consequence weeds are common, particularly annual grasses.

EVC 70 Hillcrest Herb-rich Woodland
Hillcrest Herb-rich Woodland is restricted to broad, flat hilltops and ridgelines in the far northwest of the Midlands study area, in and around the Pyrenees Ranges. It has been mapped in isolated locations through the Box-Ironbark Region to the north and east but has not been recorded further south. Altitude is 400-450m asl and mean annual rainfall is approximately 550-650mm. All sites occur on Ordovician sediments. The flatness of the ridgetops allows the formation of deeper soils and thus better growing conditions than on the surrounding slopes which are steeper and generally support Grassy Dry Forest and Heathy Dry Forests.

The overstorey is sparse and consists of low spreading eucalypts, mainly Yellow Box *Eucalyptus melliodora* and Long-leaf Box *E. goniocalyx.* The shrub layer is usually absent while the ground layer has a diverse array of grasses and forbs. Common species include Clustered Everlasting *Chrysocephalum semipapposum*, Tall Raspwort *Gonocarpus elatus*, the Wallaby-grasses *Austrodanthonia pilosa* and *A. racemosa*, Narrow Rock-fern *Cheilanthes sieberi*, Cotton Fireweed *Senecio quadridentatus*, Sieber Crassula *Crassula sieberiana*, Common Wheat-grass *Elymus scaber*, Chocolate Lily *Arthropodium strictum*, Magenta Stork's-bill *Pelargonium rodneyanum* and the Spear-grasses *Austrostipa mollis* and *A. scabra* ssp. *falcata.*

EVC 71 Hills Herb-rich Woodland

Floristic Community 71-01 *Granitic* Hills Herb-rich Woodland
Within the Midlands region, *Granitic Hills* Herb-rich Woodland is uncommon and is typically found at the boundaries of blocks of public land such as Mt Buangor State Park, Langi Ghiran State Park, Mt Cole State Forest, Mt Lonarch State Forest and Ben Major Forest Reserve on fertile granodiorite and granodiorite-derived soils. The most extensive intact example within the study area is in Mt Beckworth State Forest where it occupies most of the park. Altitude ranges from 350 to 700m asl and annual rainfall is less than 700mm.

The overstorey is a woodland of large eucalypts, usually Yellow Box *Eucalyptus melliodora*. Shrubs and understorey trees are sparse with Black Wattle *Acacia mearnsii* and less commonly Cherry Ballart *Exocarpos cupressiformis* most usual.

On the outwash slopes to the west of Mount Langi Ghiran this floristic community grows on soils which appear less fertile and are more often waterlogged than those of steeper slopes elsewhere. Here the low tree layer is missing, and tall shrubs such as Hedge Wattle *Acacia paradoxa* and Varnish Wattle *A. verniciflua* may be present, rarely forming dense stands.

The ground layer is rich in grasses and forbs such as Wallaby-grasses *Austrodanthonia* spp., Kidney-weed *Dichondra repens*, Austral Bugle *Ajuga australis*, Austral Bear's-ears *Cymbonotus preissianus* and Green Rock Fern *Cheilanthes austrotenuifolia*. Low ericoid shrubs such as Cranberry Heath *Astroloma humifusum* and Peach Heath *Lissanthe strigosa* are also common.

Due to the fertile nature of the soils and disturbance by grazing (rabbits and marsupials) weeds are common, particularly annual grasses.

EVC 72 Granitic Hills Woodland
Granitic Hills Woodland is restricted in the Midlands to the You Yangs Regional Park where is occurs on steep granite hills and rocky outcrops. Average annual rainfall is low at approximately 550mm and effective rainfall even lower due to the steep slopes and shallow free-draining soils. Altitude ranges from 200-350m asl.

Density of the overstorey varies from sparse to almost forest-like in response to soil depth and the availability of deep cracks for root growth. Red Stringybark *Eucalyptus macrorhyncha* dominates although Yellow Gum *E. leucoxylon,* Red Ironbark *E. tricarpa* and Yellow Box *E. melliodora* may

also occur. The shrub layer is usually dense where soil depth is suitable for the establishment of root systems. Common shrubs include Snowy Mint-bush *Prostanthera nivea*, Hedge Wattle *Acacia paradoxa*, Lightwood *A. implexa*, Sticky Hop-bush *Dodonaea viscosa*, Shiny Cassinia *Cassinia longifolia* and the weed Boneseed **Chrysanthemum monilifera*. Among the rocks are grasses and forbs such as Kangaroo Grass *Themeda triandra*, Fibrous Spear-grass *Austrostipa semibarbarta*, Weeping Grass *Microlaena stipoides*, Black-anther Flax-lily *Dianella revoluta*, Small-leaved Clematis *Clematis microphylla*, Yellow Rush-lily *Tricoryne elatior* and Narrow Rock-fern *Cheilanthes tenuifolia*.

EVC 73 Rocky Outcrop Shrubland/ Herbland Mosaic
Within the midlands study area, Rocky Outcrop Shrubland/Herbland Mosaic is most common on granodiorite in the Mt Buangor State Park, Mt Cole State Forest and Langi Ghiran State Park, on exposed, westerly-facing rocky outcrops at altitudes greater than 700m asl.

These two EVCs grow in tight association with each other, interspersed by areas of bare rock and were unable to be distinguished in the mapping due to the scale used (i.e. 1:100 000). Rocky Outcrop Shrubland grows in localised areas of deeper soils, usually between rocks and Rocky Outcrop Herbland grows on localised areas of shallow soils, in moss beds and in shallow depressions in the rock. Bryophytes (mosses and liverworts) and lichens are common and may cover rock surfaces.

The overstorey may be sparse to absent, depending on soil depth. Where they do occur, trees are usually stunted and spreading in form. In drier sites, for example within Langi Ghiran State Park and lower altitude areas north of Mt Buangor, the most common eucalypts are Long-leaf Box *Eucalyptus goniocalyx* and Red Stringybark *E. macrorhyncha* while in wetter sites, such as atop Ben Nevis, stunted Eurabbie *E. globulus* ssp. *bicostata* is found. Narrow-leaf Peppermint *E. radiata* or Broad-leaf Peppermint *E. dives* are less common.

The most common shrubs in this mosaic include Violet Kunzea *Kunzea parvifolia*, Spike Wattle *Acacia oxycedrus* and Sticky Hop-bush *Dodonea viscosa* while at higher altitudes, for example on the top of Ben Nevis, Shiny Tea-tree *Leptospermum turbinatum* dominates.

Among the rocks species such as Nodding Blue-lily *Stypandra glauca*, Velvet Wallaby-grass *Austrodanthonia pilosa,* Matted Tussock-grass *Poa clelandii*, Prickly Starwort *Stellaria pungens* and Austral Carrot *Daucus glochidiatus* are common. In moss beds and on rocky outcrops Spreading Crassula *Crassula decumbens* and a diversity of stunted grasses and annual forbs are found.

EVC 74 Wetland Formation
Wetland Formation is a broad, under-sampled group occurring throughout the study area. Wetland vegetation is often severely degraded and weed-invaded having suffered a history of disturbance including alteration of drainage patterns such as up-stream damming for water storage or draining and clearing for agriculture or grazing. This formation includes generally herbaceous wetland vegetation in ephemeral and permanent water bodies. On the volcanic plain EVCs present may include EVC 125 Plains Grassy Wetland, EVC 136 Sedge Wetland, EVC 647 Plains Sedgy Wetland, EVC 653 Aquatic Herbland, EVC 647 Plains Sedgy Wetland and areas of open fresh or saline water. In areas of lower rainfall EVCs present may include EVC 104 Lignum Wetland, EVC 291 Cane-grass Wetland and EVC 292 Red Gum Wetland. These EVCs are individually described in other sections of this text.

EVC 83 Swampy Riparian Woodland
Swampy Riparian Woodland has been mapped in only one location in the Midlands study area, in the Wombat State Forest where it occurs on Recent alluvial flats adjacent to the Werribee River in association with Herb-rich Foothill Forest and Shrubby Foothill Forest. The area is flooded regularly and is nearly always wet even when the river is not flowing. The altitude is 600m asl and average annual rainfall is approximately 850mm.

Swampy Riparian Woodland consists of a very open to virtually absent canopy of Swamp Gum *Eucalyptus ovata* and Manna Gum *E. viminalis*. The shrub layer is also very sparse with scattered Blackwood *Acacia melanoxylon*, Silver Wattle *A. dealbata*, Hazel Pomaderris *Pomaderris aspera*, Prickly Currant-bush *Coprosma quadrifida* and the occasional Rough Tree-fern *Cyathea australis* and Soft Tree-fern *Dicksonia antarctica*. The ground layer is dense, dominated by Fishbone Water-fern *Blechnum nudum*. Other common species include Mother Shield-fern *Polystichum proliferum*, Leafy Flat-sedge *Cyperus lucidus*, Tall Sedge *Carex appressa* and Hard Water-fern *Blechnum wattsii.* Patches between the ferns support herbs such as Bidgee-widgee *Acaena novae-zelandiae*, Kidney-weed *Dichondra repens*, Hairy Pennywort, *Hydrocotyle hirta* and Austral Brooklime *Gratiola peruviana*.

EVC 127 Valley Heathy Forest
Within the Midlands and Otway region Valley Heathy Forest was only recorded in two tiny patches in the far north-eastern corner of the Midlands study area. It is grows on flats and gentle slopes at the base of small granite hills and outcrops. Altitude is 540m asl and mean annual rainfall approximately 700mm.

Valley Heathy Forest is characterised by a diverse range of species. Dry forest species dominate on the free-draining sandy soils but underlying impeded drainage and/or seepage from adjacent hills also allows species which prefer wetter environments to thrive.

The overstorey consists of Messmate Stringybark *Eucalyptus obliqua* and Swamp Gum *E. ovata* with a sparse tall shrub layer of Black Wattle *Acacia mearnsii*, Prickly Tea-tree *Leptospermum continentale* and Spreading Wattle *Acacia genistifolia*. The ground stratum is dense and diverse in low shrubs, grasses and forbs. Common species include Small Grass-tree *Xanthorrhoea minor*, Cranberry Heath *Astroloma humifusum*, Honey-pots *Acrotriche serrulata*, Common Rice-flower *Pimelea humilis*, Silvertop Wallaby-grass *Joycea pallida*, Reed Bent-grass *Deyeuxia quadriseta*, Weeping Grass *Microlaena stipoides*, Grey Tussock-grass *Poa sieberiana*, Yam Daisy *Microseris scapigera*, Variable Sword-sedge *Lepidosperma laterale*, Ivy-leaf Violet *Viola hederacea* and Variable Stinkweed *Opercularia varia*.

EVC 128 Grassy Forest
Within the Midlands region remnants of Grassy Forest were only mapped in a small area in the valley between the Macedon Regional Park and the Wombat State Forest. Prior to European settlement, as identified in the modelling of pre-1750 vegetation types, it occurred extensively in the Gisborne-Woodend area. The best quality remnants of this EVC are on roadsides rather than on broad-scale public land blocks. Grassy Forest occurs on relatively infertile soils derived from Ordovician sediments with moderate average annual rainfall of 700-850mm and an altitude range of 400-600m asl.

The overstorey is a low forest (20m tall) of Messmate Stringybark *Eucalyptus obliqua*, Narrow-leaf Peppermint *E. radiata* and Manna Gum *E. viminalis* growing in association with an understorey tree layer of Blackwood *Acacia melanoxylon*, Black Wattle *A. mearnsii* and Cherry Ballart *Exocarpos cupressiformis*. If present, the shrub layer is low and sparse and includes Narrow-leaf Wattle *A. mucronata*, Matted Bossiaea *Bossiaea buxifolia* and Parrot-peas *Dillwynia* spp.

The ground-layer is dominated by grasses, particularly Grey Tussock-grass *Poa sieberiana*, Silver-top Wallaby-grass *Joycea pallida*, Weeping Grass *Microlaena stipoides* and Plume Grasses *Dichelachne* spp. Other common species include Purple Coral-pea *Hardenbergia violacea*, Black-anther Flax-lily *Dianella revoluta*, Handsome Flat-pea *Platylobium formosum*, and Common Hovea *Hovea linearis*.

EVC 136 Sedge Wetland
Due to the small scale of mapping (1:100 000) Sedge Wetland was only mapped within the Midlands region in the vicinity of the Upper Stony Creek Reservoirs. However, it also occurs near the Brisbane Ranges National Park and some areas were mapped within EVC 74 Wetland Formation. Sedge Wetland occurs in minor depressions on otherwise flat areas of Tertiary sands and clays. Altitude is 340m asl and average annual rainfall is approximately 680mm.

This EVC rarely has a eucalypt overstorey. Swamp Gum *Eucalyptus ovata* is often found scattered around the fringes of the wetland, along with shrubs such as Blackwood *Acacia melanoxylon* and Prickly Tea-tree *Leptospermum continentale*. The ground layer is dominated by dense swards of Pithy Sword-sedge *Lepidosperma longitudinale* in addition to Spiny-headed Mat-rush *Lomandra longifolia* ssp. *longifolia*, Soft Twig-rush *Baumea rubiginosa*, Scale Rush *Lepyrodia* spp. and Common Bog-sedge *Schoenus apogon*. Herbs present include Running Marsh-flower *Villarsia reniformis* and Centella *Centella cordifolia*.

EVC 154 Bird Colony Shrubland
Bird Colony Shrubland has only been mapped on Mutton Bird Island, a tiny island of the coast, near Lochard Gorge.

Mutton Bird Island is derived from limestone with poorly structured duplex soils that are skeletal and calcareous. This EVC occurs within Mutton Bird breeding rookeries and is subject to intense seasonal trampling and tunnelling by the Mutton Birds, Penguins and other sea-birds. Bird droppings enhance soil fertility.

Within the study area this EVC was unsampled but it has also been identified (and sampled and mapped) on islands off the coast of Wilsons Promontory. These islands have a different geology of granite with large outcropping granite slabs. Species common to both areas are Seaberry Saltbush *Rhagodia candolleana*, White Elderberry *Sambucus gaudichaudiana*, Four-leaved Allseed **Polycarpon tetraphyllum* and Drooping She-oak *Allocasuarina verticillata*. Other species likely to be

present are Blue Tussock-grass *Poa poiformis*, Cushion Bush *Leucophyta brownii*, Coast Daisy-bush *Olearia axillaris*, Ridged Ground-berry *Acrotriche affinis* and Coast Beard-heath *Leucopogon parviflorus*.

EVC 161 Coastal Headland Scrub
Coastal Headland Shrubland occurs in exposed situations on the limestone plains of coastal cliffs at Port Campbell and arkose sandstone cliffs at Cape Otway. The vegetation is often wind and salt-pruned due to exposure to prevailing south-west winds and salt spray. Fertile soils and high average annual rainfall of 950mm combine to maintain a diversity of species. Coastal Headland Shrubland occurs on the more protected south-west slopes and east-facing gullies.

Coastal Headland Shrubland is treeless, except for the occasional stunted Messmate *Eucalyptus obliqua*. It is dominated by a closed heath of Manuka *Leptospermum scoparium* with Silver Banksia *Banksia marginata*, Prickly Moses *Acacia verticillata*, Prickly Tea-tree *Leptospermum continentale* and Dusty Miller *Spyridium parvifolium* often occurring in lower densities. Honey-pots *Acrotriche serrulata*, Coast Beard-heath *Leucopogon parviflorus*, Ridged ground-berry *Acrotriche affinis*, Cranberry Heath *Astroloma humifusum*, Common Correa *Correa reflexa*, Common Heath *Epacris impressa* and Rough Guinea-flower *Hibbertia aspera* form a lower, ericoid shrub layer. Sedges such as Common Bog-sedge *Schoenus apogon*, Bare Twig-sedge *Baumea juncea,* Short-stem Sedge *Carex breviculmis* and Coast Saw-sedge *Gahnia trifida* are often present. Blue Tussock-grass *Poa poiformis* is the most common grass species, with occasional Grey Tussock-grass *Poa sieberiana*. A few scattered herbs are present including Branched Centaury **Centaurium tenuifolium*, Ivy-leaf Violet *Viola hederacea*, Common Raspwort *Gonocarpus tetragynus*, Kidney-weed *Dichondra repens* and Shiny Swamp-mat *Selliera radicans*.

Coastal Headland Shrubland near Port Campbell can also occur as a mosaic with Coastal Tussock Grassland.

EVC 163 Coastal Tussock Grassland
Coastal Tussock Grassland occurs on cliff-top plateaus affected by seaspray. The soils are poorly structured with sands over bedrock that can only support shallow-rooted plants. Water availability at depth is often good due to the proximity of bedrock. Harsh site quality encourages stunted and poorly-formed plants. Rainfall for this EVC is 950mm and the average altitude is 36m asl.

This EVC is treeless and is dominated by Blue Tussock-grass *Poa poiformis*. Other grasses include Bristly Wallaby-grass *Austrodanthonia setacea*, Common Blown Grass *Agrostis avenacea* and Mat Grass *Hemarthria uncinata* var. *uncinata*. A few shrub species often occur, including Coast Beard-heath *Leucopogon parviflorus*, Manuka *Leptospermum scoparium*, Silver Banksia *Banksia marginata* and Coast Daisy-bush *Olearia axillaris*. The ground layer may carry sedges such as Bare Twig-sedge *Baumea juncea*, Common Bog-sedge *Schoenus apogon*, Short-stem sedge *Carex breviculmis,* Coast Saw-sedge *Gahnia trifida* and Coast Sword-sedge *Lepidosperma gladiatum*. Coastal Tussock Grassland supports a diversity of forbs in low densities. These include the endangered Metallic Sun-orchid *Thelymitra epipactoides,* Common Centaury **Centaurium erythraea*, Hairy Hawkbit **Leontodon taraxacoides*, Coast Daisy *Brachyscome parvula*, Kidney-weed *Dichondra repens*, Pimpernel **Anagallis arvensis*, Cat's Ear **Hypochoeris radicata*, Sow-thistle **Sonchus oleraceus*, Angled Lobelia *Lobelia alata*, Shiny Swamp-mat *Selliera radicans*, Ivy-leaf Violet *Viola hederacea*, Common Woodruff *Asperula conferta*, Grassland Wood-sorrel *Oxalis perennans*, Buck's-horn Plantain **Plantago coronopus*, Bidgee-widgee *Acaena novae-zelandiae*, Spear Thistle **Cirsium vulgare* and Rough Fireweed *Senecio hispidulus*. A diversity of weed species may occur within this Coastal Tussock Grassland.

Shallow ephemeral swamp depressions occur within this EVC. The zone where the water recedes allows herbs to establish, which links these ephemeral sites to the Coastal Tussock Grassland. For mapping purposes, these sites will be incorporated in Coastal Tussock Grassland. In addition, Coastal Tussock Grassland near Port Campbell may occur as a mosaic with Coastal Headland Shrubland.

EVC 164 Creekline Herb-rich Woodland
Creekline Herb-rich Woodland is limited in extent and is found scattered across the drier sections of the Midlands region, often growing in association with Heathy Dry Forest, Grassy Dry Forest or Valley Grassy Forest.
It occurs on creek terraces of ephemeral streams. Altitudes vary from 250-600m asl and annual is rainfall generally less than 700mm. Major occurrences are in the Brisbane Ranges National Park, Enfield State Park and the north eastern section of Wombat State Forest.

Creekline Herb-rich Woodland is an open woodland of Swamp Gum *Eucalyptus ovata*, or the rare Yarra Gum *E. yarraensis,* with occasional Manna Gum *E. viminalis* and Narrow-leaf Peppermint *E. radiata*. Scattered shrubs such Blackwood *Acacia melanoxylon,* Silver Wattle *A. dealbata,* Large-leaf Bush-pea *Pultenaea daphnoides* or Sweet Bursaria *Bursaria spinosa* may be present along with clumps of Austral Bracken *Pteridium esculentum*. The ground has a dense covering of Common Tussock-grass *Poa labillardierei* with scattered herbs such as Cinquefoil Cranesbill *Geranium potentilloides*, Bidgee-widgee *Acaena novae-zelandiae*, Prickly Starwort *Stellaria pungens*, Fireweed Groundsel *Senecio linearifolius*, Kidney-weed *Dichondra repens* and Common Maidenhair *Adiantum aethiopicum*. The weeds Spear Thistle **Cirsium vulgare*, Sweet Vernal Grass **Anthoxanthum odoratum* and Yorkshire Fog **Holcus lanatus* are also common.

EVC 165 Damp Heath Scrub
Damp Heath Scrub occurs on flat to gently sloping terrain, on or near coastal sites near Port Campbell and in a number of widely distributed locations including Cooriemungle and Jancourt Forest/Hanson Plain public land blocks. During the pre-1750 vegetation mapping exercise, this EVC was modelled on an extensive flat near the coast between the Port Campbell National Park and the Cooriemungle public land block. This extends its distribution from the valley-type environments it commonly occupies in the extant examples on public land. High rainfall and lack of drainage of the tableland-like area combine to retain high levels of moisture throughout the year.

Floristically this EVC carries influences of Wet Heath. The overstorey is generally sparse and includes Swamp Gum *Eucalyptus ovata* and less commonly Brown Stringybark *E. baxteri*. The shrub layer is very dense and includes Prickly Tea-tree *Leptospermum continentale*, Silver Banksia *Banksia marginata*, Prickly Moses *Acacia verticillata*, Scrub She-oak *Allocasuarina paludosa*, Common Heath *Epacris impressa*, Scented Paperbark *Melaleuca squarrosa*, Dusty Miller *Spyridium parvifolium* and Honey-pots *Acrotriche serrulata*.

Other common species are Austral Grass-tree *Xanthorrhoea australis*, Spreading Rope-rush *Empodisma minus*, Slender Dodder-laurel *Cassytha glabella*, Common Rapier-sedge *Lepidosperma filiforme*, Screw-fern *Lindsaea linearis* and Honey Cone-bush *Isopogon ceratophyllus*.

EVC 177 Valley Slopes Dry Forest
Floristic Community 177-01 *Brisbane Ranges* Valley Slopes Dry Forest
Within the Midlands region Valley Slopes Dry Forest was only mapped in one tiny patch in the Brisbane Ranges National Park. It occurs on a steep east to southeast aspects on soils derived from Ordovician shales and sandstone. Soils are well-developed brown earths in contrast to skeletal soils on nearby steep slopes. Annual rainfall is 600mm, altitude is 300 to 400m asl.

The overstorey consists of Yellow Gum *Eucalyptus leucoxylon*, Red Stringybark *E. macrorhyncha,* Long-leaf Box *E. goniocalyx* and Red Box *E. polyanthemos*. There is no shrub layer, only scattered Golden Wattle *Acacia pycnantha* and Black Wattle *A. mearnsii*.

This EVC is characterised by a herb-rich ground stratum of species generally associated with extremely dry or rocky conditions such as Pigface *Carpobrotus* spp., Saloop Saltbush *Einadia hastata*, Nodding Saltbush, *E. nutans* and Austral Stonecrop *Crassula sieberiana* mixed with species usually associated with wetter or more fertile forests such as Kidney-weed *Dichondra repens*, Weeping Grass *Microlaena stipoides*, Austral Bear's-ears *Cymbonotus preissianus,* Scented Groundsel *Senecio odoratus*, Cotton Fireweed *S. quadridentatus* and Spear Thistle **Cirsium vulgare*.

EVC 178 Herb-rich Foothill Forest/Shrubby Foothill Forest Complex
Along the western edge of the Wombat State Forest near Barkstead a large area has been mapped as Shrubby Foothill forest/Herb-rich Foothill Forest Complex. This contains the diverse herb layer of EVC 23 Herb-rich Foothill forest while retaining the diverse shrub layer of EVC 45 Shrubby Foothill Forest. It is usually dominated by species that occur at the drier end of both EVCs.

EVC 181 Coast Gully Thicket
Coast Gully Thicket occurs along drainage lines and small creeks close to the coast. The soils are shallow sands grading to clay over limestone. Closed coastal scrub is a wind stressed environment as the prevailing south-west winds prune plants greater than three metres in height.

Swamp Gum *Eucalyptus ovata* and Messmate Stringybark *E. obliqua* are the dominant eucalypts and are short, wind pruned individuals. Some of the sites lack a eucalypt overstorey. A dense cover of Rough Guinea-flower Hibbertia aspera and Austral Bracken Pteridium esculentum dominates this EVC. Manuka *Leptospermum scoparium* also adds to the dense thicket, making it difficult for other plants to establish at ground level. Prickly Tea-tree *Leptospermum continentale* and Coast Beard-heath *Leucopogon parviflorus* occasionally contribute to the shrub layer. Easterly sites that offer some protection provide suitable conditions for tufted graminoids to establish such as Spiny-headed Mat-rush *Lomandra longifolia*, Black-anther Flax-lily (s.l.) *Dianella brevicaulis/revoluta*, Coast Saw-sedge *Gahnia trifida*, Tall Sword-sedge *Lepidosperma elatius* and Variable Sword-sedge

Lepidosperma laterale and Common Tussock-grass *Poa labillardierei*. Downy Dodder-laurel *Cassytha pubescens s.s.* takes advantage of the shrub structure and Mountain Clematis *Clematis aristata* is the other climber.

EVC 195 Seasonally Inundated Shrubby Woodland
Within the Midlands region Seasonally Inundated Shrubby Woodland was mapped only in a small area within Langi Ghiran State Park. It occurs on fine sandy clay loams in very shallow drainage depressions in conjunction with EVC 67 Alluvial Terraces Herb-rich Woodland. Altitude is 350m asl and average annual rainfall is 650mm. ..This EVC occurs more extensively to the west within the Grampians National Park

The overstorey is dominated by a woodland of Red Gum *Eucalyptus camaldulensis* and Yellow Box *E. melliodora* under which is a mosaic of relatively dense stands of Totem Poles *Melaleuca decussata*. Between these stands, much of the ground is bare, the fine sandy clay loams becoming hard baked over summer months.

Most prominent species in the ground stratum include Sedges such as Common Bog-sedge *Schoenus apogon*, Tiny Flat-sedge *Cyperus tenellus* and Dwarf Rush *Juncus capitatus*. Numerous forbs and grasses also occur within this EVC. The most common forbs are Pointed Centrolepis *Centrolepis aristata* Hairy Centrolepis *C. strigosa* ssp. *strigosa*, Sheep's Burr *Acaena echinata*, Black's Goodenia *Goodenia blackiana* and Wiry Mitrewort *Mitrasacme paradoxa*. The most common grasses are Bristly Wallaby-grass *Austrodanthonia setacea*, Kneed Wallaby-grass A. *geniculata,* Common Blown-grass *Agrostis avenacea*, Lesser Quaking-grass **Briza minor* and Five-awned Spear-grass *Pentapogon quadrifidus*.

EVC 198 Sedgy Riparian Woodland
Sedgy Riparian Woodland is mapped in both the Midlands and Otways study areas and will be described separately (below).

Midlands study area:
Sedgy Riparian Woodland is limited has a limited distribution within the Midlands area. It occurs in broad flat drainage lines, which may be seasonally inundated. Soils are generally recent Quaternary alluvial of varying depths. This EVC occurs in a wide range of altitudes and rainfall.

Sedgy Riparian Woodland usually has an overstorey of Swamp Gum *Eucalyptus ovata* or the rare Yarra Gum *E. yarraensis* over an open shrub layer of Blackwood *Acacia melanoxylon*, Prickly Moses *A. verticillata*, Prickly Tea- tree *Leptospermum continentale* and Wiry Bossiaea *Bossiaea cordigera.*

A very dense sward of Red-fruit Saw-sedge *Gahnia sieberiana* and/or Tall Sword-sedge *Lepidosperma elatius* often dominates the ground layer. Sometimes it is more open with scattered clumps of Spiny-headed Mat-rush *Lomandra longifolia* ssp. *longifolia* among a layer of small sedges, rushes and herbs including Spreading Rope-rush *Empodisma minus*, Club-sedges *Isolepis* spp Rushes *Juncus* spp. Slender Tussock-grass *Poa tenera,* Weeping grass *Microlaena stipoides,* Kidney-weed *Dichondra repens* and Prickfoot *Eryngium vesiculosum*.

Weed species are often present due to high soil fertility and ready availability of moisture. These include Yorkshire Fog-grass **Holcus lanatus*, Cat's ear **Hypochoeris radicata*, Sweet Vernal-grass **Anthoxanthum odoratum* and Perennial Thistle **Cirsium vulgare* are often present.

Otway study area:
Within the Otway study area Sedgy Riparian Forest occurs on riparian flats of creeks that are frequently inundated by flooding or along drainage lines carrying ephemeral streams. The soils are alluvial grey silty loams to silty clay loams. These soils are typically deep but occasionally shallow over a layer of clay. Average altitude is 110m asl and an average annual rainfall is 800mm. Some sites mapped as Sedgy Riparian Forest are not directly associated with creeks or drainage lines but occur upslope from these areas. These tend to have more herbs and grasses dominating the ground layer and less sedges, thereby expressing an affinity with EVC 23 Herb-rich Foothill Forest.

Generally this EVC is dominated by a Swamp Gum *Eucalyptus ovata* overstorey, 25 to 30m tall and is often associated with Messmate *Eucalyptus obliqua*. Prickly Tea-tree *Leptospermum continentale*, Prickly Moses *Acacia verticillata*, Scented Paperbark *Melaleuca squarrosa* and Prickly Currant-bush *Coprosma quadrifida* often form dense stands in the shrub layer.

A dense layer of sedges in the ground stratum is characteristic of this EVC. This layer is commonly comprised of Variable Sword-sedge *Lepidosperma laterale* var. *majus* though Red-fruit Saw-sedge *Gahnia sieberiana* and Thatch Saw-sedge *Gahnia radula* can also form dense stands.

More open sites allow herbs to establish such as Common Raspwort *Gonocarpus tetragynus*, Cat's ear *Hypochoeris radicata*, Shady Wood-sorrel *Oxalis exilis*, Bidgee-widgee *Acaena novae-zelandiae*, Ivy-leaf Violet *Viola hederacea*, Matted Pratia *Pratia pedunculata*, Kidney-weed *Dichondra repens* and Hairy Pennywort *Hydrocotyle hirta*. Austral Brooklime *Gratiola peruviana* is present at creek sites. Slender Tussock-grass *Poa tenera* and Forest Wire-grass *Tetrarrhena juncea* are the dominant grasses, with the occasional Yorkshire Fog **Holcus lanatus* and Weeping Grass *Microlaena stipoides* var. *stipoides*. Often Sedgy Riparian Woodland borders fertile farmlands and subsequently weedy herbs and grass species such as Cat's Ear *Hypochoeris radicata* and Yorkshire Fog **Holcus lanatus* are present

EVC 200 Shallow Freshwater Marsh
Shallow Freshwater Marsh occupies open sheets of water which are usually perennial although contract in size during the drier months. The degree of inundation, water depth and water availability at the periphery of the swamps changes seasonally. Shallow Freshwater Marsh also occurs on deep brown (anaerobic) silts where creeks and rivers broaden and flow slows as the water enters floodplains.

This EVC is a species poor and species grow in zones dependent on water depth and seasonality. Water-ribbons *Triglochin procerum* spp. agg. and *Myriophyllum* spp. dominate the deeper water and Tall Rush *Juncus procerus,* Fine/Soft Twig-sedge *Baumea arthrophylla/rubiginosa,* Pithy Sword-sedge *Lepidosperma longitudinale* and Running Marsh-flower *Villarsia reniformis* occupy more shallow water. Around the periphery of the swamp, Swamp Gum *Eucalyptus ovata* is the only eucalypt. Prickly Tea-tree *Leptospermum continentale,* Red-fruit Saw-sedge *Gahnia sieberi,* Soft Bog-sedge *Schoenus tesquorum, Amphibromus* spp., Creeping Raspwort *Gonocarpus micranthus* ssp. *micranthus* and Swamp Club-sedge *Isolepis inundata* also occur on the fringes of the swamp where water levels vary seasonally.

EVC 201 Shrubby Wet Forest
Within the Otways study area Shrubby Wet Forest is widely distributed. It occupies western and northern aspects and ridgelines and grows in association with EVC 30 Wet Forest where the elevation and rainfall within the study area decreases. Average annual rainfall is high at 1200mm, soils are fertile clay loams over medium to heavy clay and average altitude is 200m asl.

Shrubby Wet Forest differs from Wet Forest in generally having no epiphyte cover, a lower diversity of ground ferns, and Rough Tree-fern *Cyathea australis* is the common tree-fern, Soft Tree-fern *Dicksonia antarctica* occurring only rarely. In addition it has a higher diversity and cover of herbs due to increased light reaching the forest floor.

The overstorey is a tall forest dominated by Messmate *Eucalyptus obliqua*, Mountain Grey Gum *E. cypellocarpa* and Manna Gum *E. viminalis.* Blackwood *Acacia melanoxylon* and Hazel Pomaderris *Pomaderris aspera* form a lower tree layer.

The tall-shrub layer is dominated by mesic shrubs including Prickly Currant-bush *Coprosma quadrifida*, Musk Daisy-bush *Olearia argophylla*, Snow daisy-bush *O. lirata*, Hazel Pomaderris *Pomaderris aspera*, Tree Everlasting *Ozothamnus ferrugineus* and Austral Mulberry *Hedycarya angustifolia*. Prickly Moses *Acacia verticillata* and Hop Goodenia *Goodenia ovata* form a mid shrub layer. Tree-form Varnish Wattle *Acacia verniciflua* and Dwarf Silver Wattle *A. nano-dealbata* and the shrubs *Prostanthera melissifolia* and *Spyridium parvifolium* also commonly occur, their density varying, possibly in response to timber harvesting.

Rough Tree-fern *Cyathea australis* and Mother Shield-fern *Polystichum proliferum* are common ferns with Austral Bracken *Pteridium esculentum* dominating.

The ground layer may be sparse and includes the herbs Bidgee-widgee *Acaena novae-zelandiae*, Cinquefoil Cranesbill *Geranium potentilloides*, Ivy-leaf Violet *Viola hederacea*, Creeping Wood-sorrel *Oxalis corniculata*, *Galium* sp. and Forest Starwort *Stellaria flaccida*. Mountain Clematis *Clematis aristata* is the only climber and Tall Sword-sedge *Lepidosperma elatius* the only sedge. Forest Wire-grass *Tetrarrhena juncea* is commonly present and may dominate, often in response to disturbance.

EVC 203 Stony Rises Woodland
Stony Rises Woodland was only located at the Floating Islands Reserve along the Princes Highway west of Colac. The reserve has a history of grazing and much of it is in extremely poor condition and weed-invaded. Soils are derived from quaternary basalts and in some places may be absent where bedrock protrudes from the surface.

Structurally the vegetation is an open grassy woodland to 15m tall. The overstorey is dominated by Manna Gum *Eucalyptus viminalis* and Swamp Gum *E. ovata*. The shrub layer is scattered and includes Shiny Cassinia *Cassinia longifolia*, Blackwood *Acacia melanoxylon*, Tree Violet *Hymenanthera dentata*, Cherry Ballart *Exocarpos cupressiformis* ane the occasional Musk Daisy-bush *Olearia argophylla* surviving on rocky rises.

The ground layer is dominated by Common Tussock-grass *Poa labillardierei*, *Senecio* spp, Sickle Fern *Pellaea falcata*, Yorkshire Fog **Holcus lanatus*, *Geranium* spp, Spiny-headed Mat-rush *Lomandra longifolia* ssp. *longifolia*, Cat's Ear **Hypochoeris radiata*, **Aira* spp, Cleavers *Galium aparine*, *Pterostylis* spp and *Pelargonium* spp.

EVC 233 Wet Sands Thicket

Wet Sands Thicket has a limited distribution within the Otways study area and is restricted to areas that combine high rainfall with sandy Tertiary outwash geology. The average elevation is 200m asl and average annual rainfall is high at 1300mm where this EVC is best developed, dropping to 1000–1200mm in more marginal sites. The soils are characteristically deep, coarse grey sands.

The overstorey is a tall open forest dominated by Messmate *Eucalyptus obliqua*, Brown Stringybark *E. baxteri* and Blue Gum *E. globulus*, ranging in height from 30-50m. In the Cape Otway the rare Bog Gum *Eucalyptus kitsoniana* dominates. The shrub layer is characteristically dense to impenetrable and is strongly represented by Showy Bossiaea *Bossiaea cinerea*, Bushy Broom-heath *Monotoca glauca* and to a lesser extent by Forest Boronia *Boronia muelleri*, Victorian Christmas-bush *Prostanthera lasianthos*, Musk Daisy-bush *Olearia argophylla* and Scented Paperbark *Melaleuca squarrosa*. The ground layer is sparse to absent due to competition from the dense shrub stratum. Other characteristic species include Red-fruit Saw-sedge *Gahnia sieberiana*, Prickly Tea-tree *Leptospermum* continentale, Stinkwood *Zieria arborescens*, Handsome Flat-pea *Platylobium formosum*, Wiry Bauera *Bauera rubioides* and Austral Bracken *Pteridium esculentum*.

EVC 282 Shrubby Woodland

Floristic Community 282-03 *Brisbane Ranges* Shrubby Woodland

Brisbane Ranges Shrubby Woodland occurs in a small area of the Brisbane Ranges National Park on Tertiary sands and clays. It grows on the boundary between EVC 55 Plains Grassy Woodland and EVC 16 Lowland Forest. The area is flat, altitude 350m asl and average annual rainfall is 650mm.

The overstorey is dominated by Messmate *Eucalyptus obliqua* over a low, sparse, heathy shrub layer including Prickly Tea-tree *Leptospermum continentale*, Heath Tea-tree *L. myrsinoides*, Honey-pots *Acrotriche serrulata* and Common Beard-heath *Leucopogon virgatus*. The ground stratum is diverse and includes Hidden Violet *Viola cleistogamoides*, Trailing Goodenia *Goodenia lanata*, Creeping Bossiaea *Bossiaea prostrata*, Common Bog-sedge *Schoenus apogon*, Weeping Grass *Microlaena stipoides* and Yellow Rush-lily *Tricoryne elatior*.

Shrubby Woodland is similar to an area described as Herb-rich Heathy Woodland in Dergholm State Park (Rankin 1997).

EVC 351 Rocky Outcrop Shrubland/Herbland/Grassy Dry Forest Complex

Rocky Outcrop Shrubland/Herbland/Grassy Dry Forest Complex occurs on the steep north-western and western slopes of the Mt. Buangor State Park and the Mt. Cole State Forest. Soils are derived from granodiorite, are free draining, fertility limited by soil porosity. Altitude is 400-600m asl and mean annual rainfall around 700mm.

A variety of eucalypts form the overstorey including Messmate *Eucalyptus obliqua*, Eurabbie *E. globulus* ssp. *bicostata,* Long-leaf Box *E. goniocalyx* and Red Stringybark *E. macrorhyncha*.

The shrub layer is sparse and usually includes Sticky Hop-bush *Dodonaea viscosa* associated with other species such as Prickly Moses *Acacia verticillata*, Silver Wattle *A. dealbata*, Grey Everlasting *Ozothamnus obcordatus*, Sweet Bursaria *Bursaria spinosa* and Sticky Cassinia *Cassinia uncata.*

The ground layer is diverse in grasses and shrubs due to the combination of adequate moisture and fertile soils. Common include Hair-grass **Aira* spp., Quaking-grass **Briza* spp., Wallaby-grasses *Austrodanthonia* spp., Pimpernel **Anagallis arvensis*, Grassland Wood-sorrel *Oxalis perennans* and Hairy Pennywort *Hydrocotyle hirta*.

MIDLANDS & OTWAYS PRE-1750 VEGETATION DESCRIPTIONS

EVC 19 Riparian Shrubland
Riparian Shrubland occurs along streams with exposed bedrock, which may be granitic, metamorphic or basaltic in origin. These streams receive periods of seasonal flooding. In the pre-1750 mapping exercise this EVC was difficult to predict so modelling of its prior extent is based solely on remnants.

This EVC is a medium to tall shrubland that occupy the banks and the channel of the rocky creek. Species may include Silver Wattle *Acacia dealbata*, Blackwood *A. melanoxylon*, Woolly Tea-tree *Leptospermum lanigerum* Burgan *Kunzea ericoides* and Sweet Bursaria *Bursaria spinosa*. Common Reed *Phragmites australis* and Reeds *Juncus* spp. are an important component of the ground layer. Herbs of wet environments may appear seasonally. Species that may occupy the stream bank include Varnish Wattle *A. verniciflua*, Lightwood *A. implexa*, Rough Fireweed *Senecio hispidulus*, Grey Tussock-grass *Poa sieberiana* and Austral Bracken *Pteridium esculentum.* Trees may be irregularly scattered throughout but tend to be restricted to the banks. Trees may be irregularly scattered through, but tend to be restricted to the banks these include River Red Gum *Eucalyptus camaldulensis* at most sites and occasionally Swamp Gum *E. ovata.*

EVC 55 Plains Grassy Woodland
Plains Grassy Woodland has been largely cleared for agriculture or residential or commercial development or disturbed by grazing, as a result there are very few intact remnants on public land.

Within Midlands and Otway study area extant examples of Plains Grassy Woodland are small and fragmented and restricted to tiny areas, mainly on Tertiary sands/clays and Aeolian sands. Prior to European occupation this EVC once existed extensively across the study area. It occurred on a number of geologies over a wide rainfall range and was floristically variable. It has also been mapped over large areas as a mosaic with Plains Grassland.

The majority of Plains Grassy Woodland occurs on fertile, flat or gently undulating basalt plains and associated volcanic cones. Most of these plains have a rainfall of 550-650mm per annum. The overstorey consists of an open woodland dominated by Red Gum *Eucalyptus camaldulensis*. The ground-layer is dominated by Kangaroo Grass *Themeda triandra* with a diversity of grasses and herbs including Common Everlasting *Chrysocephalum apiculatum*, Yam Daisy *Microseris scapigera*, Scaly Buttons *Leptorhynchos squamatus* and Blue Devil *Eryngium ovinum*. In higher rainfall areas (over 700mm) across the northern section of the study area such as around Creswick, Ballan, Tylden, Macedon and Kilmore, the overstorey is dominated by Swamp Gum *E. ovata* and Candlebark *E. rubida*. However, as no good quality remnants of this type were found, it is not possible to typify the understorey. The lowest rainfall areas often have an overstorey of Grey Box *E. microcarpa* and/or Yellow Gum *E. leucoxylon* with a ground layer dominated by Wallaby *Austrodanthonia* spp. and Spear Grasses *Austrostipa* spp. Other common species include Windmill Grass *Chloris truncata*, Common Wheat-grass *Elymus scabra*, Weeping Grass *Microlaena stipoides*, Kidney-weed *Dichondra repens*, Black-anther Flax-lily *Dianella revoluta*, Saloop Saltbush *Einadia hastata*, Small-leaved Clematis *Clematis microphylla* and the shrubs Varnish Wattle *Acacia verniciflua*, Golden Wattle *A. pycnantha*, Tree Violet *Hymenanthera dentata* and Sweet Bursaria *Bursaria spinosa*.

On the drier plains west of Melbourne large areas of Plains Grassy Woodland were also modelled on Tertiary and Quaternary alluvial and colluvial soils washed over the basalt plains from the surrounding sedimentary hills. These areas tend to have low rainfall and have similar species to the low rainfall areas on basalt geology. Plains Grassy Woodland has also been modelled on sedimentary soils near the Lal Lal State Forest which are dominated by Manna Gum *E. viminalis* over Spear Grasses in the ground layer.

Floristic Community 55-06 *Riverina* Plains Grassy Woodland
Riverina Plains Grassy Woodland is a floristic community of Plains Grassy Woodland. It was once widespread across the Northern Plains of Victoria, from Birchip to Albury with isolated occurrences in dry rain shadow areas south of the Great Dividing Range. Because of its wide geographic range, it is likely that a number of sub-units existed within it. However, due to its suitability for grazing and agriculture, few undisturbed remnants remain for analysis.

Within the Midlands and Otway study areas *Riverina* Plains Grassy Woodland has been modelled for the pre-1750 mapping exercise in the far north-west, on the plains near the Pyrenees Ranges and in isolated pockets south of the Great Dividing Range on the western plains near Melton. In the north, *Riverina* Plains Grassy Woodland has been modelled on Quaternary alluvial flood plain deposits and in the south mainly on basalt plains in addition to some Quaternary colluvial deposits. Altitude ranges from 120-300m asl, rainfall is a low 500-550mm per annum.

Riverina Plains Grassy Woodland is an open woodland of Grey Box *Eucalyptus microcarpa* with scattered stands of Buloke *Allocasuarina luehmannii*. Extant remnants have few if any shrubs, however it is thought that this community may have been of a shrubby nature prior to European settlement. Shrubs recorded include Gold-dust wattle *Acacia acinacea*, Golden Wattle *A. pycnantha*, Sticky Wattle *A. verniciflua*, Sweet Bursaria *Bursaria spinosa*, Tree Violet *Hymenanthera dentata*, Drooping Cassinia *Cassinia arcuata* and Turkey Bush *Eremophila deserti*. The grassy understorey is dominated by Wallaby-grasses and Spear Grasses including Common Wallaby-grass *Austrodanthonia caespitosa*, Bristly Wallaby-grass *A. setacea*, Stiped Wallaby-grass *A. racemosa* and Spear-grasses including Rough Spear-grass *Austrostipa scabra* ssp. *falcata* and Kneed Spear-grass *A. bigeniculata*. Other common grasses include Windmill Grass *Chloris truncata*, Red-leg Grass *Bothriochloa macra*, Common Wheat-grass *Elymus scaber* and Grey Tussock-grass *Poa sieberiana*. Chenopods such as Nodding Saltbush *Einadia nutans*, Wingless Bluebush *Maireana enchylaenoides* and Ruby Saltbush *Enchylaena tomentosa* are also common along with Kidney-weed *Dichondra repens*, Black-anther Flax-lily *Dianella revoluta* and Small-leaved Clematis *Clematis microphylla*.

The best remnants of *Riverina* Plains Grassy Woodland in the Midlands and Otway study area are on the Eynesbury Estate south of Melton on private land and not accessible to the public.

EVC 56 Floodplain Riparian Woodland
During the pre-1750 mapping exercise Floodplain Riparian Woodland was modelled across the study area on major slow-moving rivers and creeks where they meander across the plains. Floodplain Riparian Woodland was mapped along the Barwon River and the lower reaches of the Leigh, Moorabool and Werribee Rivers and the Sutherland and Thompson Creeks. No fully intact remnants were found.
It covers the lowest, most frequently flooded terraces and generally encompasses a network of former channels and intermittent and permanent wetlands. Species composition and positioning within the EVC depends on the frequency of flooding and length of inundation of each area. Due to high levels of disturbance (natural and man-made), soil fertility, abundance of water and general accessibility and proximity to arable lands, few intact remnants of Floodplain Riparian Woodland remain and where they do occur, weeds are a dominant feature.

The overstorey is a tall woodland dominated by Red Gum *Eucalyptus camaldulensis* with occasional Manna Gum *E. viminalis* and Swamp Gum *E. ovata*. The shrub stratum is patchy and includes Silver Wattle *Acacia dealbata*, Black Wattle *A. mearnsii*, Tree Violet *Hymenanthera dentata*, River Bottlebrush *Callistemon sieberi*, and Woolly Tea-tree *Leptospermum lanigerum*. The ground layer is dominated by Common Tussock-grass *Poa labillardierei* on the drier elevated areas, with Common Reed *Phragmites australis*, Tall Sedge *Carex appressa*, Rushes *Juncus* spp., Spike Sedges *Eleocharis* spp. and Water-ribbons *Triglochin procerum* on inundated soils beside rivers. Herbs range from dryland herbs on the banks to aquatics in the river and wetland areas.

EVC 68 Creekline Grassy Woodland
Elsewhere in the State Creekline Grassy Woodland has been mapped across northern Victoria on minor creeks and tributaries on the lower slopes of the foothills and on small, intermittent creeks on the plains. During the pre-1750 mapping exercise this EVC was modelled in the study area in the driest areas, in the far north-west from Beaufort to Stawell and south of the Great Dividing Range on the drier plains, particularly just west of Melbourne and Geelong. In the north, it was mapped in association with Alluvial Terraces Herb-rich Woodland, *Low Rises* Grassy Woodland and Plains Grassy Woodland. In the south it was associated with Plains Grassland, Plains Grassy Woodland and various wetland EVCs. Soils are usually Quaternary stream alluvium and rainfall is generally less than 600mm per annum.

No intact examples of Creekline Grassy Woodland were found in the Midlands and Otway study areas. From the few remnants seen it was assumed to be the same EVC as described by Muir *et. al.* (1995) in the Box-Ironbark Region (which is similar to the Goldfields Region currently under review by the Environment Conservation Council) and by Berwick (in press) in the Goulburn-Broken Catchment Management Authority (CMA) Region.

The overstorey is dominated by Red Gum *Eucalyptus camaldulensis* with a scattered shrub layer of Black Wattle *Acacia mearnsii*, Blackwood *A. melanoxylon* and Sweet Bursaria *Bursaria spinosa*. The ground layer is dense with grasses and sedges, most commonly Common Tussock-grass *Poa labillardierei*, Weeping Grass *Microlaena stipoides*, Kangaroo Grass *Themeda triandra*, Common Wheat-grass *Elymus scabra*, Common Blown-grass *Agrostis avenacea*, Tall Sedge *Carex appressa* and Rushes *Juncus* spp.

EVC 69 Metamorphic Slopes Shrubby Woodland
Within the Midlands and Otway study areas Metamorphic Slopes Shrubby Woodland has been modelled in the pre-1750 mapping exercise in only four tiny patches in the far north-west between Landsborough and Ararat. No intact remnants exist within this study area but these sites had the same distinctive geology and landform on which this EVC occurs in the nearby Goldfields region. Metamorphic Slopes Shrubby Woodland occurs on rocky slopes of contact metamorphosed ridges adjacent to granitic plutons. These slopes have stony soils and fractured bedrock resulting in high permeability to water and low effective rainfall. Actual rainfall is also low, approximately 500-550mm per annum. Altitude is 300m asl.

In the Goldfields/Box-Ironbark region, these dry slopes support a very low open woodland with a dense layer of medium to tall shrubs. The overstorey is usually Grey Box *Eucalyptus microcarpa* although Drooping She-oak *Allocasuarina verticillata* can sometimes dominate. The shrub layer includes Sticky Hop-bush *Dodonaea viscosa*, Flame Heath *Astroloma conostephioides*, Daphne Heath *Brachyloma daphnoides* and Silky Guinea-flower *Hibbertia sericea* with different species dominating in different areas. The ground layer can be sparse with scattered grasses, forbs and low shrubs such as Cranberry Heath *Astroloma humifusum*, Wattle Mat-rush *Lomandra filiformis*, Spoon Cudweed *Stuartina muelleri*, Tall Raspwort *Gonocarpus elatus*, Rough Spear-grass *Austrostipa scabra* ssp. *falcata* and Supple Spear-grass *A. mollis*. It is assumed similar species would occur at the Midlands and Otways sites.

EVC 93 Broombush Mallee
Within the Midland and Otway study areas Broombush Mallee was modelled as part of the pre-1750 mapping exercise in only a single location, in the far north-west, on a north-west facing ridge, on Ordovician sediments. Soils are infertile, skeletal and stony. Rainfall is low, 500-550mm per annum with effective rainfall even lower. Altitude is approximately 300m asl. This EVC is widespread north of the study area in the Goldfields/Box-Ironbark Region.

Remnant Broombush Mallee at this site consists of a low open canopy of Green Mallee *Eucalyptus viridis* with a dense low shrub layer of Flame Heath *Astroloma conostephioides* and Daphne Heath *Brachyloma daphnoides*. Other species likely to have been present include Twiggy Bush-pea *Pultenaea largiflorens*, Grey Everlasting *Ozothamnus obcordatus* and Gold-dust Wattle *Acacia acinacea*. The ground layer is very sparse and species poor and includes Bristly Wallaby-grass *Austrodanthonia setacea* and Black-anther Flax-lily *Dianella revoluta*.

EVC 104 Lignum Wetland
Lignum Wetland is common across the arid areas of north-western Victoria, however within the Midlands and Otways study areas it is restricted to tiny areas scattered across the plains from Bacchus Marsh to Melton to south of Geelong. Rainfall in this area is very low (500-550mm per annum). Lignum Wetland generally occurs within areas of Plains Grassland, on swamp and lagoonal deposits and quaternary stream alluviums deposited in minor depressions on the basalt volcanic plains. Soils are very heavy grey clays, waterlogged for much of the year but also experience periods of extreme dryness. Species diversity is very low as few plants can thrive in these conditions.

Lignum Wetland is a shrubland dominated Tangled Lignum *Muehlenbeckia florulenta*. Ground species include Common Spike-sedge *Eleocharis acuta,* Sharp Club-sedge *Schoenoplectus pungens*, Brown-back Wallaby-grass *Austrodanthonia duttoniana*, Yellow Rush *Juncus flavidus*, Large-fruit Tassel *Ruppia megacarpa* and Common Nardoo *Marsilea drummondii*.

Wetlands are complex by nature, with distinct zonation patterning dependent on water depth and period of inundation. Most have been severely disturbed by drainage and dam building works in addition to heavy grazing and weed invasion. As a result they are difficult to classify. It is likely that Lignum Wetland is a complex of a number of different entities. Of the wetlands mapped as Lignum Wetland in the Midlands and Otways study area, some are freshwater, some are slightly brackish and some, with less extreme soil conditions and hence more species, have close affinities with Plains Grassy Wetland.

EVC 125 Plains Grassy Wetland
The pre-1750 extent of Plains Grassy Wetland was in very shallow depressions on the northern alluvial plain, scattered across the riverina bioregion and amongst the grassy woodlands of the basalt plateaus south west of Seymour. Average annual rainfall is less than 700mm. Some of the areas modelled are meanders of prior streams, others are discrete depressions. The unifying feature is the heavy clay soil that holds moisture as distinct from the more free-draining soils of the adjacent terrestrial vegetation. Inundation is periodic over the winter months alternating with dry periods during the summer months

This EVC is a (usually) treeless shallow seasonal wetland. River Red Gum *Eucalyptus camaldulensis* may occur on perimeter or, less frequently, scattered throughout. Structure is generally grassland, grading into sedgeland or herbland. Species present include a range of herbs and grasses that tolerate the seasonally inundated conditions. Aquatic species may be recorded during periods of inundation.

Grasses present include species include Veined Swamp Wallaby-grass *Amphibromus nervosus*, Brown-back Wallaby-grass *Austrodanthonia duttoniana*, Common Blown Grass *Agrostis avenacea,* Rigid Panic *Homopholis proluta*, and Forde Poa *Poa fordeana.* Barren Cane Grass *Eragrostis infecunda* may also be present. Herbs include Drumsticks *Pycnosorus globosus,* Swamp Daisy *Brachyscome basaltica* var. *gracilis*, Hairy Willow-herb *Epilobium hirtigerum*, Rough Raspwort *Haloragis aspera*, Common Sneezeweed *Centipeda cunninghamii,* Small Loosestrife *Lythrum hyssopifolia*, Buttercups *Ranunculus* spp., Poison Lobelia *Lobelia pratioides*, Sprawling Bluebell *Wahlenbergia gracilis* s.l., River Bluebell *W. fluvialis* and Slender Monkey-flower *Mimulus gracilis.* Aquatic species typical of inundated sites include Common Nardoo *Marsilea drummondii,* Water Plantain *Alisma plantago-aquatica,* Pacific Azolla *Azolla filiculoides,* Ferny Azolla *Azolla pinnata*, Western Water Starwort *Callitriche cyclocarpa,* Common Spike-sedge *Eleocharis acuta*, Swamp Lily *Ottelia ovalifolia,* Upright Milfoil *Myriophyllum crispatum*, Tiny Milfoil *Myriophyllum integrifolium*, Ridged Milfoil *Myriophyllum porcatum* and Amphibious Milfoil *Myriophyllum simulans*. Rushes and sedges include Hollow Rush *Juncus amabilis*, Toad Rush *Juncus bufonius*, Yellow Rush *Juncus flavidus*, and Joint-leaf Rush *Juncus holoschoenus*. Rush Sedge *Carex tereticaulis* may dominate wetter areas.

Significant species include Stiff Groundsel *Senecio behrianus* (endangered in Victoria and Australia), Barren Cane Grass *Eragrostis infecunda* (vulnerable in Australia), Water Starwort *Callitriche cyclocarpa* (vulnerable in Victoria and Australia) and Ridged Milfoil *Myriophyllum porcatum* (vulnerable in Victoria and Australia).

EVC 132 Plains Grassland
During the pre-1750 mapping exercise within the Midlands and Otway study areas Plains Grassland was modelled on the dry basalt plains immediately north and west of Melbourne. It has also been modelled across large sections of the western volcanic plains as a mosaic with Plains Grassy Woodland. A vast majority has been cleared for agriculture and settlement and it now only occurs as small, isolated and disturbed remnants, mainly on road and rail reserves. Altitude is usually less than 200m asl (to 400m near Mt Wallace). Rainfall is generally 500-550mm per annum (to 650mm near Meredith). Soils are heavy grey cracking clays that are often waterlogged in winter. The combination of these soils with low rainfall severely restricts tree-root growth resulting in virtually treeless plains.

The ground flora is generally visually dominated by grasses but species diversity and composition can vary greatly, largely depending on past management practices in the are, particularly past fire and grazing regimes. The most common species include Kangaroo Grass *Themeda triandra,* Lemon Beauty-heads *Calocephalus citreus*, Pink Bindweed *Convolvulus erubescens,* Scaly Buttons *Leptorhynchos squamatus*, Blue Devil *Eryngium ovinum*, Prickly Woodruff *Asperula scoparia*, Common Everlasting *Chrysocephalum apiculatum*, Wallaby Grasses *Austrodanthonia* spp. Long-hair Plume-grass *Dichelachne crinita* and Cut-leaf Goodenia *Goodenia pinnatifida*.

EVC 140 Mangrove Shrubland
Within the Midlands and Otways study areas Mangrove Shrubland was only mapped in tiny patches along the coast and in river estuaries from Altona Bay to Barwon heads. Altitude is at or just above sea level, rainfall is approximately 550-600mm per annum.

Mangrove Shrubland grows in saline waters, usually on mud flats within the tidal zone. Mangroves are common in this environment in warmer parts of Australia. Here they are near their southern-most limit and rarely grow over 1.5m in height. Mangrove Shrubland is often monospecific, dominated by White Mangrove *Avicennia marina* var. *australasica* This EVC is usually surrounded by or associated with Coastal Saltmarsh Complex.

EVC 175 Grassy Woodland
Within the Midlands and Otways study areas the pre-European extent of Grassy Woodland was modelled across large areas, on a variety of geologies and in a range of environments. All Grassy Woodlands, not considered part of the plains were placed in this group. It is therefore, a very broad EVC which encompasses a number of floristic communities, further sampling and analyses are required to resolve these groupings.

In general, Grassy Woodlands grow in areas with moderate to low rainfall and relatively fertile soils. The largest area of Grassy Woodland modelled is on the eastern section of the Otway Plain (including the Bellarine Peninsula). This is a large area of gently undulating plains extending from Portarlington to Colac. Geology is Tertiary sands, altitude is generally below 250m and the average annual rainfall varies from a low of 550mm per annum near Torquay to 700mm at Colac. The same land form and geology

continues further west but with increased rainfall that supports forested communities. In the drier eastern sections, the overstorey is dominated by Drooping She-oak *Allocasuarina verticillata* with Manna Gum *Eucalyptus viminalis* and Black Wattle *Acacia mearnsii*. The shrub layer is sparse and includes scattered Golden Wattle *Acacia pycnantha* and Sweet Bursaria *Bursaria spinosa*. The ground layer is likely to have been dominated by Wallaby-grasses *Austrodanthonia* spp. and Spear Grasses and *Austrostipa* spp. As rainfall increases to the west, Drooping She-oak and shrubs disappear, Manna Gum *E. viminalis* and Blackwood *Acacia melanoxylon* become dominant in the overstorey and Kangaroo Grass *Themeda triandra* dominates the ground layer.

Other areas mapped as Grassy Woodland include:
Tthe Barrabool Hills just southwest of Geelong. Low but highly dissected hills of Cretaceous sandstone. Rainfall is low and the few remnants suggest the vegetation was similar to the nearby drier sections of the Otway Plain. Whether the steep sided valleys had the same vegetation as the flatter hill tops was not clear. These hills have been virtually completely cleared.

The Pentland Hills, north west of Bacchus Marsh. Steeply dissected hills of highly weathered Tertiary volcanic soils ranging from an altitude of 200m asl and 500mm annual rainfall at Bacchus Marsh to 500m and 700mm at Greendale. The overstorey is dominated by scattered Candelbark *Eucalyptus rubida* and Swamp Gum *E. ovata* near Greendale and of White Cypress Pine *Callitris glaucophylla* on steep and otherwise bare scree slopes near Bacchus Marsh. Blackwood *Acacia melanoxylon* and Black Wattle *A. mearnsii* are present throughout.

Low hills just east of the Bamganie State Forest (southwest of Meredith). Gently undulating hills of Ordovician sediments and Tertiary fluvial gravels and silts. Altitude is 300m asl and mean annual rainfall is approximately 650mm. The overstorey is dominated by Manna Gum *Eucalyptus viminalis* with patches of Swamp Gum *E. ovata* and scattered tall shrubs including Blackwood *Acacia melanoxylon*, Black Wattle *A. mearnsii* and Black She-oak *Allocasuarina littoralis*. The ground layer is dominated by Spear-grasses *Austrostipa* spp. with Wallaby-grasses *Austrodanthonia* spp., Kangaroo Grass *Themeda triandra,* Black-anther Flax-lily *Dianella revoluta* and Honey-pots *Acrotriche serrulata*.

Kongaderra Hills north of Mickleham. Low, undulating of hills of Silurian sediments (marine sandstones and siltstones) with an altitude range of 200-300m asl. Rainfall is approximately 600mm per annum. These hills are now virtually devoid of trees. Remnants include scattered Yellow Box *Eucalyptus melliodora* on lower slopes and gullies leading into Deep Creek and Red Gum *E. camaldulensis* in the creek itself in addition to a few Grey Box *E. microcarpa* and Drooping She-oak *Allocasuarina verticillata*. Shrubs are common along the roadside reserves including Blackwood *Acacia melanoxylon*, Hedge Wattle *A. paradoxa,* Black Wattle *A. mearnsii,* Golden Wattle *A. pycnantha* and Lightwood *A. implexa*. The ground layer is dominated by grasses, particularly Spear-grasses *Austrostipa* spp., Wallaby-grasses *Austrodanthonia* spp. and Kangaroo Grass *Themeda triandra*, with Tussock-grasses *Poa* spp., Weeping Grass *Microlaena stipoides* and Common Wheat-grass *Elymus scaber*.

Floristic Community 175-04 *Low Rises* Grassy Woodland
Low Rises Grassy Woodland was once widespread across north-central Victoria where it occurred on the boundary between the plains (usually *Riverina* Plains Grassy Woodland) and the dry forests (usually Box-Ironbark Forest) of the low hills. It has been largely cleared for agriculture and is described by Muir *et al*. (1995).

Within the pre-1750 mapping exercise for the Midland and Otways study areas *Low Rises* Grassy Woodland was modelled in the far northwest, around Ararat, Stawell and the Pyrenees Ranges and in a small, isolated area south of the Great Dividing Range in the dry rain shadow areas near Melton. *Low Rises* Grassy Woodland occurs on the lowest of rises on the boundary between the infertile Ordovician sediments of the hills and the more fertile Quaternary alluvial and colluvial geologies of the plains. Altitude varies from 200 to 300m, rainfall is generally below 550mm per annum.

The overstorey is dominated by Grey Box *Eucalyptus microcarpa*, though Yellow Gum *E. leucoxylon* may be co-dominant and Yellow Box *E. melliodora* is occasionally present. The shrub layer can be sparse or dense but is generally low and lacks diversity. Species include Sticky Wattle *Acacia verniciflua*, Gold-dust Wattle *A. acinacea,* Golden Wattle *A. pycnantha*, Drooping Cassinia *Cassinia arcuata*, Grey Everlasting *Ozothamnus obcordata* and Moonah *Melaleuca lanceolata*. The ground layer is often sparse but diverse in grasses and forbs including Spear-grasses *Austrostipa* spp., Wallaby-grasses *Austrodanthonia* spp. Grey Tussock-grass *Poa sieberiana*, Common Wheat-grass *Elymus scaber*, Windmill Grass *Chloris truncata*, Saloop *Einadia hastata*, Fuzzy New Holland Daisy *Vittadinia cuneata,* Pink Bindweed *Convolvulus erubescens*, Shiny Everlasting *Bracteantha viscosa* and Small-leaved Clematis *Clematis microphylla*.

Floristic Community 175-10 *Lunette* Grassy Woodland
Lunette Grassy Woodland has been modelled on crescent-shaped rises of Quaternary aeolian sands. These lunettes are found on the eastern shore of existing or past lakes from which they are derived, blown from the lake beds during dry periods. It is usually modelled in association with Plains Grassy Woodland, Stony Rises Herb-rich Woodland or Swamp Scrub. Mean annual rainfall ranges is approximately 550-700mm. No remnants of this community were observed, its pre-1750 extent has been modelled to follow Quaternary lunette geology. Other EVCs which also occupy lunettes are Sand Forest and Damp Sands Herb-rich Woodland from which Lunette Grassy Woodland is modelled by the absence of Austral Bracken *Pteridium esculentum* which occurs in these two EVCs and is rarely ever eradicated, regardless of disturbance. Environmental factors influencing their distribution are possibly depth of sand and drainage patterns.

Floristic Community 175-11 *Granitic* Grassy Woodland
Granitic Grassy Woodland is a highly variable group and represents all Grassy Woodlands occurring on granite geologies within the study area. Variability in the structure and mineralogy of different granites (particularly clay content) impacts on the fertility and water holding capacity of the derived soils which in turn influences the vegetation present at a site. *Granitic* Grassy Woodland occurs on highly weathered granites, on gentle to flat topography and in moderate rainfall areas. Within the pre-1750 mapping exercise for the Midlands and Otways study areas, *Granitic* Grassy Woodland was modelled in only a few, small areas. The largest of these is in the Flagstaff Hill area, west of Linton where altitude ranges from 300-450m asl and average annual rainfall is approximately 650mm. In remnants the overstorey is dominated by Manna Gum *Eucalyptus viminalis* with Messmate Stringybark *E. obliqua*. The ground layer is rich in grasses and forbs. Common species include Kangaroo Grass *Themeda triandra*, Common Wheat-grass *Elymus scabra*, Wallaby-grasses *Austrodanthonia* spp., Grey Tussock-grass *Poa sieberiana*, Velvet Tussock-grass *P. rodwayi*, Bidgee-widgee *Acaena novae-zelandiae*, Common Everlasting *Chrysocephalum apiculatum*, Stinking Pennywort *Hydrocotyle laxiflora* and Common Rice-flower *Pimelea humilis*.

This floristic community was also modelled in the Yendon/Mt Egerton area where altitude ranges from 480-540m asl and rainfall is approximately 700-800mm per annum. In remnants, the overstorey varies from open woodland towards open forest. It is dominated by Manna Gum *Eucalyptus viminalis* and Narrow-leaf Peppermint *E. radiata* with scattered Swamp Gum *E. ovata* and Snow Gum *E. pauciflora* and the understorey tree/shrub Blackwood *Acacia melanoxylon*. The ground layer is diverse and includes Tussock-grasses *Poa* spp., Wallaby-grasses *Austrodanthonia* spp., Reed Bent-grass *Deyeuxia quadriseta*, Weeping Grass *Microlaena stipoides*, Yellow Rush-lily *Tricoryne elatior*, Austral Bracken *Pteridium esculentum* and Common Rice-flower *Pimelea humilis*.

EVC 196 Seasonally Inundated Sub-saline Herbland
The following description is from Yugovic (1985).

Within the Midlands and Otways study area Seasonally inundated Sub-saline herbland was only mapped in the Lake Connewarre State Game Reserve south of Geelong which is the only known location of this EVC in Victoria. Here it occupies the centre of a broad shallow basin, the relict of a former tidal lagoon. The area is totally surrounded by Coastal Saltmarsh Complex, it is not affected by tides, however a shallow brackish lake forms over the herbland for several months following major floods of the Barwon River (two kilometres to the north). The soil is a grey silty clay. The geology is recent aeolian estuarine sands and the rainfall is approximately 600 mm per annum.

The low, prostrate shrub Silky Wilsonia *Wilsonia humilis* dominates this EVC, forming extensive, almost pure stands. Narrow-leaf Wilsonia *W. backhousei* and Round-leaf Wilsonia *W. rotundifolia* are common in depressions at the southern end of the herbland.

EVC 200 Shallow Freshwater Marsh
During the pre-1750 vegetation mapping exercise, evidence of this EVC was found on a different geology to that of extant vegetation. This was swamp and lagoonal deposits within the newer volcanics, whereas extant examples were found on stream alluvium and depressions within tertiary sand areas. In both cases the soils are deep anaerobic silts. It was identified within the grounds of the Avalon Airport, approximately 15 km north east of Geelong. Due to lack of intact remnants in the pre-1750 area, species are presumed to be similar to extant examples.

EVC 203 Stony Rises Woodland
Stony Rises Woodland is found on Quaternary volcanics of the western volcanic plains of Victoria where lava tunnels have collapsed forming a mosaic of rocky woodland and wetlands. These wetlands are typically Plains Sedgy Wetland.

Stony Rises Herb-rich woodland was only identified on public land in a tiny area at the Floating Islands Flora Reserve to the south of Lake

Corangamite. During the pre-1750 vegetation mapping exercise it was modelled extensively to follow the Quaternary volcanic stony-rise geology. Soils are fertile clays though often shallow and rocky. The topography is undulating and the mean annual rainfall varies from approximately 550-700mm. Much of the prior extent of this EVC has been cleared for agriculture.

The overstorey is a woodland of Manna Gum *Eucalyptus viminalis* ssp. *viminalis* over a ground layer dominated by Austral Bracken *Pteridium esculentum* and Common Tussock-grass *Poa labillardierei.* Frequently occurring shrubs are Tree Violet *Hymenanthera dentata* and Blackwood *Acacia melanoxylon*.

EVC 283 Plains Sedgy Woodland
In the Midlands and Otways study area Plains Sedgy Woodland was only identified in one location on the western basalt plains, halfway between Beaufort and Streatham. Altitude is 320m asl, average annual rainfall is approximately 550mm and soils are the heavy grey clays associated with the basalt geology of the western volcanic plains.

Within this study area remnant Plains Sedgy Woodland is so disturbed and weed-infested adequate sampling was not possible. Generally the overstorey is sparse Red Gum *Eucalyptus camaldulensis* and a ground layer dominated by sedges including *Juncus* Joint-leaf Rush *Juncus holoschoenus*, Finger Rush *J. subsecundus*, Hollow Rush *J. amabilis*, Sword Sedge *Lepidosperma* spp., Tall Sedge *Carex appressa*, Common Blown Grass *Agrostis avenacea*, Wetland Wallaby-grass *Austrodanthonia semiannularis* and Poison Lobelia *Lobelia pratioides*. This EVC was mapped extensively in the greater Grampians area, see Tumino and Roberts (1998) for a full description.

EVC 291 Cane Grass Wetland
Cane Grass Wetlands are shallow (~1m in depth) and occur on the northern alluvial plain in depressions with a clay soil base. The period of inundation lasts for approximately 4-6 months.

Structurally this EVC is an open swamp or shallow freshwater marsh dominated by Barren Cane Grass *Eragrostis infecunda* (vulnerable in Victoria) with other occasional species including Spiny Flat-sedge *Cyperus gymnocaulos*, Common Spike-sedge *Eleocharis acuta*, Upright Milfoil *Myriophyllum crispatum*, Red Milfoil *M. verrucosum* and Floating Pondweed *Potamogeton tricarinatus*. The outer periphery of the swamp may be fringed with a woodland of River Red Gum *Eucalyptus camaldulensis* and occasionally Grey Box *E. microcarpa*. The outer verge may be may be more diverse and grade into Plains Grassy Wetland or Plains Grassy Woodland.

EVC 300 Reed Swamp
Reed Swamp has only been mapped in one location in the Midlands and Otways study areas, in the Lake Connewarre State Game Reserve, south of Geelong, where it covers much of Reedy Lake. It occurs on Quaternary sedimentary geology of mainly estuarine sands. The soils are peaty, silty clays and average annual rainfall is approximately 600mm. Reed Swamp requires shallow water (to 1m deep) and low current-scour. It can only tolerate very low levels of salinity. It occupies approximately 5 square kilometres of the centre of Reedy Lake. The more saline margins of the lake support Coastal Saltmarsh Complex and Cane Grass-Lignum Halophytic Herbland.

Reed Swamp is a closed to open grassland/sedgeland dominated by Common Reed *Phragmites australis* to 2-3m tall. Amongst the Common Reed are more open areas of tall sedges to 2m including Cumbungi *Typha orientalis*, River Club-sedge *Schoenoplectus validus* and Tall Spike-sedge *Eleocharis sphacelata*. Also growing in these less shaded areas are small species such as Swamp Crassula *Crassula helmsii*, Water Buttons **Cotula coronopifolia* and the floating species Pacific Azolla *Azolla filiculoides* and Common Duckweed *Lemna minor*.

EVC 311 Berm Grassy Shrubland
Within the Midlands and Otways pre-1750 mapping exercise Berm Grassy Shrubland was only modelled as a very narrow strip along 14 km of coastline from Seaholme to the western edge of the Point Cook RAAF Base. Within this narrow strip, areas of Berm Grassy Shrubland were too small to map at 1:100 000 scale and so have been mapped as a mosaic with Coastal Saltmarsh Complex, Mangrove Shrubland and Coastal Tussock Grassland. Rainfall in this area is approximately 500-550mm per annum and altitude is generally less than 1m asl. No fully intact examples of this EVC were located. It has been mapped and described in the Gippsland Regional Forest Agreement study area in south Gippsland on Margaret Island in Shallow Inlet.

Berm Grassy Shrubland occurs on 'berms', which are the low dunes just beyond the high tide mark and are formed by wave action and are continually reworked by the waves. They tend to form on beaches with insufficient sand to form full-scale dunes that generally support the closely related EVC Coastal Dune Scrub.

Berm Grassy Shrubland consists of a low windswept shrub layer of Coastal Saltbush *Atriplex cinerea* and Seaberry Saltbush *Rhagodia candolleana*. Other species likely to occur include Coast Fescue *Festuca littoralis*, Variable Groundsel *Senecio pinnatifolius*, Rounded Noon-flower *Disphyma crassifolium* Beaded Glasswort *Sarcocornia quinqueflora,* Knobby Club-sedge *Isolepis nodosa* and Bidgee-widgee *Acaena novae-zelandiae.*

EVC 851 Stream-bank Shrubland
Stream-bank Shrubland was not recognised during the extant vegetation mapping exercise where it was mapped as Riparian Forest/Riparian Shrubland Mosaic. Subsequent work during the pre-1750 mapping exercise identified quality intact remnants in the Midlands and Otways study area on the Moorabool River at the Meredith-Steiglitz Road crossing and along the gorge sections of the Werribee and Lerderderg Rivers.

Pre-1750, this EVC has been modelled throughout the study area on rivers and major streams on basalt geology or on sediments where the watercourse has cut into the underlying rock, producing rocky banks and a flat rocky stream-bed and in the larger rivers on broad gravel banks which are often dry but subject to regular flooding by fast-flowing waters.
Where watercourses cut deeply into basalt, the upper banks (beyond the reach of floodwaters) often support Escarpment Shrubland. Where they cut deeply into sediments as in the Werribee and Lerderderg Gorges, the upper banks often support *Midlands Escarpments* Shrubby Dry Forest. Annual rainfall is usually below 700mm.

The overstorey is generally sparse, usually consisting of Manna Gum *Eucalyptus viminalis* or Red Gum *E. camaldulensis* though Blue Gum *E. globulus* and Swamp Gum *E. ovata* have also been recorded. The shrubs layer is the dominant stratum and includes Woolly Tea-tree *Leptospermum lanigerum* and River Bottlebrush *Callistemon sieberi* amongst the rocks on the stream bed, and Sweet Bursaria *Bursaria spinulosa*, Tree Violet *Hymenanthera dentata*, Shiny Cassinia *Cassinia longifolia* and Hop Goodenia *Goodenia ovata* occupying the stream banks. Other common species among the rocks and gravel on the stream bed are Bidgee-widgee *Acaena novae-zelandiae*, Willow-herb *Epilobium* spp., *Carex polyantha* and Spiny-headed Mat-rush *Lomandra longifolia*.

EVC 858 Calcarenite Dune Woodland
Within the Midlands/Otways study area, Calcarenite Dune Woodland is restricted to coastal and near coastal areas from Torquay to Altona Bay. It commonly occurs on the landward side of primary dunes and adjacent to Coastal Saltmarsh Complex in estuarine environments. It occurs on a variety of geologies and soil types Annual rainfall is approximately 550-600mm.

The overstorey is a dense woodland of Moonah *Melaleuca lanceolata* over a shrub layer including Wirilda *Acacia retinodes*, Coast Beard-heath *Leucopogon parviflorus*, and Thyme Rice-flower *Pimelea serpyllifolia* and a sparse understorey of Blue Tussock-grass *Poa poiformis*, Bower Spinach *Tetragonia implexicoma*, Seaberry Saltbush *Rhagodia candolleana* and Small-leaved Clematis *Clematis microphylla*.

EVC 863 Floodplain Reedbed
Floodplain Reedbed was identified in only one location in the Midlands and Otways study areas, in Craven, Costin and Hordern Lakes that are on the broad swampy flats of the lower reaches of the Aire River. It occurs in the slightly deeper areas of inundation on these flats. The remainder of the flats was mapped as Swamp Scrub. Soils are Quaternary swamp and lagoonal deposits of clays, silts and peat. Altitude is just above sea level (less than 5m). Rainfall is greater than 1000mm per annum.

A dense sward of Common Reed Phragmites australis to 2m tall dominates this EVC. Other species recorded include Sea Rush *Juncus kraussii*, Creeping monkey-*flower Mimulus repens*, Water Buttons **Cotula coronopifolia,* Australian Gipsywort *Lycopus australis* and Water-ribbons *Triglochin procerum*.

EVC 891 Plains Brackish Sedge Wetland
Within the Midlands and Otways study areas Plains Brackish Sedge Wetland was only identified in the Lake Connewarre area south of Geelong. It occurs on flat to very gently sloping terrain in a strip around the southern edge of Reedy Lake. The width of this strip varies from a few meters to over 100m and is dependent on the degree of slope into the lake. This EVC appears to be very site-specific as it does not occur around the slightly more saline shores of nearby Lake Connewarre. The Quaternary aeolian geology mainly consists of estuarine sands. Annual rainfall is approximately 600mm.

Plains Brackish Sedge Wetland is grows in association with Reed Swamp, Plains Freshwater Sedge Wetland and Coastal Saltmarsh Complex. It is a closed sedgeland to 80 cm tall dominant by Sharp Club-sedge *Schoenoplectus pungens*, Creeping Cotula *Leptinella reptans* and River Buttercup *Ranunculus rivularis*. Swamp Crassula *Crassula helmsii* and Common Spike-sedge *Eleocharis acuta* are less common.

EVC 895 Escarpment Shrubland
Within the Midlands and Otways study area Escarpment Shrubland has been identified on escarpments associated with the edges of basalt flows or where watercourses have cut through a basalt capping. It occurs in lower rainfall areas or where effective rainfall is low, for example. steep west-facing escarpments. Prior to European settlement it is thought to have been scattered across the volcanic areas of the Midlands region. No extant quality intact examples of this EVC were identified and in the pre-1750 mapping exercise many of its prime habitat sites were too small to be mapped at 1:100 000 scale.

Species present varies depending on soil and water availability, cover is often sparse. Common shrubs include Tree Violet *Hymenanthera dentata*, Varnish Wattle *Acacia verniciflua*, Lightwood *A. implexa*, Hedge Wattle *A. paradoxa*, Sweet Bursaria *Bursaria spinosa* and Sticky Hop-Bush *Dodonea viscosa*. Turkey-bush *Eremophila deserti* and Fragrant Saltbush *Rhagodia parabolica* can be locally common. Occasionally Drooping She-oak *Allocasuarina verticillata* dominates. Eucalypts, mainly Candelbark *E. rubida*, when present, are usually concentrated on the upper edge of the escarpment.

EVC 898 Cane Grass – Lignum Halophytic Herbland
Within the Midlands and Otways study area, this EVC is restricted to the Lake Connewarre area south of Geelong. It occurs within shallow depressions on otherwise flat terrain, surrounded by Coastal Saltmarsh Complex and Plains Grassland. The geology is Quaternary sedimentary estuarine sands. The soils are silty clays, subject to periodic freshwater flooding from the nearby Barwon river. Annual rainfall is approximately 600mm. This EVC has been identified in two small areas, to the south of Reedy Lake in the Lake Connewarre State Game Reserve and on the west bank of the Barwon River, south east of Geelong

Cane Grass – Lignum Halophytic Herbland is a shrubland dominated by Tangled Lignum *Muehlenbeckia florulenta,* though in slightly better drained areas the Lignum is sparse and Common Tussock Grass *Poa labillardierei* dominates. The ground layer is dominated by sedges, with Common Spike-sedge *Eleocharis acuta* prominent at the wetter sites and Sharp Club-sedge *Schoenoplectus pungens* in more brackish situations.

EVC 899 Plains Freshwater Sedge Wetland
Within the Midlands and Otways study area this EVC is confined to the Lake Connewarre area south of Geelong. It is grows in association with Plains Grassland, Plains Brackish Sedge Wetland and Coastal Saltmarsh Complex. It occurs on quaternary sedimentary geology, consisting mainly of estuarine sands, the soils are peaty silty clays. Annual rainfall is approximately 600mm.

Plains freshwater sedge wetland is an open to closed sedgeland, reaching heights to 1m. The dominant species are Common Spike-sedge *Eleocharis acuta,* Common Blown Grass *Agrostis avenacea* and the weed, Curled Dock **Rumex crispus* with Swamp Crassula *Crassula helmsii* and Water-ribbons *Triglochin procerum* sub dominant.

GREATER GRAMPIANS VEGETATION DESCRIPTIONS

EVC 3 Damp Sands Herb-rich Woodland
In the Grampians, Damp Sands Herb-rich Woodland typically occurs on deep, damp sands beside creeks. The water table associated with these creeks provides permanent moisture and the fertile nature of the abutting creek geology provides a suitable substrate for herbs.

Within the study area, there are two floristic communities of Damp Sands Herb-rich Woodland. *Grampians* Damp Sands Herb-rich Woodland occurs on moister sites and is prolific in herbs, whilst *Roses Gap* Damp Sands Herb-rich Woodland is found on drier sands, with two shrub species forming a dense thicket. *Roses Gap* Damp Sands Herb-rich Woodland is also restricted geographically to the Roses Gap area, whilst *Grampians* Damp Sands Herb-rich Woodland is distributed widely across the study area.

Floristic Community 3-02 *Grampians* Damp Sands Herb-rich Woodland
Grampians Damp Sands Herb-rich Woodland typically occurs on loamy sands more than 1m deep. These sands are usually of alluvial origin, derived from adjacent creeks. The water table associated with these streams maintains moisture in the sand and the alluvium deposited provides a fertile loam for herbaceous growth, hence the name Damp Sands Herb-rich Woodland. Due to its position in the landscape, on terraces above creeks or alluvial flats, aspect and rainfall are of little significance. *Grampians* Damp Sands Herb-rich Woodland occurs in large areas in the lower reaches of the Wannon River catchment within the National Park.

This floristic community has a moderate overstorey typically to 25m but on occasions to 40m. A variety of eucalypt species comprise the overstorey with Swamp Gum *Eucalyptus ovata* the most commonly recorded. Scentbark *E. aromaphloia*, River Red Gum *E. camaldulensis*, Messmate *E. obliqua* and Manna Gum *E. viminalis* ssp. *viminalis* are also sometimes present.

A sparse secondary tree layer consists of Black Wattle *Acacia mearnsii* and/or Blackwood *A. melanoxylon,* ranging in height from 10m to 20m. Wirilda *Acacia retinodes* is also often present.

In general the understorey is open, with a few scattered narrow-leaved shrubs of Manuka *Leptospermum scoparium* and Prickly Currant-bush *Coprosma quadrifida.* Victorian Christmas-bush *Prostanthera lasianthos* is the only commonly occurring broad-leaved shrub. Sparse, ericoid-leaved shrubs can also be found, including Flame Heath *Astroloma conostephioides*, Cranberry Heath *A. humifusum* and Common Heath *Epacris impressa*.

Grampians Damp Sands Herb-rich Woodland often contains a dense field layer of Austral Bracken *Pteridium esculentum.* Another notable feature is the areas grazed by kangaroos and wallabies that are dominated by Weeping Grass *Microlaena stipoides*. Associated with this ground layer are numerous forbs, including Common Lagenifera *Lagenifera stipitata*, Small Poranthera *Poranthera microphylla*, Cat's Ear **Hypochoeris radicata*, Kidney-weed *Dichondra repens*, Common Woodrush *Luzula meridionalis* var. *flaccida*, Ivy-leaf Violet *Viola hederacea* ssp *hederacea*, Pimpernel **Anagallis arvensis*, Common Woodruff *Asperula conferta*, Small St John's Wort *Hypericum gramineum*, Narrow Groundsel *Senecio tenuiflorus* and Hairy Speedwell *Veronica calycina*. Important tussock grasses include Wallaby Grass *Danthonia* spp., Common Tussock-grass *Poa labillardierei* var. *labillardierei*, Soft Tussock-grass *Poa morrisii* and Slender Tussock-grass *Poa tenera*. The annual grasses Elegant Hair-grass **Aira elegans*, Lesser Quaking-grass **Briza minor* and Silvery Hair-grass **Aira caryophyllea* are generally present.

The Garamond, Spiny-headed Mat-rush *Lomandra longifolia* ssp. *longifolia,* is a major component of the ground layer with other graminoids present including Red-fruit Saw-sedge *Gahnia sieberiana*, Tall Sedge *Carex appressa* and Black-anther Flax-lily *Dianella revoluta*.

The damp nature of the environment provides suitable conditions for small ground ferns such as Necklace Fern *Asplenium flabellifolium* and occasionally Common Maidenhair *Adiantum aethiopicum*.

Yarra Gum Rr *Eucalyptus yarraensis* is the only significant species recorded from this community.

Floristic Community 3-03 *Rose's Gap* Damp Sands Herb-rich Woodland
Roses Gap Damp Sands herb-rich Woodland occurs beside creeks in the vicinity of Rose's Gap in the northern Grampians. It occurs on deep sands that are much drier than *Grampians* Damp Sands Herb-rich Woodland. Subsequently, it supports a dense shrub layer and less herbaceous species. This also makes it difficult to distinguish from *Grampians* Shrubby Woodland, especially if it occurs under River Red Gum.

Yellow Box *Eucalyptus melliodora* and Swamp Gum *E. ovata* are the most common eucalypt species. Other species present include Desert Stringybark *E. arenacea*, Brown Stringybark *E. baxteri*, River Red Gum *E. camaldulensis*, Long-leaf Box *E. goniocalyx* s.s., Rough-barked Manna Gum *E. viminalis* ssp. *cygnetensis* and Manna Gum *E. viminalis* ssp. *viminalis.* Black Wattle *Acacia mearnsii* is the only understorey tree.

The most striking feature of *Roses Gap* Damp Sands Herb-rich Woodland is the dominance of Grampians Thryptomene *Thryptomene calycina*, forming a dense shrub layer. Sallow Wattle *Acacia longifolia* to 5m is also common. Other shrubs that frequently occur are tree form Silver Banksia *Banksia marginata* and Hop Goodenia *Goodenia ovata*. Ground-hugging heaths beneath this dense shrub layer include Flame Heath *Astroloma conostephioides*, Cranberry Heath *A. humifusum*, Pine Heath *A. pinifolium*, Brush Heath *Brachyloma ericoides* and Upright Guinea-flower *Hibbertia stricta* s.l. The dominance of Grampians Thryptomene and Sallow Wattle suggest some past disturbance which has favoured their dominance, however there is no evidence of fire for a long period.

Graminoids include Twining Fringe-lily *Thysanotus patersonii*, Pale Grass-lily *Caesia parviflora*, *Corybas* spp., Maroonhood *Pterostylis pedunculata,* Black-anther Flax-lily s.l. *Dianella brevicaulis/revoluta*, Little Club-sedge *Isolepis marginata* and Wattle Mat-rush *Lomandra filiformis* ssp. *coriacea.*

The only significant species recorded is Mossy Woodruff r *Asperula minima*.

EVC 6 Sand Heathland
Sand Heathland is most often a treeless heathland, or if trees are present, they are usually small and spindly. It occurs in all catchments within the study area on sand deposits combining outwash, fluviatile and aeolian processes. The water table is often close to the surface, providing a moisture gradient inhibiting the growth of large dominant eucalypts. At the wetter end of this moisture gradient, Wet Heathland replaces Sand Heathland.

Floristic Community 6-01 *Grampians Dunes* Sand Heathland
Grampians Dunes Sand Heathland occurs on deep aeolian sands that form dunes in the major valley systems of the Grampians. The soils are fine loamy sands that grade from white/grey to yellow down the soil profile. The sands are deeper than 1m, well-drained and often quite dry, with the soil surface low in organic content. *Grampians Dunes* Sand Heathland can occur as islands within extensive areas of *Grampians* Sand Heathland and *Shallow* Sand Heathland. It can also abut *Sand* Heathy Woodland and whilst they belong to separate EVCs, they are very similar floristically and sometimes structurally if the *Grampians Dune* Sand Heathland is treed.

Grampians Dunes Sand Heathland is most often treeless. Desert Banksia *Banksia ornata* is the tallest shrub at 2m in height with lower shrubs of 1.5m including Flame Heath *Astroloma conostephioides*, Silver Banksia *Banksia marginata*, Daphne Heath *Brachyloma daphnoides*, Common Correa *Correa reflexa*, Smooth Parrot-pea *Dillwynia glaberrima*, Twiggy Guinea-flower *Hibbertia virgata*, Common Hovea *Hovea linearis*, Heath tea-tree *Leptospermum myrsinoides*, Common Beard-heath *Leucopogon virgatus*, Common Rice-flower *Pimelea humilis*, Golden Heath *Styphelia adscendens*, Slender Smoke-bush *Conospermum patens*, Prickly Cryptandra *Cryptandra tomentosa*, Gorse Bitter-pea *Daviesia ulicifolia*, Common Wedge-pea *Gompholobium huegelii*, Prickly Broom-heath *Monotoca scoparia* and Heathy Phyllota *Phyllota pleurandroides*.

Forbs are present in low densities, scattered over the sandy soil. These include Blunt Everlasting *Argentipallium obtusifolium*, Blue Pincushion *Brunonia australis*, Blue-spike Milkwort *Comesperma calymega*, Common Raspwort *Gonocarpus tetragynus*, Bent Goodenia *Goodenia geniculata* and Small Poranthera *Poranthera microphylla*. Grasses are not common either, but include *Danthonia* spp., *Deyeuxia* spp., Supple Spear-grass *Austrostipa mollis* and Rough Porcupine Grass *Triodia scariosa* ssp. *scariosa*.

Sedges, restionaceous species and graminoids include Tassel Rope-rush *Hypolaena fastigata*, Black Rapier-sedge *Lepidosperma carphoides*, Dwarf Mat-rush *Lomandra nana*, Matted Bog-sedge *Schoenus breviculmis*, Scale Shedder *Lepidobolus drapetocoleus,* Milkmaids *Burchardia umbellata* and Grass Trigger-plant *Stylidium graminifolium*.

Significant plants recorded in *Grampians Dunes* Sand Heathland include Early Golden Moths k *Diuris* sp. aff. *lanceolata* (Derrinallum) and Yucca r *Xanthorrhoea caespitosa*.

Floristic Community 6-02 *Grampians* Sand Heathland/*Shallow* Sand Heathland Complex
Whilst *Grampians* Sand Heathland and *Shallow* Sand Heathland are distinguished floristically in the analysis, they are very similar structurally and could not be separated easily on the ground, either floristically or with aerial

photographic interpretation. Subsequently, they have been mapped as a single map unit but are described here separately

Grampians Sand Heathland is found on loamy sands approximately 80 cm deep over a drainage-impeding clay layer. The sands are often dry at the surface, with increasing moisture as the sand meets the clay. In many instances, the sand is often waterlogged due to the medium to heavy clays that prevent water drainage. This community is most commonly found on the broad flood plains of the Glenelg River and the Wannon River.

Grampians Sand Heathland is typically treeless, however when eucalypts do occur, they are sparse, spindly and rarely reach 5m in height. Rough-barked Manna Gum *Eucalyptus viminalis* ssp. *cygnetensis* is the most common species. Shining Peppermint *E. willisii* also occurs as a small spindly tree, whereas Messmate *E. obliqua* and Brown Stringybark *E. baxteri* occur as larger trees with denser crowns. River Red Gum *E. camaldulensis* is present as either a remnant of the alluvial flood plain that has been covered in sand or the site is in close proximity to *Grampians* Shrubby Woodland or *Grampians* Alluvial Terraces Herb-rich Woodland in which this species is common.

The characteristic features of *Grampians* Sand Heathland are the dense shrub cover and high diversity of narrow-leaved and ericoid-leaved shrubs to approximately 1m. Associated with this are Blue Tinsel-lily *Calectasia intermedia*, grass trees and Thatch Saw-sedge *Gahnia radula* over a dense mat of restionaceous species.

Shrubs are typically less than 2m tall, but this can be influenced by fire frequency. The most common species in this dense shrub layer are shrub form Silver Banksia *Banksia marginata*, Heath Tea-tree *Leptospermum myrsinoides*, Prickly Geebung *Persoonia juniperina*, Prickly Tea-tree *Leptospermum continentale*, Common Rice-flower *Pimelea humilis*, Slender She-oak *Allocasuarina misera*, Smooth Parrot-pea *Dillwynia glaberrima,* Common Heath *Epacris impressa,* Upright Guinea-flower *Hibbertia stricta*, Common Beard-heath *Leucopogon virgatus*, Twisted Beard-heath *L. glacialis* and Golden Heath *Styphelia adscendens*. Slender She-oak *Allocasuarina misera,* Heath Tea-tree *Leptospermum myrsinoides* and *L. continentale* structurally dominate this community.

Slender Dodder-laurel *Cassytha glabella* and Downy Dodder-laurel *C. pubescens* frequently intertwine the shrubs.

Grass trees are common, most frequently Austral Grass-tree *Xanthorrhoea australis,* with Yucca r *X. caespitosa* occurring in the Black Range.

Thatch Saw-sedge *Gahnia radula* and Black Rapier-sedge *Lepidosperma carphoides* occur above a layer of smaller sedges including Matted Bog-sedge *Schoenus breviculmis* and Common Bog-sedge *S. apogon*.

A number of restionaceous species are very common and often form a dense sward. Tassel Rope-rush *Hypolaena fastigata,* Scale Shedder *Lepidobolus drapetocoleus* and Slender Twine-rush *Leptocarpus tenax* are the most common restionaceous species. Bare Twig-sedge *Baumea juncea* is also present.

Scarlet Sundew *Drosera glanduligera,* Pale Sundew *D. peltata* ssp. *peltata*, Common Raspwort *Gonocarpus tetragynus*, Bent Goodenia *Goodenia geniculata* and Hidden Violet *Viola cleistogamoides* are the only common forbs. Perennial geophytes present include Milkmaids *Burchardia umbellata*, Blue Squill *Chamaescilla corymbosa* var. *corymbosa*, whilst the graminoids include Short Purple-flag *Patersonia fragilis,* Grey-beard Grass *Amphipogon strictus* var. *setifer* and Supple Spear-grass *Austrostipa mollis.*

Significant species in *Grampians* Sand Heathland include Yucca r *Xanthorrhoea caespitosa*, Elegant Spider Orchid Ve *Caladenia formosa*, Veined Spider Orchid v *C. reticulata* s.s., Early Golden Moths k *Diuris* sp. aff. *lanceolata* (Derrinallum), Short-leaf Bog-sedge r *Schoenus laevigatus* and Blotched Sun-orchid r *Thelymitra benthamiana*.

Grampians Sand Heathland differs from *Shallow* Sand Heathland in that the former has a deeper layer of loamy sand over clay. *Grampians* Sand Heathland has a greater diversity of species, more heathy shrubs, more herbs and fewer species known to favour wetter environments. Some of these species include Necklace Fern *Asplenium flabellifolium*, Spreading Rope-rush *Empodisma minus*, Dagger Hakea *Hakea teretifolia* ssp. *hirsuta*, Common Scale-rush *Lepyrodia muelleri*, Branching Scale-rush *L. tasmanica*, Long Purple-flag *Patersonia occidentalis*, Swamp Selaginella *Selaginella uliginosa*, Pink Swamp-heath *Sprengelia incarnata* and Hair-sedge *Tetraria capillaris.*

Shallow Sand Heathland is found on loamy sands. These sites are poorly drained and soils may become waterlogged in winter due to a clay layer 40-60cm beneath the sand. *Shallow* Sand Heathland is most frequently found on the gentle to flat outwash in the broad Wannon River valley system between the Serra and Mt William Ranges.

It is typically treeless, with sparse, small spindly eucalypts growing on slightly deeper sand, where the soil is better drained. Rough-barked Manna Gum *Eucalyptus viminalis* ssp. *cygnetensis* is nearly always present with a low cover together with Shining Peppermint *E. willisii.* The waterlogged nature of the soil may make it difficult for trees to survive.

Shrubs structurally dominate this community and are high in diversity, similar to that of *Grampians* Sand Heathland. Shrubs are dense and varied and include Slender She-oak *Allocasuarina misera*, Prickly Tea-tree *Leptospermum continentale,* Heath Tea-tree *L. myrsinoides*, Showy Parrot-pea *Dillwynia sericea*, Dagger Hakea *Hakea teretifolia* ssp. *hirsuta*, Upright Guinea-flower *Hibbertia stricta* s.l., Silver Banksia *Banksia marginata*, Common Heath *Epacris impressa*, Prickly Geebung *Persoonia juniperina*, Twisted Beard-heath *Leucopogon glacialis*, Smooth Parrot-pea *D. glaberrima*, Western Furze Hakea *Hakea repullulans*, Slender Honey-myrtle *Melaleuca gibbosa* and Pink Swamp-heath *Sprengelia incarnata*. Austral Grass-tree *Xanthorrhoea australis* also appears throughout the shrub layer. Slender Dodder-laurel *Cassytha glabella* takes advantage of the many host shrubs.

A dense layer of restionaceous species dominate the ground layer, including Slender Twine-rush *Leptocarpus tenax*, Tassel Rope-rush *Hypolaena fastigata*, Common Scale-rush *Lepyrodia muelleri*, and Branching Scale-rush *L. tasmanica*. The sedges, Thatch Saw-sedge *Gahnia radula* and Needle Bog-sedge *Tricostularia pauciflora,* also contribute to this ground layer. Short Purple-flag *Patersonia fragilis* also thrives in the moist conditions.

Amongst this dense field layer are the smaller herbs and ferns such as Common Raspwort *Gonocarpus tetragynus*, Grey Beard-grass *Amphipogon strictus* var. *setifer*, Pale Sundew *Drosera peltata* ssp. *peltata*, Necklace fern *Asplenium flabellifolium* and Swamp Selaginella *Selaginella uliginosa*. Occasional perennial geophytes appear such as Milkmaids *Burchardia umbellata*, Blue Squill *Chamaescilla corymbosa* var. *corymbosa* and Rabbit Ears *Thelymitra antennifera.*

Shallow Sand Heathland also has affinities with Damp and Wet Heathland. They share species of wetter environments and these include Spreading Rope-rush *Empodisma minus,* Dagger Hakea *Hakea teretifolia* ssp, *hirsuta,* Common Scale-rush *Lepyrodia muelleri,* Branching Scale-rush *L. tasmanica,* Long Purple-flag *Patersonia occidentalis,* Swamp Selaginella *Selaginella uliginosa and* Pink Swamp-heath *Sprengelia incarnata*. These species also separate *Shallow* Sand Heathland from *Grampians* Sand Heathland.

Significant species include Yucca r *Xanthorrhoea caespitosa* and Tiny Spyridium Rv *Spyridium cinereum*.

EVC 8 Wet Heathland

Wet Heathland occurs on broad drainage lines, creeklines and flats of the major valley systems. In the Victoria Valley, at the base of the Victoria Range outwash slopes, it often occurs on slopes where ground water discharge reaches the surface and provides continuous moisture. It can also occur along thin drainage lines within the outwash and Sand Heathland systems, often associated with Riparian Scrub and along rocky creeks in the Victoria Range and on Mt William. However, it reaches its greatest expression within the flat expanses of the Glenelg River floodplain, where one contiguous patch is approximately 400ha in size. It occurs on silty clay loams 50- 90cm in depth overlaying light to medium heavy clays. Water can be obtained from either the watertable or from moisture trapped above the heavy clay layer. In early to mid spring, there may be surface water due to saturated soils associated with winter rainfall.

Wet Heathland in many instances is treeless, although Rough-barked Manna Gum *Eucalyptus viminalis* ssp. *cygnetensis* sometimes occurs, but only as occasional, small trees on higher ground. Shining Peppermint *E. willisii* can also be present in low numbers.

Shrubs are not as dense and diverse compared with the communities of Sand Heathland. Prickly Tea-tree *Leptospermum continentale* is common with Scented Paperbark *Melaleuca squarrosa*, Silver Banksia *Banksia marginata*, Pink Swamp-heath *Sprengelia incarnata*, Dagger Hakea *Hakea teretifolia* ssp. *hirsuta,* Slender She-oak *Allocasuarina misera*, Smooth Parrot-pea *Dillwynia glaberrima* and Slender Honey-myrtle *Melaleuca gibbosa* commonly co-occurring. Slender Dodder-laurel *Cassytha glabella* twines amongst the shrubs.

The most notable feature of Wet Heathland is Button Grass *Gymnoschoenus sphaerocephalus*. It forms large hummocks amongst which grow the shrubs and the grass trees such as Austral Grass-tree *Xanthorrhoea australis* and Small Grass-tree *X. minor* ssp. *lutea*. Restionaceous species protrude from beneath and include Flat Cord-rush *Restio complanatus*, Spreading Rope-rush *Empodisma minus*, Slender Twine-rush *Leptocarpus tenax*, Branching Scale-rush *Lepyrodia tasmanica*, Pale Twig-sedge *Baumea acuta*, Tassel Rope-rush *Hypolaena fastigata* and

Common Scale-rush *Lepyrodia muelleri*. Herbs present include Tall Yellow-eye *Xyris operculata* and Long Purple-flag *Patersonia occidentalis.*

Small ground-dwelling plants can be found underneath the Button Grass and shrubs. These include Swamp Selaginella *Selaginella uliginosa,* Screw Fern *Lindsaea linearis,* Forked Sundew *Drosera binata,* Pale Sundew *D. peltata* ssp. *peltata*, Tiny Sundew *D. pygmaea* and Scented Sundew *D. whittakeri* that grow well in this wet environment.

Significant species in Wet Heathland are Thready Bush-pea Rr *Pultenaea luehmannii*, Yucca r *Xanthorrhoea caespitosa* and Short-leaf Bog-sedge r *Schoenus laevigatus*.

EVC 16 Lowland Forest

Floristic Community 16-01 *Grampians* Lowland Forest
Grampians Lowland Forest occurs on shallow loams overlaying sandstones in sheltered areas where rainfall ranges from around 700mm to 1000mm per annum. In higher altitudes, cloud cover, often to ground level enhances rainfall. These areas are on the gentle to moderately steep mid slopes along the south-east side of the Victoria Range, to the south of the Major Mitchell Plateau and along the Mt Difficult Range. Soils are well drained and rich in organic matter and can vary in depth from 45cm-100cm at low altitude sites to less than 10cm at higher altitudes where rocks begin to outcrop.

Brown Stringybark *Eucalyptus baxteri* and Messmate *E. obliqua* are the dominant trees in the overstorey, where they often co-occur with Mountain Grey-gum *E. cypellocarpa*.

A diverse assemblage of narrow-leaved and ericoid-leaved shrub species characteristic of drier and heath communities is present. These include Common Heath *Epacris impressa*, Pink-bells *Tetratheca ciliata*, Silver Banksia *Banksia marginata*, Honey-pots *Acrotriche serrulata*, Common Correa *Correa reflexa*, Rough Bush-pea *Pultenaea scabra*, Slender Platysace *Platysace heterophylla*, Prickly Geebung *Persoonia juniperina*, Myrtle Wattle *Acacia myrtifolia*, Common Hovea *Hovea linearis*, Manuka *Leptospermum scoparium*, Common Rice-flower *Pimelea humilis,* Dusty Miller *Spyridium parvifolium*, Common Flat-pea *Platylobium obtusangulum* and numerous other species forming the sometimes dense shrub layer. Other common species of heath communities which are present include Austral Grass-tree *Xanthorrhoea australis* and Wattle Mat-rush *Lomandra filiformis*.

In addition to this heathy component, a number of species characteristic of moister, sheltered environments with more fertile soils are also often present. These include the shrubs Rough Coprosma *Coprosma hirtella*, Hairy Correa *Correa aemula* and Hop Goodenia *Goodenia ovata.* Unlike other floristic communities, *Grampians* Lowland Forest is also rich in climbers, including Love Creeper *Comesperma volubile*, Mountain Clematis *Clematis aristata,* Common Apple-berry *Billardiera scandens*, Orange Bell-climber *Billardiera bignoniacea* and Downy Dodder-laurel *Cassytha pubescens* s.s.

The ground layer is rich in herbs. Common forbs present include Ivy-leaf Violet *Viola hederacea* ssp. *hederacea*, Tall Sundew *Drosera peltata* ssp. *auriculata*, Button Everlasting *Helichrysum scorpioides,* Shade Raspwort *Gonocarpus humilis*, Small Poranthera *Poranthera microphylla*, Tight Bedstraw *Galium curvihirtum*, Variable Stinkweed *Opercularia varia*, Common Raspwort *Gonocarpus tetragynus*, Bent Goodenia *Goodenia geniculata*, Broom Spurge *Amperea xiphoclada* ssp. *xiphoclada*, Cut-leaf Daisy *Brachyscome multifida* and Common Billy Buttons *Craspedia glauca* spp. agg. Perennial geophytes include Common Bird-orchid *Chiloglottis valida*, Milkmaids *Burchardia umbellata* and Grass Trigger-plant *Stylidium graminifolium.* Black-anther Flax-lily (s.l.) *Dianella brevicaulis/revoluta* is also present.

Grasses often found are Weeping Grass *Microlaena stipoides* var. *stipoides*, Grey Tussock-grass *Poa sieberiana* and Soft Tussock-grass *P. morrisii.*

Large sedges and rushes are often present which include Variable Sword-sedge *Lepidosperma laterale*, Wire Rapier-sedge *L. semiteres,* Red-fruit Saw-sedge *Gahnia sieberiana* and Spiny-headed Mat-rush *Lomandra longifolia.*

Austral Bracken *Pteridium esculentum* is also common.

Significant species in *Grampians* Lowland Forest are Rock Banksia r *Banksia saxicola*, Mossy Woodruff r *Asperula minima,* Grampians Bossiaea r *Bossiaea rosmarinifolia*, Mount William Beard-heath Rr *Leucopogon neurophyllus*, River Bossiaea r *Bossiaea riparia*, Glossy Hovea Rr *Hovea corrickiae,* Narrow-leaf Trymalium r *Trymalium daltonii*, Ribbed Bush-pea Rr *Pultenaea costata* and Branched Trymalium Rr *Trymalium ramosissimum.* However, none of these species are commonly found in *Grampians* Lowland Forest.

Floristic Community 16-02 *Feldspar Porphyry* Lowland Forest
Feldspar Porphyry Lowland Forest occurs in a few isolated patches on the summit of Mount Difficult, on exposed seams of feldspar porphyry. *Grampians* Lowland Forest, in some instances, can occur on quartz porphyry, with deep soils on protected southerly slopes. This is in contrast to the more exposed nature of *Feldspar Porphyry* Lowland Forest with a shallow soil layer over the feldspar porphyry.

The eucalypt species are similar to those found in *Grampians* Lowland Forest but are shorter in stature. Brown Stringybark *Eucalyptus baxteri*, Mountain Grey Gum *E. cypellocarpa* and Messmate *E. obliqua* are the common overstorey species, with Oyster Bay Cypress-pine *Callitris rhomboidea* the only tall understorey shrub.

Feldspar Porphyry Lowland Forest has a variety of lifeforms that defines its structure. It contains a layered strata of grasses, forbs, sedges, graminoids, climbers, ferns, shrubs and trees.

Shrubs recorded in *Feldspar Porphyry* Lowland Forest are Thin-leaf Wattle *Acacia aculeatissima*, Mitchell's Wattle *A. mitchellii,* Spike Wattle *A. oxycedrus*, Honey Pots *Acrotriche serrulata*, Pine Heath *Astroloma pinifolium*, Dwarf Boronia *Boronia nana* var. *pubescens*, Common Correa *Correa reflexa*, Common Heath *Epacris impressa*, Variable Prickly Grevillea *Grevillea aquifolium*, Bushy Hakea *Hakea* sp. (ex *H. sericea* sensu Willis 1972), Prickly Tea-tree *Leptospermum continentale*, Heath Tea-tree *L. myrsinoides*, Manuka *L. scoparium*, Thyme Beard-heath *Leucopogon thymifolius*, Prickly Geebung *Persoonia juniperina*, Notched Phebalium *Phebalium bilobum*, Yellow Rice-flower *Pimelea flava*, Common Flat-pea *Platylobium obtusangulum*, Slender Platysace *Platysace heterophylla*, Soft Bush-pea *Pultenaea mollis*, Rough Bush-pea *P. scabra*, Golden Heath *Styphelia adscendens*, Pink-bells *Tetratheca ciliata*, *Acacia* spp. and *Allocasuarina* spp.

Common forbs include Broom Spurge *Amperea xiphoclada* var. *xiphoclada,* Austral Carrot *Daucus glochidiatus*, Tall Sundew *Drosera peltata*, Scented Sundew *D. whittakeri*, Clustered/Creeping Cudweed *Euchiton gymnocephalus* s.l., Rough Bedstraw *Galium gaudichaudii*, Common Raspwort *Gonocarpus tetragynus*, Button Everlasting *Helichrysum scorpioides*, Yellow Pennywort *Hydrocotyle foveolata*, Small St John's Wort *Hypericum gramineum*, Small Poranthera *Poranthera microphylla*, Hairy Speedwell *Veronica calycina* and Ivy-leaf Violet *Viola hederacea* ssp. *hederacea*. Grasses include Elegant Hair-grass **Aira elegans*, Reed Bent-grass *Deyeuxia quadriseta*, *Dichelachne* spp., *Poa ?morrisii /sieberiana* var. *hirtella* and *Poa* spp.

Perennial geophytes include Milkmaids *Burchardia umbellata*, Common Bird-orchid *Chiloglottis valida*, and Tall Greenhood *Pterostylis longifolia* s.l.

Sedge and restionaceous species recorded include Thick Twist-rush *Caustis pentandra*, Wire Rapier-sedge *Lepidosperma semiteres*, Common Bog-sedge *Schoenus apogon*, as well as Wattle Mat-rush *Lomandra filiformis* and *Lomandra* spp.

Austral Grass-tree *Xanthorrhoea australis* and Austral Bracken *Pteridium esculentum* are also present.

EVC 18 Riparian Forest
Riparian Forest is found along permanent, narrow, meandering creeks on flat terrain, or in rocky gullies which are fed by seasonal flowing waters. The soils are fertile sand/sand loam alluviums with variable sized rocks in the stream bed. Riparian Forest has a limited ecological range within the study area, with the floristics changing quickly as distance from the creek increases. On flat terrain, Riparian Forest is often surrounded by *Grampians* Damp Sands Herb-rich Woodland or Sedgy Riparian Woodland, so Riparian Forest is either exaggerated or absorbed into the surrounding vegetation. Some of the deeper, sheltered rocky streams within the Victoria, Serra, Mt Difficult and Mt William Ranges have been mapped as Riparian Forest in complex with *Grampians* Damp Forest and sometimes *Grampians* Lowland Forest. Riparian Forest is not common in the Grampians as it tends to occur in wetter environments associated with Wet Forest or Damp Forest**.** The ecological niche for Riparian Forest occurs on sheltered, semi-permanent creeks and gullies within the taller forests of the study area.

A medium forest of 25-30m in height of Messmate *Eucalyptus obliqua* overhangs the creek, with Mountain Grey Gum *E. cypellocarpa* commonly co-occurring. Brown Stringybark *E. baxteri* and Shining Peppermint *E. willisii* s.l. are present in small numbers from the surrounding vegetation community. Blackwood *Acacia melanoxylon* and Narrow-leaf Wattle *A. mucronata* to 10m tall as well as Rough Pomaderris *Pomaderris aspera* and Victorian Christmas-bush *Prostanthera lasianthos* are the most common species in the sparse secondary tree layer.

Rough Coprosma *Coprosma hirtella*, Scented Paperbark *Melaleuca squarrosa*, Prickly Moses *Acacia verticillata*, Woolly Tea-tree *Leptospermum lanigerum* and Prickly Bush-pea *Pultenaea juniperina* form an open understorey of occasional shrubs.

Due to the constant supply of moisture and shade, the most notable feature of Riparian Forest is the dense ground cover of ferns. These are predominantly the Water-ferns such as Hard Water-fern *Blechnum wattsii,* Fishbone Water-fern *B. nudum* and Soft Water-fern *B. minus*. Silky Fan-fern *Sticherus tener*, Austral King-fern *Todea barbara*, Pouched Coral-fern *Gleichenia dicarpa*, Scrambling Coral-fern *G. microphylla* and Austral Bracken *Pteridium esculentum* also line the creek bank.

Amongst the fern layer, Red-fruit Saw-sedge *Gahnia sieberiana* and Tall Sword-sedge *Lepidosperma elatius* can be found. Weeping Grass *Microlaena stipoides* var. *stipoides* is common but only as a few individual plants on the exposed bank edges.

The only significant species recorded in this EVC are Smooth tea-tree K *Leptospermum glabrescens* and Branched Trymalium Rr *Trymalium ramosissimum*.

EVC 19 Riparian Shrubland

Floristic Community 19--01 *Grampians Rocky* Riparian Shrubland
Grampians Rocky Riparian Shrubland occurs on rocky creeks, soaks or depressions, often fed by springs. It can be found on steep gradients on permanent streams or on sediment beds trapped in rocks. It grows amongst *Grampians* Rocky Outcrop Shrubland and *Grampians* Rocky Outcrop Herbland.

Grampians Rocky Riparian Shrubland is often treeless, but areas have been mapped with an overstorey. This EVC is not easily accessible and thus has not been sampled. It possibly has affinities with several EVCs including Riparian Scrub, Sedgy Riparian Woodland, Riparian Forest and Wet Heathland. The treeless version is uncommon but does occur on the tops of the ranges, eg., on Mt Abrupt, on Mt Difficult and in the Wonderland. This community is similar, floristically, to Riparian Scrub, however the rock-dominating environment may account for the lack of taller thickets which are indicative of Riparian Scrub. Hence further sampling is required.

EVC 20 Heathy Dry Forest

Floristic Community 20-08 *Grampians* Heathy Dry Forest
Grampians Heathy Dry Forest is a medium open forest, but can vary structurally to form occasional low open forest on more exposed sites with skeletal soils. It occurs on loamy sands variously derived from sandstones and granodiorites, usually less than 50cm deep, overlying clay or rock. Often this rock layer is very close to or above the soil surface, causing a decrease in tree height. The average annual rainfall is approximately 800mm, with some sites at higher altitudes receiving close to 1000mm. Soils are often *in situ* with parent rock present. It grows on slopes and ledges between rock outcrops and the sandy outwash. It is not confined to any particular aspect and is widespread in the Grampians National Park.

The overstorey is dominated by Brown Stringybark *Eucalyptus baxteri* and Messmate *E. obliqua* greater than 20m in height. Less common eucalypts include Shining Peppermint *E. willisii*, Scentbark *E. aromaphloia* and Mountain Grey Gum *E. cypellocarpa*. The taller *Grampians* Heathy Dry Forest occurs on more protected slopes which often abut Lowland Forest.

Narrow and ericoid leaved shrubs are prominent, often forming a thick, low to medium height in the understorey. Prominent shrubs 1-2m in height include shrub or tree form Silver Banksia *Banksia marginata*, Heath Tea-tree *Leptospermum myrsinoides,* Myrtle Wattle *Acacia myrtifolia,* Western Furze Hakea *Hakea repullulans,* Mitchell's Wattle *Acacia mitchellii*, Prickly Broom-heath *Monotoca scoparium,* Spike Wattle *Acacia oxycedrus,* Prickly Tea-tree *Leptospermum continentale,* Prickly Moses *Acacia verticillata*, Soft Bush-pea *Pultenaea mollis* and Dusty Miller *Spyridium parvifolium*.

Heath species usually less than 1m in height are prevalent. Those most often found are Pink-bells *Tetratheca ciliata*, Common Heath *Epacris impressa*, Common Correa *Correa reflexa*, Honey-pots *Acrotriche serrulata*, Common Beard-heath *Leucopogon virgatus*, Common Hovea *Hovea linearis*, Common Flat-pea *Platylobium obtusangulum*, Flame Heath *Astroloma conostephioides*, Common Rice-flower *Pimelea humilis*, Leafless Bitter-pea *Daviesia brevifolia*, Upright Guinea-flower *Hibbertia stricta* s.s., Horny Cone-bush *Isopogon ceratophyllus*, Prickly Geebung *Persoonia juniperina*, Showy Parrot-pea *Dillwynia sericea*, Cat's Claws Grevillea *Grevillea alpina* Variable Prickly Grevillea *G. aquifolium,* Slender Platysace *Platysace heterophylla,* and Beaked Hakea *Hakea rostrata*. Austral Grass-tree *Xanthorrhoea australis* also contributes to the understorey layer.

The most common forbs are those frequently found in heath communities on infertile soils such as Button Everlasting *Helichrysum scorpioides*, Scented Sundew *Drosera whittakeri*, Tall Sundew *D. peltata* ssp. *auriculata*, Variable Stinkweed *Opercularia varia*, Common Raspwort *Gonocarpus tetragynus*, Common Billy-buttons *Craspedia glauca*, Ivy-leaf Violet *Viola hederacea* ssp. *hederacea* Hidden Violet *V. cleistogamoides* and Bent Goodenia *Goodenia geniculata.* Frequently occurring graminoids include Black-anther Flax-lily *Dianella revoluta*, Wire Rapier-sedge *Lepidosperma semiteres*, Wattle Mat-rush *Lomandra filiformis*, Milkmaids *Burchardia umbellata* and Small-flower Mat-rush *Lomandra micrantha*.

Grasses typically account for little ground cover with Weeping Grass *Microlaena stipoides*, Grey Tussock-grass *Poa sieberiana* ssp. *sieberiana* and *P. sieberiana* ssp. *hirtella* being the most common. In a number of areas where disturbance has occurred, presumably by fire, Wiry Spear-grass *Austrostipa muelleri* forms a dense cover. Wiry Spear-grass can dominate *Grampians* Heathy Dry Forest.

Significant species occurring in *Grampians* Heathy Dry Forest are Mossy Woodruff r *Asperula minima*, Ribbed Bush-pea Rr *Pultenaea costata* and River Bossiaea r *Bossiaea riparia*, none of which are common in this EVC.

EVC 22 Grassy Dry Forest
Grassy Dry Forest occurs on the eastern upper scree and scarp slopes of the Mt Difficult, Wonderland, Serra and parts of the Mt William Range. On these ranges, it occurs on medium to fine grained quartzose sandstones and siltstones of the Silverband Formation and Red Man Bluff geologies. It also grows on steep north-western slopes along Chinaman Track on granodiorite. Soils are shallow, light brown, sandy loams that do not retain moisture. Loose rocks often lie on the soil surface. Grassy Dry Forest is also found in very rocky domains where it forms complexes and mosaics with *Grampians* Rocky Outcrop Shrubland and *Grampians* Rocky Outcrop Herbland.

Grassy Dry Forest has a variety of overstorey species. These include Red Stringybark *Eucalyptus macrorhyncha*, Yellow Box *E. melliodora,* Mountain Grey Gum *E. cypellocarpa,* Messmate *E. obliqua* and Rough-barked Manna Gum *E. viminalis* ssp. *cygnetensis*. Beneath the eucalypts, Black Wattle *Acacia mearnsii* and Blackwood *A. melanoxylon* form a secondary tree layer.

Shrubs are few and sparse, and include Sallow Wattle *Acacia longifolia*, Wirilda *A. retinodes* var. *retinodes*, Varnish Wattle *A verniciflua,* Sweet Bursaria *Bursaria spinosa* and Rough Bush-pea *Pultenaea scabra.* Occasional, small ground-hugging heaths include Honey-pots *Acrotriche serrulata*, Flame Heath *Astroloma conostephioides*, Cranberry Heath *A. humifusum*, Creeping Bossiaea *Bossiaea prostrata*, Common Hovea *Hovea linearis* and Common Rice-flower *Pimelea humilis*.

The appearance of Grassy Dry Forest is characterised by a dry field layer of forbs and grasses. Common forbs include Sheep's Burr *Acaena echinata*, Mossy Woodruff r *Asperula minima*, Blue Pincushion *Brunonia australis*, Pink Bindweed *Convolvulus erubescens*, Kidney-weed *Dichondra repens*, Tall Sundew *Drosera peltata*, Creeping Cudweed *Euchiton gymnocephalus* s.s., Common Raspwort *Gonocarpus tetragynus*, Yellow Pennywort *Hydrocotyle foveolata*, Stinking Pennywort *H. laxiflora*, Small St John's Wort *Hypericum gramineum*, Cat's Ear **Hypochoeris radicata*, Coarse Lagenifera *Lagenifera huegelii*, Yam-daisy *Microseris scapigera* s.l., Magenta Stork's-bill *Pelargonium rodneyanum*, Variable Plantain *Plantago varia*, Small Poranthera *Poranthera microphylla,* Narrow Groundsel *Senecio tenuiflorus*, Hairy Speedwell *Veronica calycina*, Hidden Violet *Viola cleistogamoides* and Ivy-leaf Violet *Viola hederacea* ssp. *hederacea* and *Wahlenbergia* sp.

Many grass species occur in Grassy Dry Forest, however they are often sparse amongst much bare ground. Species include *Danthonia* sp., *Deyeuxia* sp., *Dichelachne* sp., Common Wheat-grass *Elymus scabrus* and Weeping Grass *Microlaena stipoides*. Other graminoids include Wattle Mat-rush *Lomandra filiformis* and Austral Grass-tree *Xanthorrhoea australis*. Common Bog-sedge *Schoenus apogon* is the only sedge recorded.

Climbers include Common Apple Berry *Billardiera scandens* and Twining Fringe-lily *Thysanotus patersonii*.

EVC 23 Herb-rich Foothill Forest

Floristic Community 23-10 *Grampians 1* Herb-rich Foothill Forest
Grampians 1 Herb-rich Foothill Forest occurs on moist southern slopes, with an average annual rainfall of 870mm. Soils are fertile clay loams derived from soft siltstones and sandstones. *Grampians 1* Herb-rich Foothill Forest can be geologically specific and grows on soft siltstone in the Red Man Bluff geologies.

Grampians 1 Herb-rich Foothill Forest is characterised by an overstorey of medium to tall eucalypts, a low diversity of shrub species and a diverse, dense ground layer of tussock grasses and forbs. Eucalypts 20-30m in height include Messmate *Eucalyptus obliqua* with Grey Gum *E. cypellocarpa* / *E. alaticaulis* and Manna Gum *E. viminalis* ssp. *viminalis* the subdominant species. Blackwood *Acacia melanoxylon* is a common understorey tree.

Shrubs are typically sparse within this community and include Prickly Currant-bush *Coprosma quadrifida*, Prickly Moses *Acacia verticillata*, Hairy

Correa *Correa aemula*, Common Heath *Epacris impressa*, Narrow-leaf Wattle *Acacia mucronata*, Pink-bells *Tetratheca ciliata*, Hop Goodenia *Goodenia ovata* and Manuka *Leptospermum scoparium*.

Grass tussocks above a diverse forb layer is the indicative structure of this community. Tussock grasses include Slender Tussock-grass *Poa tenera*, Soft Tussock-grass *Poa morrisii*, Common Tussock-grass *Poa labillardierei* ssp. *labillardierei*, Sword Tussock-grass *Poa ensiformis* and Bent-grass *Deyeuxia spp.* with Weeping *Grass Microlaena stipoides* var. *stipoides* growing between the tussocks. Amongst this tussock grass layer also is a carpet of forbs including Cinquefoil Cranesbill *Geranium potentilloides*, Cat's Ear **Hypochoeris radicata*, Kidney-weed *Dichondra repens*, Common Lagenifera *Lagenifera stipitata*, Prickly Starwort *Stellaria pungens*, Mossy Woodruff r *Asperula minima*, Ivy-leaf Violet *Viola hederacea* ssp. *hederacea*, Bidgee-widgee *Acaena novae-zelandiae*, Spear Thistle r *Cirsium vulgare*, Hairy Pennywort *Hydrocotyle hirta*, Stinking Pennywort *Hydrocotyle laxiflora*, Forest Mint *Mentha laxiflora*, Sheep's Burr *Acaena echinata*, Austral Bugle *Ajuga australis*, Common Woodruff *Asperula conferta*, Fireweed Groundsel *Senecio linearifolius*, Slender Swainson-pea v *Swainsona brachycarpa* and Hairy Speedwell *Veronica calycina.* The predominance of perennial forbs indicates a retention of moisture by the soil overlying clay or rock in these typically sheltered and comparatively high rainfall sites.

Common graminoids include Spiny-headed Mat-rush *Lomandra longifolia*, Wattle Mat-rush *Lomandra filiformis* ssp. *coriacea*, Common Woodrush *Luzula meridionalis* var. *flaccida* and Grass Trigger-plant *Stylidium graminifolium*. Sedges include Short-stem Sedge *Carex breviculmis* and Red-fruit Saw-sedge *Gahnia sieberiana*.

Austral Bracken *Pteridium esculentum* is also present. The moist nature of this community is reflected in the number of other ground fern species commonly present including Mother Shield-fern *Polystichum proliferum,* Common Maidenhair *Adiantum aethiopicum* and Necklace Fern *Asplenium flabellifolium.*

Mountain Clematis *Clematis aristata* occurs together with other climbers such as Love Creeper *Comesperma volubile* and Common Apple-berry *Billardiera scandens.*

Significant species recorded in this floristic community include Mossy Woodruff r *Asperula minima*, Slender Swainson-pea v *Swainsona brachycarpa*, Swamp Flax-lily v *Dianella callicarpa*, Hairy Raspwort r *Gonocarpus mezianus* and Smooth Tea-tree K *Leptospermum glabrescens* s.l.

Floristic Community 23-11 *Grampians Montane* Herb-rich Foothill Forest

Grampians Montane Herb-rich Foothill Forest occurs at high altitudes of at least 900m asl on the southern slopes of the Major Mitchell Plateau, just below Montane Rocky Shrubland. In this situation, *Grampians Montane* Herb-rich Foothill Forest sometimes occurs as a mosaic with *Grampians* Damp Forest or *Grampians* Shrubby Foothill Forest.

The overstorey includes Messmate *Eucalyptus obliqua*, Swamp Gum *E. ovata*, Snow Gum r *E. pauciflora* ssp. *pauciflora*, Rough-barked Manna Gum *E. viminalis* ssp. *cygnetensis* and Shining Peppermint *E. willisii*. At higher altitudes pure stands of Snow Gum can dominate this community. Blackwood *Acacia melanoxylon* is the only understorey tree recorded.

Narrow leaved shrubs are typically sparse within this community, making the understorey strata quite open. Narrow-leaf Wattle *A. mucronata*, Hedge Wattle *A. paradoxa*, Rough Wattle *Acacia ? aspera,* Sweet Bursaria *Bursaria spinosa* and Small-leaf Pomaderris *Pomaderris elachophylla* are sparsely distributed. Mount William Beard-heath Vr *Leucopogon neurophyllus* is also present due to the proximity of this community to *Grampians* Shrubby Foothill Forest. Small ground shrubs include Honey-pots *Acrotriche serrulata*, Common Heath *Epacris impressa* and Netted Daisy-bush *Olearia speciosa*. This sparse shrub layer is the same as in *Grampians 1* Herb-rich Foothill Forest.

Grasses form a dense field layer of hummocks through which many forbs are hidden. Common Tussock-grass *Poa labillardierei* ssp. *labillardierei* is the dominant tussock-forming grass, with Sword Tussock-grass *P. ensiformis* and Slender Tussock-grass *P. tenera* also dense. These species form the same hummock structure as *Grampians 1* Herb-rich Foothill Forest. Other species common to both communities include Yorkshire Fog **Holcus lanatus*, Weeping Grass *Microlaena stipoides*, *Agrostis* sp., and *Danthonia* sp. Grasses not found in *Grampians 1* Herb-rich Foothill Forest are Brown-top Bent **Agrostis capillaris,* Elegant Hair-grass **Aira elegans,* Common Hedgehog-grass *Echinopogon ovatus* and Wheat-grass *Elymus scabrus*.

Perennial forbs are dense and numerous and include Bidgee Widgee *Acaena novae-zelandiae*, Austral Bugle *Ajuga australis*, *Brachyscome* spp., Spear Thistle r *Cirsium vulgare*, *Craspedia* spp., Kidney-weed *Dichondra repens*, Cinquefoil Cranesbill *Geranium potentilloides*, Shade Raspwort *Gonocarpus humilis*, Common Raspwort *G. tetragynus*, Satin Everlasting *Helichrysum leucopsideum*, Button Everlasting *H. scorpioides*, Hairy Pennywort *Hydrocotyle hirta*, Shining Pennywort *H. sibthorpioides*, Cat's Ear **Hypochoeris radicata*, Common Lagenifera *Lagenifera stipitata*, Common Woodrush *Luzula meridionalis*, Forest Mint *Mentha laxiflora*, *Oxalis* spp., *Pelargonium* spp., Forest/Subalpine Buttercup *Ranunculus plebeius/scapigera*, Small Poranthera *Poranthera microphylla*, Slender Dock *Rumex brownii*, Narrow Groundsel *Senecio tenuiflorus*, Prickly Starwort *Stellaria pungens*, Hairy Speedwell *Veronica calycina* and Ivy-leaf Violet *Viola hederacea* ssp. *hederacea, Cardamine* sp., Clustered/Creeping Cudweed *Euchiton gymnocephalus* s.l., Thread Speedwell *Veronica* sp. aff. *gracilis* and a native Carraway *Oreomyrrhis ? eriopoda*.

Graminoids include Tasman Flax-lily *Dianella ?tasmanica ,* Wattle Mat-rush *Lomandra filiformis* and Spiny-headed Mat-rush *Lomandra longifolia* and *Carex* spp.

Mother Shield-fern *Polystichum proliferum*, Austral Bracken *Pteridium esculentum* and Mountain Clematis *Clematis aristata* are also present.

EVC 28 Rocky Outcrop Shrubland

Floristic Community 28-01 *Grampians* Rocky Outcrop Shrubland

Grampians Rocky Outcrop Shrubland is common and widespread within the study area, occurring at an average altitude of 610m. Due to the spectacular rock formations it is associated with, it is one of the most notable features of the Grampians National Park. It occurs primarily on the Palaeozoic sandstones that form the main ranges of the Grampians and less frequently on granitic outcrops. This shrubland is found most frequently on westerly aspects on mid to upper dip slopes on hard sandstones. Fifty to ninety percent of the area that this community occupies is on exposed rocky substrate, mostly in the form of outcropping bedrock or less frequently, large free-standing rocks and boulders. Due to the harsh environment of this EVC, plants are either short-lived forbs or the shrubs possess water conserving strategies such as hairy leaves, narrow leaves or lack of leaves. *Grampians* Rocky Outcrop Shrubland is often treated as a mosaic with *Grampians* Rocky Outcrop Herbland, which together form the characteristic vegetation on the rocky outcrops of the Grampians and less commonly on the Black Range.

A eucalypt overstorey is occasionally absent from this community. However, when it does occur, the eucalypts are sparse and spindly and form a component of the shrub layer, only occasionally reaching tree proportions. The most frequently occurring eucalypt species in this community was formerly known as Grampians Grey Gum *Eucalyptus alaticaulis*, which is a stunted form of Grey Gum *E. cypellocarpa*. Brown Stringybark *E. baxteri,* also commonly occurs.

Whilst a shrub understorey is absent from the outcropping rock, the interstitial spaces often have a dense understorey consisting of shrubby species characteristic of rocky sites as well as more widespread species that are rarely more than 2m in height. Species characteristic of *Grampians* Rocky Outcrop Shrubland vegetation include Grey Everlasting *Ozothamnus obcordatus,* Wedge-leaf Hop-bush *Dodonaea viscosa* ssp. *cuneata* and Shiny Tea-tree *L. turbinatum*. Oyster Bay Cypress-pine *Callitris rhomboidea* is common, usually as a shrub but may also reach small tree proportions. Other more common species include Manuka *Leptospermum scoparium*, Heath Tea-tree *L. myrsinoides*, Common Fringe-myrtle *Calytrix tetragona*, Snow Myrtle *C. alpestris,* Pink-bells *Tetratheca ciliata,* Showy Parrot-pea *Dillwynia sericea*, Hairy Correa *Correa aemula*, Spike Wattle *Acacia oxycedrus* and Common Heath *Epacris impressa*.

The common forbs and geophytes include Tall Sundew *Drosera peltata* ssp. *auriculata*, Hairy Centrolepis *Centrolepis strigosa* ssp. *strigosa*, Australian Stonecrop *Crassula sieberiana*, Cat's Ear * *H. radicata*, Milkmaids *Burchardia umbellata,* Pink Purslane *Calandrinia calyptrata*, Scented Sundew *Drosera whittakeri* and Grampians Trigger-plant *Stylidium soboliferum*. Wallaby Grass *Danthonia spp.* and Weeping Grass *Microlaena stipoides* are the two grasses most often present. Grasses are more abundant in *Grampians* Rocky Outcrop Herbland.

Necklace Fern *Asplenium flabellifolium* is the only commonly occurring fern, but grows only in sheltered crevices. Sedges include Variable Sword-sedge *Lepidosperma laterale* and Common Bog-sedge *Schoenus apogon*. Tall Greenhood *Pterostylis longifolia s.s.* is often present.

Significant species occurring in *Grampians* Rocky Outcrop Shrubland include Grampians Parrot-pea r *Dillwynia oreodoxa*, Glossy Hovea Rr *Hovea corrickiae,* Grampians Zieria r *Zieria* sp. (Grampians), Hairy Raspwort r *Gonocarpus mezianus*, Rock Rose Guinea-flower r *Hibbertia cistiflora* ssp. *rostrata*, Ribbed Bush-pea Rr *Pultenaea costata*, Rock Banksia r *Banksia saxicola*, Mountain Bertya Rr *Bertya findlayi*, Spreading Brachyloma r *Brachyloma depressum* and Grampians Grevillea Rr *Grevillea confertifolia*. Rare eucalypts include Serra Range Gum r *Eucalyptus serraensis* and Victoria Range Gum r *Eucalyptus victoriana*.

EVC 29 Damp Forest

Floristic Community 29-02 *Grampians* Damp Forest
Grampians Damp Forest has a limited distribution in the study area, confined to sheltered aspects in narrow moist gullies in high rainfall areas such as the eastern scarp gullies of the Victoria Range, the eastern scarp slopes of the Serra Range from Mt. Rosea to Serra Gap and around the Mt. William Range massif. Typically, it contains broad and narrow leaved shrubs, with a suite of fern species, indicating a moist habitat. This community is poorly sampled in the Grampians. One quadrat was taken in the Victoria Range, however a lack of similar data has led to this quadrat being grouped with *Grampians* Shrubby Foothill Forest within the analysis.

Species considered indicative of *Grampians* Damp Forest and not shared with *Grampians* Shrubby Foothill Forest include Rough Tree-fern *Cyathea australis*, Golden-tip *Goodia lotifolia* var. *pubescens,* Blue Howittia *Howittia trilocularis,* Forest Mint *Mentha laxiflora*, Mother Shield-fern *Polystichum proliferum,* Fireweed Groundsel *Senecio linearifolius* and Glossy Hovea Rr *Hovea corrickiae.*

Species also commonly found in *Grampians* Damp Forest, which also occur in other surrounding floristic communities include Blackwood *Acacia melanoxylon,* Prickly Moses *Acacia verticillata*, Mountain Clematis *Clematis aristata*, Tasman Flax-lily *Dianella tasmanica*, Mountain Grey Gum *Eucalyptus cypellocarpa*, Messmate *Eucalyptus obliqua*, Slender Tussock-grass *Poa tenera*, Small Poranthera *Poranthera microphylla*, Austral Bracken *Pteridium esculentum*, Forest Wire-grass *Tetrarrhena juncea* and Ivy-leaf Violet *Viola hederacea*.

Three other important species noted whilst mapping *Grampians* Damp Forest in this area include Forest Starwort *Stellaria flaccida*, Manna Gum *Eucalyptus viminalis* ssp. *viminalis* and Victorian Christmas-bush *Prostanthera lasianthos.*

Other species found in *Grampians* Damp Forest include Bat's Wing-fern *Histiopteris incisa*, Common Ground-fern *Calochlaena dubia,* Rough Pomaderris *Pomaderris apetala* and Prickly Currant-bush *Coprosma quadrifida.*

EVC 30 Wet Forest

Floristic Community 30-03 *Grampians* Wet Forest
Grampians Wet Forest occupies an ecological niche that is physically and geographically limited in the Grampians. Sites are generally south, south-east facing, in steep, narrow gullies which are sometimes spring fed and are supplemented by high annual rainfall of approximately 1000mm.
The low annual rainfall received in the Grampians and the lack of fertile, heavy soils associated with Wet Forest elsewhere in the state, makes *Grampians* Wet Forest a significant community within the study area.

Overstorey species form a tall forest of Messmate *Eucalyptus obliqua,* Mountain Grey Gum *E. cypellocarpa* and Swamp Gum *E. ovata.* Tall understorey trees are Blackwood *Acacia melanoxylon* and Rough Pomaderris *Pomaderris apetala*

Broad-leaved shrubs distinctive of Wet Forest elsewhere in the state are lacking in *Grampians* Wet Forest. Narrow-leaved shrubs include Narrow-leaf Wattle *Acacia mucronata*, Prickly Currant-bush *Coprosma quadrifida*, Rough Coprosma *C. hirtella*, Glossy Hovea *Hovea corrickiae*, Bootlace Bush *Pimelea axiflora*, Small-leaf Bramble *Rubus parviflorus*, White Elderberry *Sambucus gaudichaudiana* and Indian Weed *Sigesbeckia orientalis*.

Ferns are the distinctive lifeform in *Grampians* Wet Forest. Soft Tree-fern *Dicksonia antarctica* is often the dominant tree-fern with Austral King-fern *Todea barbara* also occasionally dominating Beneath the tree-ferns are a thick layer of ground ferns which include Fishbone Water-fern *Blechnum nudum*, Hard Water-fern *B. wattsii*, Bat's Wing Fern *Histiopteris incisa*, Mother Shield-fern *Polystichum proliferum* and Spleenwort *Asplenium* spp. The epiphytic ferns, Long Fork-fern *Tmesipteris obliqua* and Kangaroo Fern *Microsorum pustulatum* are also often present.
Mountain Clematis *Clematis aristata* is the only common climber.

Grampians Wet Forest occurring in the gullies is almost devoid of herbs due to the closed, dense fern layer. Herbs that are found in more open areas include Forest Wire-grass *Tetrarrhena juncea,* Forest Starwort *Stellaria flaccida,* Bidgee Widgee *Acaena novae-zelandiae*, Clustered/Creeping Cudweed *Euchiton gymnocephalus* s.l., Cleavers **Galium aparine*, Cinquefoil Cranesbill *Geranium ? potentilloides*, Hairy Pennywort *Hydrocotyle hirta*, Common Lagenifera *Lagenifera stipoides*, Mint *Mentha spp.*, Prickly Starwort *Stellaria pungens*, Ivy-leaf Violet *Viola hederacea* ssp. *hederacea,* Weeping Grass *Microlaena stipoides*, Common Tussock-grass *Poa labillardierei* and Slender Tussock-grass *P. tenera.* Mosses also form an important part of the floristic diversity and provide substrate for some small ferns to grow.

EVC 37 Montane Grassy Woodland

Floristic Community 37-03 *Grampians* Montane Grassy Woodland
Grampians Montane Grassy Woodland is only mapped in one small area of the Grampians National Park on skeletal soils over a dark purple conglomerate rock. The site occurs at 900m on a north-westerly aspect.

Grampians Montane Grassy Woodland is a very open and sparsely treed woodland, with multi-stemmed, stunted trees, less than 5m in height. The combination of eucalypts are also unusual, with Snow Gum *Eucalyptus pauciflora* ssp. *pauciflora*, *E. viminalis/aromaphloia* sp. *Nov.* and Brown Stringy Bark *E. baxteri* occurring together. Brown Stringybark is found in the surrounding *Grampians* Shrubby Foothill Forest and Snow Gum is nearby in the *Montane* Herb-rich Foothill Forest, but the *E. viminalis/aromaphloia sp. Nov.* is currently being considered as a new species, only recorded from this site.

Shrubs are small and sparse, contributing little to the ground cover. They include Thin-leaf Wattle *Acacia aculeatissima*, Blackwood *A. melanoxylon*, Hedge Wattle *A. paradoxa*, Honey Pots *Acrotriche serrulata*, Pine Heath *Astroloma pinifolium*, Showy Parrot-pea *Dillwynia sericea*, Common Heath *Epacris impressa*, Manuka *Leptospermum scoparium* and Common Rice-flower *Pimelea humilis*.

Herbs form a major component of the field layer with *Argentipallium* sp. and *Chrysocephalum apiculatum* s.l. being prolific. Common forbs present include Blue Pincushion *Brunonia australis*, Hairy Centrolepis *Centrolepis strigosa*, *Craspedia* sp., Austral Carrot *Daucus glochidiatus*, Kidney-weed *Dichondra repens*, Tall Sundew *Drosera peltata*, Scented Sundew *Drosera whittakeri*, *Geranium* sp., Common Raspwort *Gonocarpus tetragynus*, Hairy Pennywort *Hydrocotyle hirta*, Small St John's Wort *Hypericum gramineum*, Smooth Cat's Ear **Hypochoeris glabra*, Cat's Ear **Hypochoeris radicata*, *Lagenifera* sp., *Oxalis* sp., Magenta Stork's-bill *Pelargonium rodneyanum*, Small Poranthera *Poranthera microphylla*, Prickly Starwort *Stellaria pungens*, *Taraxacum* sp., Hairy Speedwell *Veronica calycina*, Ivy-leaf Violet *Viola hederacea* ssp. *hederacea* and *Wahlenbergia* sp.

Grasses are numerous and form a lawn on the skeletal soil. Grasses present include *Agrostis* sp., Elegant Hair-grass **Aira elegans*, *Danthonia* sp., *Dichelachne* sp., *?Elymus* sp., Weeping Grass *Microlaena stipoides*, *?Poa annua*, Common Tussock-grass *Poa labillardierei*, *Poa* spp. and Kangaroo Grass *Themeda triandra*.

Graminoids are also an important element of the ground layer and species include *Dianella callicarpa/tasmanica*, Black-anther Flax-lily *Dianella revoluta*, Wattle Mat-rush *Lomandra filiformis*, Spiny-headed Mat-rush *L. longifolia*, Dwarf Mat-rush *L. nana* and *?Neurachne alopecuroidea*.

Perennial geophytes identifiable in the dry conditions at the time of sampling include *Arthropodium* sp., Milkmaids *Burchardia umbellata*, Blue Squill *Chamaescilla corymbosa*, Parson's Bands *Eriochilus cucullatus* and *Orchidaceae* spp.

Sedges are few, with Common Woodrush *Luzula meridionalis* and Dwarf Rush **Juncus capitatus* the only species recorded.

EVC 45 Shrubby Foothill Forest

Floristic Community 45-02 *Grampians* Shrubby Foothill Forest
Grampians Shrubby Foothill Forest occurs primarily along the eastern side of the Victoria Range where the rainfall is between 800mm and 1140mm per annum. In higher altitude quadrats, this rainfall is enhanced by cloud cover, often to ground level. The soils are fertile loams to sandy clay loams rich in organic matter. Typically the soil is shallow over the parent rock, with many loose rocks at and above the surface of the soil. It is found at an average altitude of 745 m asl on upper slopes, just below the ridge-line. It is most commonly found on east-facing slopes or with a sheltered south-easterly aspect.

This floristic community has two structural classes: a medium forest on deeper soils and a shorter forest on shallow soil over rock. In most instances, the taller structural class of *Grampians* Shrubby Foothill Forest has been logged, compared with the shorter structural class. The eucalypt overstorey is dominated by Messmate *E. obliqua*, growing to more than 20m. Brown Stringybark *E. baxteri* is co-dominant, with Mountain Grey Gum *E. cypellocarpa*, Shining Peppermint *E. willisii,* and Victoria Range Gum r *E victoriana* occurring less frequently.

Understorey trees include the occasional Blackwood *Acacia melanoxylon,* Rock Banksia r *Banksia saxicola*. and Broom-heath Rr *Monotoca billawinica.* Many sites appeared to be protected from fire, with well developed understoreys and old-growth *Banksia saxicola.*

The lower shrub layer consists of a variety of broad, narrow and ericoid-leaved species. The most common broad leaved species include Rough Coprosma *Coprosma hirtella*, Moth Daisy-bush *Olearia erubescens* and Hairy Correa *Correa aemula.* Narrow-leaved species include Pink-bells

Tetratheca ciliata, Rough Bush-pea *Pultenaea scabra,* Spike Wattle *Acacia oxycedrus*, Gorse Bitter-pea *Daviesia ulicifolia*, Slender Platysace *Platysace heterophylla,* Common Rice-flower *Pimelea humilis*, Dwarf Boronia *Boronia nana* var. *pubescens*, Shiny Tea-tree *Leptospermum turbinatum,* Silver Banksia *Banksia marginata,* Variable Prickly Grevillea *Grevillea aquifolium,* Rough Star-hair *Astrotricha asperifolia,* Manuka *Leptospermum scoparium,* Mount William Beard-heath Rr *Leucopogon neurophyllus,* Thyme Beard-heath *L. thymifolius,* Prickly Geebung *Persoonia juniperina,* Prickly Bush-pea *Pultenaea juniperina and* Soft Bush-pea *Pultenaea mollis.* Common ericoid-leaved shrubs present are Heath *Epacris impressa,* Honey-pots *Acrotriche serrulata* and Golden Heath *Styphelia adscendens.*

The broad leaved Tasman Flax-lily *Dianella tasmanica* and Black-anther Flax-lily *Dianella revoluta* s.s. are frequently present above a ground layer of forbs and grasses. Common forbs are Broom Spurge *Amperea xiphoclada* ssp. *xiphoclada,* Ivy-leaf Violet *Viola hederacea* ssp. *hederacea*, Tall Sundew *Drosera peltata* ssp. *auriculata*, Shade Raspwort *Gonocarpus humilis* and Button Everlasting *Helichrysum scorpioides.*

Graminoids present include Wattle Mat-rush *Lomandra filiformis*, Grass Trigger-plant *Stylidium graminifolium*, Austral Grass-tree *Xanthorrhoea australis*, and Cluster-headed Mat-rush r *Lomandra longifolia* ssp. *exilis*. Red-fruit Saw-sedge *Gahnia sieberiana* sometimes occurs with Variable Sword-sedge *Lepidosperma laterale* and Wire Rapier-sedge *L. semiteres*. Austral Bracken *Pteridium esculentum* is found at all sites.

The most common grasses are the trailing and climbing Hairy Rice-grass *Tetrarrhena distichophylla*, Heath Bent-grass *Deyeuxia densa*, Matted Tussock-grass *Poa clelandii* and Grey Tussock-grass *P. sieberiana* var. *hirtella.* Forest Wire-grass *Tetrarrhena juncea* dominates the lower stratum in a number of sites that have presumably been disturbed by selective timber harvesting. Litter and large fallen logs, many from logging activities, are common on the forest floor.

Downy Dodder-laurel *Cassytha pubescens* s.s. and Orange Bell-climber *Billardiera bignoniacea* are the common climbers, with Common Hovea *Hovea linearis* trailing along the ground.

Significant species found in this floristic community are Rock Banksia r *Banksia saxicola*, Mount William Beard-heath Rr *Leucopogon neurophyllus*, Grampians Broom-heath Rr *Monotoca billawinica,* Cluster-headed Mat-rush r *Lomandra longifolia* ssp. *exilis*, Swamp Flax-lily v *Dianella callicarpa*, Grampians Parrot-pea r *Dillwynia oreodoxa*, Rr Glossy Hovea *Hovea corrickiae*, Victoria Range Gum r *Eucalyptus victoriana,* Common Tussock Grass k *Poa labillardierei var. acris* and Ribbed Bush-pea Rr *Pultenaea costata*.

EVC 47 Valley Grassy Forest

Floristic Community 47-03 *Grampians* Valley Grassy Forest
Grampians Valley Grassy Forest arises consistently on a variety of geologies. The soils are loams and sandy loams with high organic content. Depth of the soil is dependent on its position within the landscape. Sites on lower slopes are on deeper soils overlying clay. Soils on mid to upper slopes tend to be shallow loams over rock, with loose rocks and rock outcropping common. *Grampians* Valley Grassy Forest is most often located on protected easterly and southerly slopes. Altitude also varies considerably, occurring as low as 240m ASL on gentle slopes to 660m ASL below ridgelines. The largest area of *Grampians* Valley Grassy Forest grows along the Fyans Creek valley in which Halls Gap is situated.

Brown Stringybark *Eucalyptus baxteri* and Messmate *E. obliqua* are co-dominant, with Grampians Grey Gum *E. alaticaulis* sub-dominant. A variety of other eucalypt species occur, including Shining Peppermint *E. willisii*, Mountain Grey Gum E. *cypellocarpa*, Swamp Gum *E. ovata* and Scentbark *E. aromaphloia*.

An open shrubby understorey that is generally low in species diversity is found below the overstorey. The most common species, approaching 5m in height, are Blackwood *Acacia melanoxylon*, Black Wattle *A. mearnsii*, Manuka *Leptospermum scoparium* and tree form Silver Banksia *Banksia marginata*.

With the exception of species forming a sparse lower understorey such as Common Heath *Epacris impressa*, Honey-pots *Acrotriche serrulata,* Pink-bells *Tetratheca ciliata* and Austral Grass-tree *Xanthorrhoea australis*, species that are otherwise quite ubiquitous in forests and woodlands in the Grampians are notably lacking in *Grampians* Valley Grassy Forest indicating the more fertile nature of the soils.

The most notable feature of *Grampians* Valley Grassy Forest is a herb-rich ground layer that is frequently associated with Weeping Grass *Microlaena stipoides.* The most common forbs are Tall Sundew *Drosera peltata* ssp. *auriculata*, Hairy Speedwell *Veronica calycina*, Ivy-leaf Violet *Viola hederacea* ssp. *hederacea*, Cat's Ear **Hypochoeris radicata*, Mossy Woodruff *Asperula minima*, Common Lagenifera *Lagenifera stipitata*, Grassland Wood-sorrel *Oxalis perennans*, Small Poranthera *Poranthera microphylla*, Button Everlasting *Helichrysum scorpioides*, Variable Stinkweed *Opercularia varia*, Scented Sundew *Drosera whittakeri*, Small St John's Wort *Hypericum gramineum*, Narrow Groundsel *Senecio tenuiflorus*, Common Raspwort *Gonocarpus tetragynus* and Kidney-weed *Dichondra repens*. Other common grasses in addition to Weeping Grass are Reed Bent-grass *Deyeuxia quadriseta*, Soft Tussock-grass *Poa morrisii*, Grey Tussock-grass *P. sieberiana* var. *sieberiana* and Slender Tussock-grass *P. tenera*.

A variety of lilies, sedges and mat-rushes are also present, the most common of these graminoids being Black-anther Flax-lily *Dianella revoluta*, Wattle Mat-rush *Lomandra filiformis,* Spiny-headed Mat-rush *L. longifolia* ssp *longifolia,* Milkmaids *Burchardia umbellata* and Short-stem Sedge *Carex breviculmis*. Climbers present are Love Creeper *Comesperma volubile*, Common Apple-berry *Billardiera scandens* and less commonly Twining Fringe-lily *Thysanotus patersonii*.

Austral Bracken *Pteridium esculentum* is also an important component of the ground layer. Large quantities of litter and some exposed sandstone are also present on the forest floor.

Significant species are r *Asperula minima* and less commonly Rock Banksia r *Banksia saxicola*, Hairy Raspwort *Gonocarpus mezianus* and Clover Glycine Vv *Glycine latrobeana*.

EVC 48 Heathy Woodland
Heathy Woodland is comprised of six floristic communities within the Greater Grampians, covering large tracts of the landscape between Rocky Outcrop communities, the taller forest growing in protected niches and the floodplains. This EVC is primarily on sandy outwash systems of variable depth and geology. Outwash sands range from pale, siliceous sands to orange-red lateritic gravels. Heathy Woodland contains two of the most species-rich communities in the study area. It also contains a number of ubiquitous heath species indicative of the Grampians, with each community having its own suite of distinguishing heaths.

Floristic Community 48-01 *Plains Lateritic* **Heathy Woodland**
Plains Lateritic Heathy Woodland occurs on well-drained, lateritic soils, usually on Pliocene ferruginised fluviatile gravels, sands and clays and on 'laterites' as well as on rhyolites south of Rocklands Reservoir. It grows on gently undulating to flat ground bordering alluvial flats, with æolian sand covering the 'A' soil horizon. The sand depth, in most instances, is greater than that of *Slopes Lateritic* Heathy Woodland.

A variety of eucalypts form the overstorey with Yellow Gum *E. leucoxylon* and Messmate *Eucalyptus obliqua* being the most common. Yellow Gum commonly occurs with Yellow Box *E. melliodora,* whilst Messmate is usually associated with Brown Stringybark *E. baxteri* and Long-leaf Box *E. goniocalyx*. Occasionally, up to four eucalypt species can be co-dominant. Trees are 20-30m tall, open-crowned and sparse in cover, whereas the eucalypts in *Slopes Lateritic* Heathy Woodland are much shorter, densely crowded and have crowns with a tangled spreading habit.

The most common species in the diverse shrubby understorey (typically 0.4-1m tall) are the narrow-leaved and ericoid-leaved Honey-pots *Acrotriche serrulata,* Flame Heath *Astroloma conostephioides*, Cranberry Heath *A. humifusum,* Daphne heath *Brachyloma daphnoides,* Heath Tea-tree *Leptospermum myrsinoides*, Silver Banksia *Banksia marginata* (shrub form or tree form to 5m tall), Common Correa *Correa reflexa*, Upright Guinea-flower *Hibbertia stricta* s.l., Common Beard-heath *Leucopogon virgatus,* Common Flat-pea *Platylobium obtusangulum*, Horny Cone-bush *Isopogon ceratophyllus*, Common Rice-flower *Pimelea humilis*, Leafless Bitter-pea *Daviesia brevifolia*, Dwarf Wedge-pea *Gompholobium ecostatum,* Cat's Claws Grevillea *Grevillea alpina,* Golden Heath *Styphelia adscendens,* Pink-bells *Tetratheca ciliata*, Slender She-oak *Allocasuarina misera*, Common Fringe-myrtle *Calytrix tetragona*, Smooth Parrot-pea *Dillwynia glaberrima*, Showy Parrot-pea *D. sericea* and Beaked Hakea *Hakea rostrata.* These shrubs are often entwined by Downy Dodder-laurel *Cassytha pubescens* s.s. Leafless Bitter-pea *Bossiaea prostrata* and Running Postman *Kennedia prostrata* are common prostrate species.

Plains Lateritic Heathy Woodland has many more herb species than *Slopes Lateritic* Heathy Woodland, suggesting that this community may be wetter and more fertile. The most common forbs include Bent Goodenia *Goodenia geniculata,* Scarlet Sundew *Drosera glanduligera,* Stinking Pennywort *Hydrocotyle laxiflora,* Yam-daisy *Microseris scapigera* spp. agg., Sheep's Burr *Acaena echinata,* Blue Pincushion *Brunonia australis*, Pointed Centrolepis *Centrolepis aristata,* Common Raspwort *Gonocarpus tetragynus*, Smooth Cat's Ear **Hypochoeris glabra*, Wiry Mitrewort *Mitrasacme paradoxa*, Small Poranthera *Poranthera microphylla*, Tall Bluebell *Wahlenbergia stricta* ssp. *stricta,* Yellow Pennywort *Hydrocotyle foveolata,* Small St John's Wort *Hypericum gramineum*, Hidden Violet *Viola cleistogamoides,* Annual Blue-bell *Wahlenbergia gracilenta* s.l., Austral Carrot *Daucus glochidiatus,* Creeping Cudweed *Euchiton gymnocephalus* s.s., Black's Goodenia *Goodenia blackiana* and Button Everlasting

Helichrysum scorpioides. Perennial geophytes include Chocolate-lily *Arthropodium strictum*, Milkmaids *Burchardia umbellata,* Blue Squill *Chamaescilla corymbosa* ssp. *corymbosa,* Black Anther Flax-lily *Dianella revoluta* and Twining Fringe-lily *Thysanotus patersonii*.

The most common grasses are Elegant Hair-grass *Aira elegans, Weeping Grass *Microlaena stipoides,* Supple Spear-grass *Austrostipa mollis*, Grey Tussock-grass *Poa sieberiana* var. *hirtella*, Velvet Wallaby-grass *Austrodanthonia pilosa*, Bristly Wallaby-grass *R. setaceum*, Lesser Quaking-grass **Briza minor* and Five-awned Spear-grass *Pentapogon quadrifidus.*

The ground layer also contains sedges such as Common Bog-sedge *Schoenus apogon* and Black Rapier-sedge *Lepidosperma carphoides*. Graminoids include Small Mat-rush *Lomandra sororia* and Dwarf Mat-rush *Lomandra nana.*

Yucca r *Xanthorrhoea caespitosa* is found in the State Forest to the south of the Black Range as well as in the west of the Grampians National Park. Austral Grass-tree *Xanthorrhoea australis* occurs elsewhere in this community within the Grampians National Park.

Significant species occurring in *Plains Lateritic* Heathy Woodland are Yucca r *Xanthorrhoea caespitosa,* Blotched Sun-orchid r *Thelymitra benthamiana,* Early Golden-moths k *Diuris* sp. aff. *lanceolata* (Derrinallum), Mossy Woodruff r *Asperula minima* and Azure Sun-orchid v *Thelymitra azurea*.

Floristic Community 48-02 *Gully Outwash* Heathy Woodland
Gully Outwash Heathy Woodland occurs along the western slopes of the Serra Range on Mount Difficult Sandstones. It grows on the lower outwash slopes, where deep white sands with many loose surface rocks are thought to have been washed down in a single catastrophic event. The soils are medium and fine grained, derived from quartzose sandstones, with some pebble beds near the base.

Brown Stringybark *Eucalyptus baxteri*, Shining Peppermint *E. willisii*, Messmate *E. obliqua* and Rough-barked Manna Gum *E. viminalis* ssp. *cygnetensis* form the short and open canopy. Oyster Bay Cypress-pine *Callitris rhomboidea* and Cherry Ballart *Exocarpos cupressiformis* are patchy understorey trees.

Narrow and ericoid-leaved shrubs dominate this community, with indicator shrub species combined from numerous other heathy communities. Importantly, *Gully Outwash* Heathy Woodland contains species rarely seen in any of the other heathy communities. These include Showy Bossiaea *Bossiaea cinerea,* Flame Grevillea *Grevillea dimorpha,* Twisted Beard-heath *Leucopogon glacialis* and Rough Bush-pea *Pultenaea scabra.*

Other shrubs that commonly occur are Spike Wattle *Acacia oxycedrus*, Broom Spurge *Amperea xiphoclada* var. *xiphoclada,* Fringed Brachyloma *Brachyloma ciliatum*, Common Fringe-myrtle *Calytrix tetragona*, Victorian Smoke-bush *Conospermum mitchellii*, Western Furze Hakea *Hakea repullulans*, Beaked Hakea *Hakea rostrata*, Bushy Hakea *Hakea* sp. (ex *H. sericea* sensu Willis 1972), Silky Guinea-flower *Hibbertia sericea* s.l., Twiggy Guinea-flower *H. virgata*, Manuka *Leptospermum scoparium*, Pink Beard-heath *Leucopogon ericoides*, Heathy Phyllota *Phyllota pleurandroides*, Dwarf Bush-pea *Pultenaea humilis*, Soft Bush-pea *Pultenaea mollis,* Dusty Miller *Spyridium parvifolium* and Winged Spyridium *S. vexilliferum.*

Ubiquitous heath species that consistently occur but are not used as indicator species include *Allocasuarina* spp., Flame Heath *Astroloma conostephioides*, Silver Banksia *Banksia marginata*, Dwarf Boronia *Boronia nana* var. *pubescens*, Common Correa *Correa reflexa*, Leafless Bitter-pea *Daviesia brevifolia*, Smooth Parrot-pea *Dillwynia glaberrima*, Common Heath *Epacris impressa*, Variable Prickly Grevillea *Grevillea aquifolium*, Bundled Guinea-flower *Hibbertia prostrata*, Horny Cone-bush *Isopogon ceratophyllus*, Heath Tea-tree *Leptospermum myrsinoides*, Common Beard-heath *Leucopogon virgatus*, Prickly Broom-heath *Monotoca scoparia*, Prickly Geebung *Persoonia juniperina*, Common Flat-pea *Platylobium obtusangulum*, Golden Heath *Styphelia adscendens* and Pink-bells *Tetratheca ciliata.*

Common graminoids include Thick Twist-rush *Caustis pentandra*, Black-anther Flax-lily *Dianella revoluta*, Tassel Rope-rush *Hypolaena fastigata*, Dwarf Wire-lily *Laxmannia orientalis*, Scale-shedder *Lepidobolus drapetocoleus*, Black Rapier-sedge *Lepidosperma carphoides*, Wire Rapier-sedge *L. semiteres*, Wattle Mat-rush *Lomandra filiformis*, Small Mat-rush *L. sororia* and Austral Grass-tree *Xanthorrhoea australis*.

Perennial geophytes are not common but include Milkmaids *Burchardia umbellata* and Red-beaks *Lyperanthus nigricans*.
Forbs are few, but include Sundew *Drosera macrantha*, Scented Sundew *D. whittakeri*, Bent Goodenia *Goodenia geniculata*, Button Everlasting *Helichrysum scorpioides* and Narrow Groundsel *Senecio tenuiflorus*. Grasses are few with the main one dominating the community being Wiry Spear-grass *Austrostipa muelleri.*

Floristic Community 48-03 *Grampians Desert* Heathy Woodland
Grampians Desert Heathy Woodland is confined to well-drained deep loamy sands on gentle outwash slopes surrounding Mt Stapylton and Mt Zero in the northern part of the Grampians National Park. These usually pink or orange sands, typically 50-100cm deep, overlay either clay or bedrock. Occasionally, small, loose rocks lie at the soil surface. The northern part of the Grampians receives the least rainfall in the study area, with *Grampians Desert* Heathy Woodland receiving an average of 560mm per annum. Whilst this annual rainfall is greater than 300-400mm per annum received in the Victorian deserts and Mallee to the north-west of the Grampians, the combination of low rainfall and deep sand provides similar environmental conditions. Subsequently, a number of species more commonly found in the Victorian deserts and Mallee occurs in *Grampians Desert* Heathy Woodland of the Northern Grampians. These include Desert Stringybark *Eucalyptus arenacea*, Slaty She-oak *Allocasuarina muelleriana* ssp. *muelleriana,* Leafless Currant-bush *Leptomeria aphylla*, Tiny Bog-sedge *Schoenus nanus* and Desert Baeckea *Baeckea crassifolia.*

Grampians Desert Heathy Woodland often has a sparse eucalypt overstorey typically less than 10m tall, although on rare occasions it may reach 20m. The most common eucalypt is Desert Stringybark *Eucalyptus arenacea* which is a characteristic species of this community and frequently co-dominates with Long-leaf Box *E. goniocalyx*. Where the sands are more shallow or less well drained, Yellow Gum *E. leucoxylon* is present either with these species or less commonly as the only eucalypt species. Oyster Bay Cypress-pine *Callitris rhomboidea* often occurs to tree height.

The layered shrub strata includes taller shrubs to 2m in height, with a lower layer of heathy species. Taller shrubs include Slaty She-oak *Allocasuarina muelleriana* ssp. *muelleriana*, Bushy Hakea *Hakea* sp. (*sensu* Willis) and Golden Wattle *Acacia pycnantha*.

The lower shrub layer consists of narrow-leaved and ericoid-leaved species such as Common Fringe-myrtle *Calytrix tetragona*, Cat's Claws Grevillea *Grevillea alpina*, Heath Tea-tree *Leptospermum myrsinoides*, Pine Heath *Astroloma pinifolium*, Variable Prickly Grevillea *Grevillea aquifolium*, Ruddy Beard-heath *Leucopogon rufus*, Flame Heath *Astroloma conostephioides*, Daphne Heath *Brachyloma daphnoides*, Showy Parrot-pea *Dillwynia sericea*, Upright Guinea-flower *Hibbertia stricta* s.l., Common Beard-heath *Leucopogon virgatus*, Thyme Spurge *Phyllanthus hirtellus*, Horny Cone-bush *Isopogon ceratophyllus* and *Hibbertia* sp. cf *riparia* (Grampians). Austral Grass-tree *Xanthorrhoea australis* is also commonly present.

Litter and/or bare ground are frequently the most common constituents of the herbaceous woodland floor.

Common forbs are Scarlet Sundew *Drosera glanduligera*, Pointed Centrolepis *Centrolepis aristata*, Sundew *Drosera macrantha*, Small Pennywort *Hydrocotyle callicarpa*, Smooth Cat's Ear **Hypochoeris glabra*, Hairy Centrolepis *Centrolepis strigosa* ssp *strigosa*, Scented Sundew *Drosera whittakeri* and Common Raspwort *Gonocarpus tetragynus*. Geophytes include Twining Fringe-lily *Thysanotus patersonii*, Blue Squill *Chamaescilla corymbosa*, and Early Golden Moths k *Diuris* sp. aff. *lanceolata* (Derrinallum).

The only significant species is Early Golden Moths k *Diuris* sp. aff. *lanceolata* (Derrinallum).

Floristic Community 48-05 *Slopes Lateritic* Heathy Woodland
Slopes Lateritic Heathy Woodland occurs on well-drained orange lateritic soils, usually of sedimentary origin and sometimes igneous. It grows in low elevations, with slight to moderate **t**o steep slopes. Exceptions to this occur in the Black Range, where *Slopes Lateritic* Heathy Woodland is on gently undulating terrain south of Rocklands Reservoir.

The structure is distinctive with a dense canopy of eucalypts short in stature (10-15m) with crowns exhibiting a spreading and tangled habit and trunks often leaning. The stringybark eucalypts dominate this community, with Brown Stringybark *Eucalyptus baxteri* and Messmate *E. obliqua* co-dominant. Long-leaf Box *Eucalyptus goniocalyx* can also dominate and is present on shallow rocky soils at exposed sites, often in close proximity to the two communities of Hills Herb-rich Woodland.

The most common species in the diverse shrubby understorey are the narrow-leaved and ericoid-leaved species including Flame Heath *Astroloma conostephioides*, Common Correa *Correa reflexa,* Prickly Grevillea *Grevillea aquifolium,* Heath Tea-tree *Leptospermum myrsinoides*, Common Flat-pea, *Platylobium obtusangulum,* Pink-bells *Tetratheca ciliata,* Daphne heath *Brachyloma daphnoides*, Showy Parrot-pea *Dillwynia sericea*, Common Beard-heath *Leucopogon virgatus,* Honey-pots *Acrotriche serrulata*, Cranberry Heath *Astroloma humifusum*, Silver Banksia *Banksia marginata*, Horny Cone-bush *Isopogon ceratophyllus*, Thyme Spurge *Phyllanthus hirtellus*, Myrtle Wattle *Acacia myrtifolia*, Leafless Bitter-pea *Daviesia brevifolia*, Erect Guinea-flower *Hibbertia riparia*, Silky Guinea-flower *H. sericea* s.l., Ruddy Beard-heath *Leucopogon rufus,* Pine Heath *Astroloma pinifolium* and Golden Heath *Styphelia adscendens*. These shrubs are often

entwined by Downy Dodder-laurel *Cassytha pubescens* s.s. and Love Creeper *Comesperma volubile.*

The ground layer species include the decumbent Hovea *Hovea linearis* and forbs such as Blue Pincushion *Brunonia australis*, Common Raspwort *Gonocarpus tetragynus*, Button Everlasting *Helichrysum scorpioides,* Variable Stinkweed *Opercularia varia,* Tall Sundew *Drosera peltata* ssp. *auriculata,* Black's Goodenia *Goodenia blackiana,* Scented Sundew *Drosera whittakeri,* Pointed Centrolepis *Centrolepis aristata,* Scarlet Sundew *Drosera glanduligera*, Bent Goodenia *Goodenia geniculata*, Small Pennywort *Hydrocotyle callicarpa* and Hidden Violet *Viola cleistogamoides.*

The most common grasses are Grey-beard Grass *Amphipogon strictus* var. *setifer,* Wallaby Grasses *Austrodanthonia* spp., Fox-tail Mulga-grass *Neurachne alopecuroidea,* Supple Spear-grass *Austrostipa mollis* and Weeping Grass *Microlaena stipoides*.

Yucca r *Xanthorrhoea caespitosa* and Austral Grass-tree *Xanthorrhoea australis* are also present.

The most common graminoids are Small Mat-rush *Lomandra sororia* and Dwarf Mat-rush *L. nana.* Sedges include Black Rapier-sedge *Lepidosperma carphoides,* Common Bog-sedge *Schoenus apogon*, and Wire Rapier-sedge *Lepidosperma semiteres.* The restionaceous Tassel Rope-rush *Hypolaena fastigata* and Scale-shedder *Lepidobolus drapetocoleus* are also present.

Significant species occurring in *Slopes Lateritic* Heathy Woodland are Ribbed Bush-pea Rr *Pultenaea costata*, Yucca r *Xanthorrhoea caespitosa*, Rock Wattle r *Acacia rupicola,* Early Golden-moths k *Diuris* sp. aff. *lanceolata* (Derrinallum), Hairy Raspwort r *Gonocarpus mezianus,* Scented Bush-pea v *Pultenaea graveolens*, Mt. Byron Bush-pea *Pultenaea patellifolia*, Williamson's Bush-pea *Pultenaea williamsoniana* and Narrow-leaf Trymalium r *Trymalium daltonii.*

Floristic Community 48-08 *Sandy Outwash* Heathy Woodland
Sandy Outwash Heathy Woodland is typically found on deep outwash, fine to medium grained quartzose sands. On upper slopes, the sand can be quite shallow, with many small sandstone rocks at the soil surface. Progression further downslope brings deeper outwash sand, more typical of this community. *Sandy Outwash* Heathy Woodland is generally found on outwash slopes, often with some rock components of variable size in the outwash. It can occur directly under rocky outcrops or as part of larger areas of sand at the mid to lower end of the outwash profile. Average annual rainfall for this community is variable because it is present in all ranges within the National Park and in the Black Range State Park.

The overstorey comprises woodland eucalypts most frequently 10-20m tall, although occasionally reaching 25-30m. The dominant eucalypt species is Messmate *Eucalyptus obliqua.* Brown Stringybark *E. baxteri* frequently co-occurs or dominates at times. Various other eucalypts can be present, however their occurrence is sub-dominant to *E. obliqua* or *E. baxteri*. These include Scentbark *E. aromaphloia*, Shining Peppermint *E. willisii*, Long-leaf Box *E. goniocalyx* and Rough-barked Manna Gum *E. viminalis* ssp. *cygnetensis*.

The understorey is rich in narrow-leaved and ericoid-leaved species typical of heath communities that form an open understorey usually less than 1.5m tall. The most common of these species are Heath Tea-tree *Leptospermum myrsinoides,* Common Heath *Epacris impressa*, Bundled Guinea-flower *Hibbertia prostrata*, Horny Cone-bush *Isopogon ceratophyllus*, Common Beard-heath *Leucopogon virgatus*, Common Rice-flower *Pimelea humilis*, Flame Heath *Astroloma conostephioides*, shrub form Silver Banksia *Banksia marginata*, Showy Parrot-pea *Dillwynia sericea*, *Allocasuarina* spp., Smooth Parrot-pea *D. glaberrima*, Common Flat-pea *Platylobium obtusangulum*, Pink-bells *Tetratheca ciliata* and Common Correa *Correa reflexa* while numerous other (heathy) species are also found. Austral Grass-tree *Xanthorrhoea australis* also forms an important component of this community. Taller shrubs to 5m tall include tree form Silver Banksia *Banksia marginata* and Oyster Bay Cypress-pine *Callitris rhomboidea*.

Forbs do not contribute significantly to the ground cover. Those present include Common Raspwort *Gonocarpus tetragynus*, Bent Goodenia *Goodenia geniculata*, Tall Sundew *Drosera peltata* ssp. *auriculata*, Scented Sundew *Drosera whittakeri*, Variable Stinkweed *Opercularia varia*, Hidden Violet *Viola cleistogamoides* and Button Everlasting *Helichrysum scorpioides*.
Geophytes and graminoids are quite common and diverse. Blue Squill *Chamaescilla corymbosa* var. *corymbosa*, Milkmaids *Burchardia umbellata,* Chocolate Lily *Arthropodium strictum*, Twining Fringe Lily *Thysanotus patersonii* and numerous orchids such as Pink Fingers *Caladenia carnea* spp. agg., Wax-lip Orchid *Glossodia major*, Rabbits-ears *Thelymitra antennifera,* Spotted Sun-orchid *T. ixioides*, Red-beaks *Lyperanthus nigricans* and Greenhood *Pterostylis* spp. Prominent graminoids are Black-anther Flax-lily *Dianella revoluta*, Small-flower Mat-rush *Lomandra micrantha*, Small Mat-rush *L. sororia* and Wattle Mat-rush *L. filiformis*.

Thatch Saw-sedge *Gahnia radula* and Wire Rapier-sedge *Lepidosperma semiteres* are the two dominant sedges. Tassel Rope-rush *Hypolaena fastigata* is frequently present but does not dominate the ground cover as in wetter heath EVCs such as Sand Heathland.

The climbers Downy Dodder-laurel *Cassytha pubescens* and Love Creeper *Comesperma volubile* are typically found intertwining the low heath species.

Grasses are low in diversity and abundance, with Wallaby Grass *Austrodanthonia* spp. and Weeping Grass *Microlaena stipoides* var. *stipoides* usually present. When disturbed by fire a dense cover of Wiry Spear-grass *Austrostipa muelleri* can dominate in some areas of the Park.

There are few significant species in *Sandy Outwash* Heathy Woodland. Those noted include Blotched Sun-orchid r *Thelymitra benthamiana*, Mossy Woodruff r *Asperula minima* and Scented Bush-pea v *Pultenaea graveolens.*

Floristic Community 48-09 *Sand* Heathy Woodland
Sand Heathy Woodland occurs on. gently undulating terrain at the base of slopes and on deep sands on the plains. Soils are deep, well drained, white aeolian and outwash sands

Sand Heathy Woodland has a diverse shrub layer, dominated by narrow-leaved and epacrid shrubs. The taller, narrow-leaved shrubs from 1-1.5m in height include Slender She-oak *Allocasuarina misera,* Silver Banksia *Banksia marginata*, Desert Banksia *B. ornata*, Common Fringe-myrtle *Calytrix tetragona*, Victorian Smoke-bush *Conospermum mitchellii*, Common Correa *Correa reflexa*, Western Furze Hakea *Hakea repullulans,* Bushy Hakea *Hakea sp.* (ex H. sericea sensu Willis 1972), Heath Tea-tree *Leptospermum myrsinoides* and Winged Spyridium *Spyridium vexilliferum*.

Small heaths include Broom Spurge *Amperea xiphoclada* ssp. *xiphoclada*, Flame Heath *Astroloma conostephioides*, Daphne heath *Brachyloma daphnoides*, Blue Tinsel-lily *Calectasia intermedia*, Leadless Bitter-pea *Daviesia brevifolia*, Smooth Parrot-pea *Dillwynia glaberrima*, Showy Parrot-pea *D. sericea,* Common Heath *Epacris impressa,* Common Wedge-pea *Gompholobium huegelii,* Bundled Guinea-flower *Hibbertia prostrata*, Erect Guinea-flower *H. riparia*, Silky Guinea-flower *Hibbertia sericea* s.l., Twiggy Guinea-flower *H. virgata*, Common Hovea *Hovea linearis*, Horny Cone-bush *Isopogon ceratophyllus*, Pink Beard-heath *Leucopogon ericoides*, Common Beard-heath *L. virgatus*, Prickly Broom-heath *Monotoca scoparia*, Prickly Geebung *Persoonia juniperina,* Heathy Phyllota *Phyllota pleurandroides,* Common Rice-flower *Pimelea humilis,* Common Flat-pea *Platylobium obtusangulum,* Golden Heath *Styphelia adscendens* and Pink-bells *Tetratheca ciliata.*

Austral Grass-tree *Xanthorrhoea australis* also forms part of the shrub layer, with Downy Dodder-laurel *Cassytha pubescens* s.s. entwined amongst the shrubs.

The deep, sandy nature limits the variety of herbs in *Sand* Heathy Woodland. Forbs include Common Raspwort *Gonocarpus tetragynus*, Bent Goodenia *Goodenia geniculata* and Button Everlasting *Helichrysum scorpioides.* Few grasses are present, with negligible cover.

Perennial geophytes include Nodding Chocolate-lily *Arthropodium fimbriatum*, Creamy Candles *Stackhousia monogyna* and Grass Trigger-plant *Stylidium graminifolium*.

Other ground covers include Thatch Saw-sedge *Gahnia radula*, Tassel Rope-rush *Hypolaena fastigata*, Scale-shedder *Lepidobolus drapetocoleus* and Black Rapier-sedge *Lepidosperma carphoides*.

EVC 55 Plains Grassy Woodland

Floristic Community 55-02 *Greater Grampians* Plains Grassy Woodland
Greater Grampians Plains Grassy Woodland occurs on shallow, fine sandy clay loams from 20-40cm in depth. These sands overlay drainage-impeding light to medium clays. Laterites are often found where the sand grades into clay. Undulating lower slopes and plains that may occasionally be seasonally inundated are the common landscapes in which *Greater Grampians* Plains Grassy Woodland occurs. Average annual rainfall is low at around 620 mm, but the clay layer not far from the soil surface helps in the retention of some moisture. It is found in the Black Range State Park and adjacent State Forest as well as Dadswells Bridge in the north-eastern end of the Grampians National Park.

The overstorey is typically composed of Yellow Gum *Eucalyptus leucoxylon* and Yellow Box *E. melliodora.* Less frequently, Grey Box *E. microcarpa* occurs as either a pure stand or co-dominant with the first two species mentioned. River Red Gum *E. camaldulensis* can also be present.

Taller shrubs are neither common nor diverse. Those that do occur include Oyster Bay Cypress-pine *Callitris rhomboidea* and Buloke d *Allocasuarina luehmannii.* The understorey is virtually devoid of low shrubs, with the ericoid-leaved Cranberry Heath *Astroloma humifusum* the most common. At much lower frequencies, Flame Heath *Astroloma conostephioides* and Brush Heath *Brachyloma ericoides* occur as scattered small plants.

Grasses dominate the ground layer with the most frequently occurring being Lesser Quaking-grass **Briza minor*, Elegant Hair-grass **Aira elegans*, Common Wheat-grass *Elymus scabrus*, Hair-grass **Aira* spp., Large Quaking-grass **B. maxima,* Weeping Grass *Microlaena stipoides*, Five-awned Spear Grass *Pentapogon quadrifidus*, Kneed Wallaby-grass *Austrodanthonia geniculata* and Fibrous Spear-grass *Austrostipa semibarbata.* Many more grass species occur at lower frequencies and these include Common Blown Grass *Agrostis avenacea var. avenacea*, Velvet Wallaby-grass *Austrodanthonia pilosa* ssp. *coriacea*, Wallaby-grass *Austrodanthonia* spp., Common Plume-grass *Dichelachne rara*, Squirrel-tail Fescue **Vulpia bromoides*, Long-hair Plume-grass *Dichelachne crinita*, Fox-tail Mulga-grass *Neurachne alopecuroidea*, Grey Tussock-grass *Poa sieberiana* var. *sieberiana*, Hill Wallaby-grass *Austrodanthonia eriantha*, Rough Spear-grass *Austrostipa scabra* ssp. *falcata*, Kangaroo Grass *Themeda triandra* and Rat's-tail Fescue **Vulpia myuros* forma *myuros*.

Forbs are also well represented although accounting for less cover than grasses. Stinking Pennywort *Hydrocotyle laxiflora*, Cat's ear **Hypochoeris radicata*, Sheep's Burr *Acaena echinata*, Austral Carrot *Daucus glochidiatus*, Small St John's Wort *Hypericum gramineum*, Solenogyne *Solenogyne dominii*, Pimpernel **Anagallis arvensis,* Creeping Cudweed *Euchiton gymnocephalus*, Scaly Buttons *Leptorhynchos squamatus* and Hop Clover **Trifolium campestre* occur frequently in this community.

Perennial geophytes are also present in spring. These include Chocolate-lily *Arthropodium strictum*, Nodding Chocolate-lily *A. fimbriatum,* Yellow Rush-lily *Tricoryne elatior,* Common Onion-orchid *Microtis unifolia*, Milkmaids *Burchardia umbellata,* Common Onion-grass **Romulea rosea* var. *australis* and Blue Squill *Chamaescilla corymbosa* var. *corymbosa*.

Dwarf Mat-rush *Lomandra nana,* Dwarf Rush **Juncus capitatus*, Finger Rush *J. subsecundus*, Wattle Mat-rush *Lomandra filiformis* ssp. *coriacea* and Small Mat-rush *L. sororia* collectively represent the rush lifeform. Due to the drier nature of this environment, sedges are not present in high numbers, with Common Bog-sedge *Schoenus apogon* and Tiny Flat-sedge **Cyperus tenellus* the only common sedges.

The large number of introduced species reflects the fertility of the soil and the proximity of most quadrats to public land boundaries and adjacent farmland. In addition, past and ongoing disturbance from grazing and timber harvesting adds to the high weed numbers.

Significant species in this EVC are Buloke d *Allocasuarina luehmannii*, Hairy-tails e *Ptilotus erubescens,* Small Milkwort v *Comesperma polygaloides,* Early Golden Moths k *Diuris* sp. aff. *lanceolata* (Derrinallum), Trailing Hop-bush Vv *Dodonaea procumbens*, Quinetia r *Quinetia urvillei*, Corkscrew Spear-grass r *Austrostipa setacea* and Yucca r *Xanthorrhoea caespitosa.*

Floristic Community 55-04 *Western Basalt* Plains Grassy Woodland

Western Basalt Plains Grassy Woodland occupies a very small area of an easement adjoining the Grampians National Park on the south-western side of the Wannon River. The basalt geology gives rise to a suite of species different to the surrounding vegetation. Tussocks of *Poa* sp. line the banks of the creek up to the abutting farmland, with other grasses present including many weed species.

EVC 67 Alluvial Terraces Herb-rich Woodland

Floristic Community 67-02 *Grampians* Alluvial Terraces Herb-rich Woodland

Within the study area, *Grampians* Alluvial Terraces Herb-rich Woodland occurs on broad alluvial flood plains, drainage lines and shallow moist depressions of the Glenelg and Wannon River systems. Due to its low position in the topographic profile, *Grampians* Alluvial Terraces Herb-rich Woodland is often subject to seasonal water inundation. The soils are poorly drained duplex soils with sandy loam to 30cm deep, overlying medium to heavy mottled clay. A layer of buckshot gravel is often found at the boundary of the sand/clay horizon. Floristic comparisons with this EVC in the Goldfields Bioregion (Muir et al., 1995) indicate this is a separate community which is endemic to the Grampians.

The most common overstorey species in this open woodland is River Red Gum *Eucalyptus camaldulensis* 20-30m tall. Occasionally River Red Gum is co-dominant with or replaced by Yellow Box *E. melliodora* or Scentbark *E. aromaphloia*. The open nature of the canopy, in some circumstances, may be an artefact of past timber harvesting.

The most striking structural feature of this community is the high diversity of the ground layer, along with its low biomass, especially in summer. The most characteristic feature of *Grampians* Alluvial Terraces Herb-rich Woodland is the ground layer that is rich in forbs, many of which are annuals. Annual herbs include, Slender Cicendia **Cicendia filiformis*, Smooth Cat's Ear **Hypochoeris glabra*, Pimpernel **Anagallis arvensis*, Dwarf Aphelia *Aphelia pumilo*, Small Wrinklewort *Siloxerus multiflorus*, Slender Aphelia *Aphelia gracilis* and Yellow Pennywort *Hydrocotyle foveolata*. Perennial herbs include Pointed Centrolepis *Centrolepis aristata*, Hairy Centrolepis *C. strigosa* ssp. *strigosa*, Cat's Ear **Hypochoeris radicata,* Pale Sundew *Drosera peltata* ssp. *peltata,* Small St John's Wort *Hypericum gramineum* and Solenogyne *Solenogyne dominii.*

The perennial geophytes Blue Squill *Chamaescilla corymbosa*, Sheath Star *Hypoxis vaginata*, Common Early Nancy *Wurmbea dioica*, Pink Fingers *Caladenia carnea,* Yellow Bulbine-lily *Bulbine bulbosa*, Milkmaids *Burchardia umbellata* and Twining Fringe-lily *Thysanotus patersonii* also commonly occur.

Common sedges that indicate seasonally moist conditions are Tiny Flat-sedge **Cyperus tenellus*, Common Bog-sedge *Schoenus apogon*, Dwarf Rush **Juncus capitatus,* Toad Rush *J. bufonius,* Finger Rush *J. subsecundus,* Floating Club-sedge *Isolepis fluitans* and Little Club-sedge *I. marginata.*

Frequently occurring grasses are Lesser Quaking-grass **Briza minor* and Weeping Grass *Microlaena stipoides,* Elegant Hair-grass **Aira elegans,* Wallaby Grass *Austrodanthonia* spp., Squirrel-tail Fescue **Vulpia bromoides*, Common Onion-grass **Romulea rosea* var. *australis*, Bristly Wallaby-grass *Austrodanthonia setacea,* Five-awned Spear-grass *Pentapogon quadrifidus* and Grey Tussock-grass *Poa sieberiana.*

The disturbance by past timber harvesting and often heavy grazing by rabbits and marsupials is reflected in the large number of weeds.

Mossy Woodruff r *Asperula minima*, Buloke d *Allocasuarina luehmannii* and wetland Blown Grass k *Agrostis avenacea* var. *perennis* are the significant species recorded in this floristic community.

EVC 71 Hills Herb-rich Woodland

Hills Herb-rich Woodland is a dry open woodland often with no discernible shrub layer. Its floristic composition is dominated by a carpet of forbs and grasses. The dry nature of the environment is favourable for annual herbs, with the fertile nature of the various geologies also supporting perennial herbs. The environment can vary from relatively flat ground to ridge tops on sedimentary sandstones (along seams of mineral-rich sandstone) and on undulating, rounded, granite hill landforms.

Floristic Community 71-01 *Granitic* Hills Herb-rich Woodland

Granitic Hills Herb-rich Woodland occurs on Palaeozoic granite and granodiorite. Parent rock is often close to the soil surface and in some instances outcrops as large rocky boulders. The soils are coarse, sandy loams, thereby having a poor water-holding capacity. Topography varies from relatively flat ground, to west and north facing slopes and to ridge tops. The exposed aspects that *Granitic* Hills Herb-rich Woodland inhabits are subjected to scorching summer heat, thereby limiting the range of species that can survive. Subsequently, annual herbs are an important feature of this community, growing and setting seed before the summer heat.

A variety of eucalypts form the overstorey of *Granitic* Hills Herb-rich Woodland. At any one site there can be up to 5 eucalypt species, however more commonly there are only two or three. Messmate *Eucalyptus obliqua* and Yellow Box *E. melliodora* are co-dominant, with Scentbark *E. aromaphloia* and Long-leaf Box *E. goniocalyx* often co-occurring. River Red Gum *E. camaldulensis* often co-occurs with Yellow Box. Black Wattle *Acacia mearnsii* is often the only understorey tree present.

The shrub layer is sparse and species-poor, with Daphne Heath *Brachyloma daphnoides* and Heath Tea-tree *Leptospermum myrsinoides* the only common shrub above 0.5m. The shallow soil over the parent rock prevents many shrub species from dominating, with only the small ground-hugging shrubs common. Flame Heath *Astroloma conostephioides*, Cranberry Heath *A. humifusum*, Common Rice-flower *Pimelea humilis*, Honey Pots *Acrotriche serrulata* and Common Beard-heath *Leucopogon virgatus* form the characteristic small clumps scattered amongst a carpet of grasses and forbs. Another indicative feature of *Granitic* Hills Herb-rich Woodland is the Austral Grass-tree *Xanthorrhoea australis.* It is often the only plant above 0.5m and can be quite common.

The enormous variety of herbs that inhabit *Granitic* Hills Herb-rich Woodland make it one of the most species-rich communities in the world (Lunt, 1990). Weeping Grass *Microlaena stipoides* occurs at all sites, forming a 'lawn' from which macropods and rabbits graze. Various forbs proliferate amongst the carpet of Weeping Grass. Perennial forbs that prevail include Grassland Wood-sorrel *Oxalis perennans*, Small Poranthera *Poranthera microphylla*, Austral Carrot *Daucus glochidiatus*, Common Raspwort *Gonocarpus*

tetragynus, Stinking Pennywort *Hydrocotyle laxiflora*, Cat's Ear **Hypochoeris radicata*, Hidden Violet *Viola cleistogamoides*, Yellow Pennywort *Hydrocotyle foveolata*, Smooth Cat's Ear **H. glabra*, Common Lagenifera *Lagenifera stipitata* and Cotton Fireweed *Senecio quadridentatus*. Perennial geophytes include Pink Fingers *Caladenia carnea* spp. agg., Blue Squill *Chamaescilla corymbosa* var. *corymbosa*, Yam Daisy *Microseris scapigera* spp. agg. and Twining Fringe-lily *Thysanotus patersonii*. Small annual forbs are also common. These include Wiry Mitrewort *Mitrasacme paradoxa*, Hairy Centrolepis *Centrolepis strigosa* ssp. *strigosa*, Spoon Cudweed *Stuartina muelleri*, Dwarf Aphelia *Aphelia pumilio*, Pointed Centrolepis *Centrolepis aristata*, Soft Millotia *Millotia tenuifolia*, Small Wrinklewort *Siloxerus multiflorus* and Annual Bluebell *Wahlenbergia gracilenta* s.l.

Larger graminoids include Black-anther Flax-lily *Dianella revoluta*, Wattle Mat-rush *Lomandra filiformis*, Small Mat-rush *L. sororia* and Dwarf Mat-rush *L. nana*.

There are few species of significance in *Granitic* Hills Herb-rich Woodland, which is surprising for such a species-rich community. Mossy Woodruff r *Asperula minima* and Quinetia r *Quinetia urvillei* are the only recorded significant species.

Floristic Community 71-02 *Fertile* Hills Herb-rich Woodland
Fertile Hills Herb-rich Woodland occurs on intrusive igneous geology such as quartz porphyry, Cambrian chert and greenstone and on soft siltstone and sandstone. Seams of mineral-rich siltstone and sandstone are exposed where Golton Creek and Briggs Creek have cut through the harder Red Man Bluff geologies just north of Roses Gap. These seams are occupied by *Fertile* Hills Herb-rich Woodland. Soils are sandy loams over light to medium clays or shallow sandy loams over rock. Sites are in a variety of ecological niches such as on gentle to moderate slopes, around rocky outcrops, along gullies and on steep rocky slopes.

Yellow Box *Eucalyptus melliodora* is the dominant eucalypt with sub-dominants including River Red Gum *E. camaldulensis* and Yellow Gum *E. leucoxylon* on flatter terrain and Long-leaf Box *E. goniocalyx* on steeper slopes. Black Wattle *Acacia mearnsii* is also present.

Shrubs are sparse, with only the small ground-hugging plants present. Cranberry Heath *Astroloma humifusum* frequently occurs, with the next most common shrub being Flame Heath *A. conostephioides.* Upright Guinea Flower *Hibbertia stricta* s.l. and Common Rice-flower *Pimelea humilis* are less common. Taller shrubs found include Daphne Heath *Brachyloma daphnoides* and Heath Tea-tree *Leptospermum myrsinoides.*

A carpet of Weeping Grass *Microlaena stipoides* var. *stipoides* is common, interspersed with numerous annual and perennial herbs. Perennial herbs include Stinking Pennywort *Hydrocotyle laxiflora,* Sheep's Burr *Acaena echinata*, Austral Carrot *Daucus glochidiatus*, Yellow Pennywort *H. foveolata*, Small St John's Wort *Hypericum gramineum*, Cat's Ear **Hypochoeris radicata*, Cotton Fireweed *Senecio quadridentatus*, Smooth Cat's Ear **H. glabra*, Small Poranthera *Poranthera microphylla*, Pointed Centrolepis *Centrolepis aristata*, Hairy Centrolepis *Centrolepis strigosa* ssp. *strigosa*, Creeping Cudweed *Euchiton gymnocephalus* s.s and Tall Bluebell *Wahlenbergia stricta* ssp. *stricta*. Annual herbs are also important in *Fertile* Hills Herb-rich Woodland and include Wiry Mitrewort *Mitrasacme paradoxa*, Pimpernel **Anagallis arvensis*, Spoon Cudweed *Stuartina muelleri*, Yellow Sebaea *Sebaea ovata*, Dwarf Aphelia *Aphelia pumilio*, Small Wrinklewort *Siloxerus multiflorus* and Annual Bluebell *Wahlenbergia gracilenta* s.l. Two other weedy grasses can be found amongst the Weeping Grass and these are Lesser Quaking-grass **Briza minor* and Elegant Hair-grass **Aira elegans*. Perennial geophytes are not common, but include Blue Squill *Chamaescilla corymbosa* var. *corymbosa* and Yellow Bulbine-lily *Bulbine bulbosa*.

An important indicator species for *Fertile* Hills Herb-rich Woodland is Green Rock Fern *Cheilanthes austrotenuifolia*. The small sedge Common Bog-sedge *Schoenus apogon* and Dwarf Rush **Juncus capitatus* are the only commonly occurring sedge species. Dwarf Mat-rush *Lomandra nana* and Black-anther Flax-lily *Dianella revoluta* are the only consistently represented graminoids.

Species of significance include Mossy Woodruff r *Asperula minima*, Small Milkwort v *Comesperma polygaloides*, Clover Glycine Vv *Glycine latrobeana*, Ribbed Bush-pea Rr *Pultenaea costata* and Blotched Sun-orchid r *Thelymitra benthamiana.*

EVC 134 Sand Forest

Floristic Community 134-02 *Grampians* Sand Forest
Grampians Sand Forest occurs on deep sand dunes, possibly aeolian in nature. The sand is well-drained and subsequently, the soil is very dry, supporting few shallow-rooted plants. This EVC is similar in appearance to *Grampians* Damp Sands Herb-rich Woodland, with Austral Bracken *Pteridium esculentum* forming a dense ground cover. However, the deep sands are much further from the water table in *Grampians* Sand Forest and thus, the environment is much drier, supporting fewer herbs. This EVC often abuts farmland where it has been cleared.

Tree species that are present in *Grampians* Sand Forest are Brown Stringybark *Eucalyptus baxteri*, River Red Gum *E. camaldulensis* and Messmate *E. obliqua*. Trees are often tall, but can also be of a woodland nature, similar to that of *Sand* Heathy Woodland, which often abuts this community.

Black Wattle *Acacia mearnsii* and tree form Silver Banksia *Banksia marginata* are the most common understorey trees, often to 15m. Beneath this, is a layer of sparse, smaller heaths which include Flame Heath *Astroloma conostephioides*, Cranberry Heath *A. humifusum*, Daphne Heath *Brachyloma daphnoides*, Bundled Guinea-flower *Hibbertia prostrata*, Heath Tea-tree *Leptospermum myrsinoides and* Manuka *L. scoparium*.

Forbs are almost absent, with the occasional individual plant beneath the dense Austral Bracken layer. Herbs present include Mossy Woodruff r *Asperula minima*, *Hydrocotyle laxiflora*, Smooth Cat's Ear **Hypochoeris glabra* and Small Poranthera *Poranthera microphylla.* A few grasses are dispersed across the sand, but they do not form a lawn as in *Grampians* Damp Sands Herb-rich Woodland. Grasses include *Aira* sp., Weeping Grass *Microlaena stipoides* var. *stipoides*, *Poa* spp. and *Vulpia* sp.

EVC 136 Sedge Wetland
Sedge Wetland occurs on the fringes of open freshwater swamps. It is a transition zone between Shallow Freshwater Marsh and Sedge-rich Wetland and other seasonally inundated EVCs. During the wetter months it is covered in water of varying depths but the water recedes over the drier months, leaving Shallow Freshwater Marsh the only community submerged.

Eucalypt species are often absent from Sedge Wetland as the environment is too wet. When River Red Gum *Eucalyptus camaldulensis* does occur, it often overhangs from surrounding vegetation communities, which are seasonally inundated for much shorter periods.

Shrubs are most often absent from this EVC, although occasionally River Tea-tree *Leptospermum obovatum* may form a dense stand with Downy Dodder-laurel *Cassytha pubescens s.s.* tangled amongst it.

Dominating above the water surface are sedge and rush species. Fine/Soft Twig-sedge *Baumea arthrophylla/rubiginosa*, Common Spike-sedge *Eleocharis acuta,* Floating Club-sedge *Isolepis fluitans* and Joint-leaf Rush *Juncus holoschoenus* are the most common. Combined with the some of the following species, Square Twig-sedge *Baumea tetragona,* Rush Sedge *Carex tereticaulis*, Hollow Rush *Juncus amabilis*, Pale Rush *J. pallidus*, Tall Rush *J. procerus*, Tassel Cord-rush *Restio tetraphyllus* ssp. *tetraphyllus,* Soft Bog-sedge *Schoenus tesquorum* and *Typha* spp., sedges become the dominant life form protruding from the water.

The environment amongst the sedges is occupied by various aquatic and semi-aquatic herbs. Streaked Arrow-grass *Triglochin striatum* has a high cover at all sites. Other water-dwelling species include Running Marsh-flower *Villarsia reniformis*, Water Starwort **Callitriche hamulata*, Australian Lilaeopsis *Lilaeopsis polyantha*, Amphibious Milfoil *Myriophyllum simulans*, White Purslane *Neopaxia australasica* and Floating Pondweed *Potamogeton tricarinatus* s.l.

Whilst Sedge Wetland is covered with water for most parts of the year, some species suggest that the water does recede to some extent over summer. These species include *Lobelia/Isotoma* spp., *Poaceae* spp., Shade Raspwort *Gonocarpus humilis*, Swamp Goodenia *Goodenia humilis*, Hairy Hawkbit **Leontodon taraxacoides* and Small Poranthera *Poranthera microphylla*.

EVC 184 Montane Wet Heathland

Floristic Community 184-01 *Grampians* Montane Wet Heathland
Grampians Montane Wet Heathland occurs at an average altitude of 1030m on the Major Mitchell Plateau and also on D'Altons peak in the Serra Range. It inhabits wet soak depressions, narrow gullies and the headwaters of the First Wannon Creek, where the soil is a little deeper and moister than the surrounding *Grampians* Montane Rocky Shrubland. Rock is, however, at or very close to the soil surface. On the Major Mitchell Plateau annual average rainfall is 1200mm, with cloud cover to ground level supplementing precipitation. *Grampians* Montane Wet Heathland is similar structurally to Wet Heathland, but contains fewer plants and occurs at much higher elevations.
For the most part, *Grampians* Montane Wet Heathland is treeless, with small spindly Victoria Range Gum *Eucalyptus victoriana* (now included in *E. baxteri*) the most common. Sporadic occurrences of Snow Gum r *E. pauciflora* ssp. *pauciflora* (now included in *E. pauciflora* ssp. *pauciflora*) and Scentbark *E. aromaphloia* (often synonymous with *E. viminalis* ssp. *cygnetensis*).are also recorded.

The shrub layer is quite dense with common shrubs including Prickly Tea-tree *Leptospermum continentale*, Shiny Tea-tree *L. turbinatum*, Mealy

Honey-myrtle *Melaleuca squamea*, Showy Parrot-pea *Dillwynia sericea*, Hairy Boronia *Boronia pilosa*, Rosy Bush-pea Rr *Pultenaea subalpina*, Pink Swamp-heath *Sprengelia incarnata*, Common Heath *Epacris impressa*, Manuka *L. scoparium* and Thyme Beard-heath *Leucopogon thymifolius*.

The ground is dominated by a combination of sedges and rushes. Red-fruit Saw-sedge *Gahnia sieberiana,* Branching Scale-rush *Lepyrodia tasmanica* and Flat Cord-rush *Restio complanatus* are present at all sites. Other common species include Common Rapier-sedge *Lepidosperma filiforme* and Spreading Rope-rush *Empodisma minus*.

The high sedge and rush density, combined with the dense shrub layer, subsequently leaves little light or substrate for herbs to establish and hence they are not a large component of this community. Grey-beard Grass *Amphipogon strictus* var. *setifer* and Matted Tussock-grass *Poa clelandii* are the only grass species, with Purple Bladderwort *Utricularia dichotoma* and Grass Trigger-plant *Stylidium graminifolium* the only forbs recorded.

Significant species occurring in *Grampians* Montane Wet Heathland are Victoria Range Gum r *Eucalyptus victoriana*, Rosy Bush-pea Rr *Pultenaea subalpina* and Snow Gum r *Eucalyptus pauciflora* ssp. *pauciflora*.

EVC 191 Riparian Scrub
Riparian Scrub forms a dense thicket along creeks and in gullies where spring water or underground streams provide constant moisture. The streams have a flat profile and are narrow, with variable seasonal flows. Soils are dark, fine sandy loams, anaerobic and high in organic matter. Riparian Scrub is common and occurs in a number of ecological niches. These include where streams emerge from the rocky ranges and meet the sandy, heathy outwash system; along major rivers such as the Wannon River where it alternates with patches of Sedgy Riparian Woodland and sometimes forms complexes with this floristic community and occasionally as broad flat expanses, on creeks within the Glenelg River catchment.

Eucalypts are often absent from Riparian Scrub but when they do occur, they overhang from adjacent communities. Even so, a structural domain of tree-covered Riparian Scrub has been mapped and isolated from a treeless version in the mapping. The treeless version of Riparian Scrub often has Wet Heathland associated with it and is possibly closer to the Wet Heathland floristic community than the treed version which is more likely to be situated in better drained valleys. Swamp Gum *Eucalyptus ovata* is the most common eucalypt with Brown Stringybark *Eucalyptus baxteri* or Messmate *E. obliqua,* 6-25m tall, being occasional species overhanging the dense thicket.

One of the main structural features of Riparian Scrub is a dense and impenetrable thicket of Scented Paperbark *Melaleuca squarrosa* 2-6m tall, which is frequently entangled with Coral-fern *Gleichenia* spp.. In areas where the Scented Paperbark is a little more open, Button Grass *Gymnoschoenus sphaerocephalus* and Pink Swamp-heath *Sprengelia incarnata* are common. Understorey shrubs present include Prickly Tea-tree *Leptospermum continentale*, Woolly Tea-tree *L. lanigerum* and Prickly Moses *Acacia verticillata*.

Spreading Rope Rush *Empodisma minus* is found at all sites climbing amongst the shrubs, together with Pouched Coral Fern *Gleichenia dicarpa* and Scrambling Coral Fern *G. microphylla*. The sedges, Square Twig-sedge *Baumea tetragona,* Red-fruit Saw-sedge *Gahnia sieberiana* and Slender Bog-sedge *Schoenus lepidosperma*, and the restionaceous species, Slender Twine-rush *Leptocarpus tenax* and Flat Cord-rush *Restio complanatus* are found beneath the shrub layer.

Although accounting for only a small proportion of the ground cover, the forbs Tufted Centrolepis *Centrolepis fascicularis*, Forked Sundew *Drosera binata*, Hairy Mitrewort *Mitrasacme pilosa*, and Purple Bladderwort *Utricularia dichotoma* are often present. The graminoid Tall Yellow-eye *Xyris operculata* is also common as is the grass Slender Tussock-grass *Poa tenera*.

This EVC shows floristic similarities to Wet Heathland, but differs most noticeably by the tall dense thickets of *Melaleuca squarrosa* intertwined with *Gleichenia* spp.
Smooth Tea-tree K *Leptospermum glabrescens* s.l. is the only significant species recorded in this EVC for the study area.

EVC 192 Montane Rocky Shrubland
Montane Rocky Shrubland is an EVC with a restricted distribution, occurring on rocky sites with a mean elevation of around 1050m. It occurs in the study area on Mt. William, Major Mitchell Plateau and the Victoria Range, including Mt. Thackeray. Field observations also indicate its presence in the Serra Range on Mt. Rosea and D'Alton Peaks.

Annual rainfall is above 1200mm and precipitation is supplemented by cloud cover to ground level. Snow and strong winds lead to wind-pruned and layered shrubs except where shelter in narrow gullies permits taller plants to develop. Montane Rocky Shrubland usually occurs on gentle to moderate slopes on exposed mountain tops and plateaus. Soils are well-drained skeletal sandy loams, varying in depth between sedimentary rocks and boulders and overlaying rocky outcrops.

Montane Rocky Shrubland is one of the most species-poor communities in the study area. There are 4 floristic communities within this EVC. The first community is more species rich and specifically has more forbs and grasses than the second community, however both are rich in shrub species and have stunted eucalypts. The third community occurs in gullies on the Major Mitchell Plateau and is the most species poor of the four communities. The fourth community is uncommon and occurs only as small patches on the steep south-east escarpment of the Major Mitchell Plateau.

Floristic Community 192-01 *Mt. William* Montane Rocky Shrubland
This floristic community is restricted to the Mt William Range, occurring on the upper slopes of Mt William and on steep slopes around the perimeter of the Major Mitchell Plateau. Rainfall for this community is high, with low cloud cover for much of the winter contributing to a higher effective rainfall. Soils are shallow between slabs of rock and boulders. Tree and shrub species are short in stature due to exposure to strong winds.

An overstorey of eucalypts is usually absent, with eucalypts commonly forming part of the shrub layer. Where present, the Victoria Range Gum r *Eucalyptus victoriana* (now included in *E. baxteri*) is the most common eucalypt species, typically less than 3m in height. Only at lower altitudes do the eucalypts, Brown Stringybark *E. baxteri,* Messmate *E. obliqua* and *E. viminalis/rubida* attain heights in excess of 5m.

The most characteristic feature of *Mt William* Montane Rocky Shrubland is the diversity of broad, narrow and ericoid-leaved shrubs that form a dense layer to 2m tall. Beneath the shrub layer is a variable covering of restionaceous species, sedges and herbs. Exposed rocks typically account for at least 50% of the ground area and are covered in lichen and moss.

The most common shrub species are Spike Wattle *Acacia oxycedrus*, Pine Heath *Astroloma pinifolium,* Rock Banksia r *Banksia saxicola,* Snow Myrtle *Calytrix alpestris,* Thyme Beard-heath *Leucopogon thymifolius*, Green She-oak *Allocasuarina paradoxa,* Victorian Smoke-bush *Conospermum mitchellii,* Rock Rose Guinea-flower r *Hibbertia cistiflora ssp. rostrata,* Heath Tea-tree *Leptospermum myrsinoides,* Rosy Bush-pea Rr *Pultenaea subalpina,* Silver Banksia *Banksia marginata,* Dwarf Boronia *Boronia nana* var. *pubescens,* Oyster Bay Cypress-pine *Callitris rhomboidea,* Mountain Correa *Correa lawrenciana*, Grampians Parrot-pea r *Dillwynia oreodoxa*, Common Heath *Epacris impressa,* Shiny Tea-tree *Leptospermum turbinatum* and Mount William Beard-heath Rr *Leucopogon neurophyllus.*

The sedges Red-fruit Saw-sedge *Gahnia sieberiana,* Flat Cord-rush *Restio complanatus,* Common Bog-sedge *Schoenus apogon,* and Common Rapier-sedge *Lepidosperma filiforme* are common, but not abundant.

Herbs are low in cover and the only forb present is Cat's Ear **Hypochoeris radicata*. Perennial geophytes include Orchidaceae spp, Grass Trigger-plant *Stylidium graminifolium* and Grampians Trigger-plant *Stylidium soboliferum*. Grasses are generally sparse and include Matted Tussock-grass *Poa clelandii,* Wallaby Grasses *Austrodanthonia* spp. and Yorkshire Fog **Holcus lanatus*.

There are 7 significant species in *Mt William* Montane Rocky Shrubland, 6 of which are endemic to the Grampians and Black Range. A majority of these species occur only at higher altitudes, including Rock Banksia r *Banksia saxicola*, Grampians Bossiaea r *Bossiaea rosmarinifolia*, Grampians Parrot-pea r *Dillwynia oreodoxa*, Victoria Range Gum r *Eucalyptus. victoriana*, Rock Rose Guinea-flower r *Hibbertia cistiflora* ssp. *rostrata*, Mount William Beard-heath Rr *Leucopogon neurophyllus,* and Rosy Bush-pea Rr *Pultenaea subalpina*.

Floristic Community 192-02 *Grampians* Montane Rocky Shrubland
Grampians Montane Rocky Shrubland occurs on the Major Mitchell Plateau, in the Victoria Range including Mount Thackeray and isolated patches on the higher peaks of the Serra Range at an average altitude of 1030m. In the Victoria Range, it occurs on slabs of loose rock and boulders whereas on the Major Mitchell Plateau the environment is more flat and open.

An overstorey of eucalypts is usually absent, however, if eucalypts do occur they commonly form part of the shrub layer. Victoria Range Gum r *Eucalyptus victoriana* (now included in *E. baxteri*) is the most common eucalypt species, typically less than 3m. There are, however, taller treed versions of this community on the Major Mitchell Plateau.

Grampians Montane Rocky Shrubland is species poor with shrubs dominating over a sparse ground layer of forbs, grasses and perennial geophytes. The common shrubs include Shiny Tea-tree *Leptospermum turbinatum*, Spike Wattle *Acacia oxycedrus,* Silver Banksia *Banksia*

marginata, Hairy Boronia *Boronia pilosa*, Common Heath *Epacris impressa,* Mount William Beard-heath Rr *Leucopogon neurophyllus*, Thyme Beard-heath *L. thymifolius*, Manuka *Leptospermum scoparium*, Notched Phebalium *Phebalium bilobum*, Pink-bells *Tetratheca ciliata*, Slender She-oak *Allocasuarina misera*, Pine Heath *Astroloma pinifolium*, Rock Banksia r *Banksia saxicola*, Showy Parrot-pea *Dillwynia sericea*, Heath Tea-tree *Leptospermum myrsinoides* and Shrubby Platysace *Platysace lanceolata*.

Sedges are the only other commonly occurring lifeform and include Red-fruit Saw-sedge *Gahnia sieberiana*, Common Rapier-sedge *Lepidosperma filiforme* and Slender Bog-sedge *Schoenus lepidosperma*. Flat Cord-rush *Restio complanatus* can also form dense mats over the rock strata on the Major Mitchell Plateau.

This community is also notable for its eleven significant species including Victoria Range Gum r *Eucalyptus victoriana*, Mount William Beard-heath Rr *Leucopogon neurophyllus,* Rock Banksia r *Banksia saxicola*, Grampians Parrot-pea r *Dillwynia oreodoxa*, Grampians Broom-heath Rr *Monotoca billawinica*, Rosy Bush-pea Rr *Pultenaea subalpina,* Grampians Boronia Rr *Boronia latipinna*, Grampians Bossiaea r *Bossiaea rosmarinifolia*, Swamp Flax-lily v *Dianella callicarpa*, Grampians Grevillea Rr *Grevillea confertifolia* and Short-leaf Bog-sedge r *Schoenus laevigatus*.

Floristic Community 192-03 *Gully* Montane Rocky Shrubland
Gully Montane Rocky Shrubland occurs on the Major Mitchell Plateau in protected gullies. Rocky boulders cover most of the area, with shrubs and trees growing on soil substrate between these boulders.

The only dominant tree is Serra Range Gum r *Eucalyptus serraensis,* ranging in height from 4-8m.
Shrubs account for 65% of the lifeforms in this community and include Spike Wattle *Acacia oxycedrus*, Rock Banksia r *Banksia saxicola*, Grampians Boronia Rr *Boronia latipinna*, Mountain Correa *Correa lawrenciana*, Manuka *Leptospermum scoparium*, Shiny Tea-tree *L. turbinatum*, Mount William Beard-heath Rr *Leucopogon neurophyllus*, Notched Phebalium *Phebalium bilobum*, Rosy Bush-pea Rr *Pultenaea subalpina*, Mountain Hickory Wattle *Acacia obliquinervia*, Grampians Bossiaea r *Bossiaea rosmarinifolia*, Smooth Parrot-pea *Dillwynia glaberrima*, Grampians Parrot-pea r *D. oreodoxa*, Common Heath *Epacris impressa*, Rock Rose Guinea-flower r *Hibbertia cistiflora* ssp. *rostrata*, Prickly Tea-tree *Leptospermum continentale*, Totem-poles *Melaleuca decussata*, Netted Daisy-bush *Olearia speciosa*, Victorian Christmas-bush *Prostanthera lasianthos* and Pink-bells *Tetratheca ciliata.*

The ground layer is sparse, with Grey Tussock-grass *Poa sieberiana* var. *hirtella* and Red-fruit Saw-sedge *Gahnia sieberiana* the only species that occur at both sites. Necklace Fern *Asplenium flabellifolium* also occurs at both sites, nestled in moist boulder overhangs. Other ferns include Bat's Wing Fern *Histiopteris incisa* and Austral Bracken *Pteridium esculentum*. Giant Mountain Grass *Dryopoa dives* and Flat Cord-rush *Restio complanatus* are also present.

Rare plants recorded include Rock Banksia r *Banksia saxicola,* Grampians Boronia Rr *Boronia latipinna*, Mount William Beard-heath Rr *Leucopogon neurophyllus*, Rosy Bush-pea Rr *Pultenaea subalpina*, Grampians Bossiaea r *Bossiaea rosmarinifolia*, Grampians Parrot-pea r *Dillwynia oreodoxa* and Rock Rose Guinea-flower r *Hibbertia cistiflora* ssp. *rostrata.*

Floristic Community 192-04 *Escarpment* Montane Rocky Shrubland
Escarpment Montane Rocky Shrubland occurs on the protected, steep, precipitous southerly slopes of the Major Mitchell Plateau. It grows on the plateau escarpment, in small protected pockets where snow may lie for the longest periods. Whilst the vegetation is quite stunted, *Escarpment* Montane Rocky Shrubland would have some protection from strong winds, whilst still receiving high annual rainfall and often cloud cover to ground level. It occurs at an average altitude of 1130m, on 31 - 34° slopes.

Escarpment Montane Rocky Shrubland is the only floristic community of Montane Rocky Shrubland to have Snow Gum r *E. pauciflora* ssp. *pauciflora* (now included in *E. pauciflora ssp. pauciflora*) as the dominant eucalypt species. The trees are stunted, growing no more than 5m in height. Victoria Range Gum r *Eucalyptus victoriana* (now included in *E. baxteri*) is also occasionally present.
Shrubs are a dominant feature of this floristic community and include Pine Heath *Astroloma pinifolium*, Silver Banksia *Banksia marginata*, Grampians Bossiaea r *Bossiaea rosmarinifolia*, Showy Parrot-pea *Dillwynia sericea*, Shiny Tea-tree *Leptospermum turbinatum*, Mount William Beard-heath Rr *Leucopogon neurophyllus*, Thyme Beard-heath *L. thymifolius*, Slender Rice-flower *Pimelea linifolia*, Prickly Bush Pea *Pultenaea juniperina* s.l. and Pink-bells *Tetratheca ciliata*.

Another distinctive floristic feature of *Escarpment* Montane Rocky Shrubland is the presence of Spreading Rope-rush *Empodisma minus.* It forms a dense mat beneath the Snow Gum and even climbs part way up the shrubs and trees. Amongst the Spreading Rope-rush, grasses present include Grey-beard Grass *Amphipogon strictus* var. *setifer*, Matted Tussock-grass *Poa clelandii*, Grey Tussock-grass *P. sieberiana* var. *hirtella* Grey Tussock-grass *P. sieberiana* var *sieberiana* and Heath Bent-grass *Deyeuxia dens.*

Forbs and geophytes are present in low numbers with low cover and include Silver Daisy *Celmisia asteliifolia spp. agg*., Tall Sundew *Drosera peltata* ssp. *auriculata*, Turquoise Berry *Drymophila cyanocarpa*, Button Everlasting *Helichrysum scorpioides* and Grass Trigger-plant *Stylidium graminifolium.*

Escarpment Montane Rocky Shrubland has 6 plants of significance including Grampians Bossiaea r *Bossiaea rosmarinifolia*, Snow Gum r *Eucalyptus pauciflora* ssp. *pauciflora*, Mount William Beard-heath Rr *Leucopogon neurophyllus*, Rock Banksia r *Banksia saxicola*, Victoria Range Gum r *E. victoriana* and Rosy Bush-pea Rr *Pultenaea subalpina*.

EVC 193 Rocky Outcrop Herbland

Floristic Community 193-01 *Grampians* Rocky Outcrop Herbland
Grampians Rocky Outcrop Herbland is common and widespread within the study area. Due to the spectacular rock formations it is associated with, it is one of the most notable features of the Grampians National Park. *Grampians* Rocky Outcrop Herbland occurs primarily on the Palaeozoic sandstones that form the main ranges of the Grampians and less frequently on granitic outcrops. This community most frequently occurs on northern and western aspects, on quite steep mid to upper slopes. It grows on exposed rocky substrates, mostly in the form of outcropping bedrock or less frequently on large rocks and boulders. Due to the harsh environment of this EVC, plants are either short-lived forbs, perennial geophytes or possess water conserving strategies such as succulency or resurrection capabilities (resurrection plants such as Narrow Rock Fern *Cheilanthes sieberi* ssp. *sieberi)*.

This EVC is often treated as a mosaic with *Grampians* Rocky Outcrop Shrubland, which together form the vegetation characteristic of the rocky outcrops of the Grampians and less commonly on the Black Range. *Grampians* Rocky Outcrop Herbland is comprised of exposed slabs of rock covered with lichens and mosses over a skeletal soil layer which transiently retains moisture. This provides a substrate for annual and perennial herbs and geophytes to grow. This life strategy reflects the short growing season available at these sites, where winter rains saturate the soil profile before it rapidly dries out over summer.

A eucalypt overstorey is rare in this community. However, Long-leaf Box *Eucalyptus goniocalyx* and less often Brown Stringybark, *E. baxteri* can occur as spindly scattered individuals. Oyster Bay Cypress-pine *Callitris rhomboidea* is the only small tree.

Wedge-leaf Hop-bush *Dodonea viscosa* ssp. *cuneata*, Cranberry Heath *Astroloma humifusum*, Common Fringe-myrtle *Calytrix tetragona*, Shiny Tea-tree *Leptospermum turbinatum*, Grey Everlasting *Ozothamnus obcordatus*, Grampians Thryptomene *Thryptomene calycina* and Pine Heath *Astroloma pinifolium* occasionally occur as scattered individuals, with little cover.

The life form profile of this EVC is dominated by grasses, forbs and geophytes. Forbs include Smooth Cat's Ear †*Hypochoeris glabra*, Pink Purslane *Calandrinia calyptrata*, Hairy Centrolepis *Centrolepis strigosa* ssp. *strigosa*, Australian Stonecrop *Crassula sieberiana*, Pointed Centrolepis *Centrolepis aristata*, Austral carrot *Daucus glochidiatus*, Tall Raspwort *Gonocarpus elatius*, Cat's Ear †*Hypochoeris radicata*, Hairy Stylewort *Levenhookia dubia*, Wiry Centrolepis *Centrolepis polygyna*, Tall Sundew *Drosera peltata* ssp. *auriculata* and Soft Millotia *Millotia tenuifolia*.

Native grasses are not as common as weedy grass species but do include Hill Wallaby-grass *Austrodanthonia eriantha*, Kneed Wallaby-grass *A. geniculata*, Bristly Wallaby-grass *R. setaceum* and Supple Spear-grass *Austrostipa mollis*.

Nodding Blue-lily *Stypandra glauca* is a rock-loving species, in addition to perennial geophytes such as Chocolate-lily *Arthropodium strictum* and Pale Grass-lily *Caesia parviflora*. Narrow Rock Fern *Cheilanthes sieberi* ssp. *sieberi* and Necklace Fern *Asplenium flabellifolium* are the only ferns.

The only significant species that occurs in this EVC is Hairy Raspwort r *Gonocarpus mezianus*.

EVC 195 Seasonally Inundated Shrubby Woodland
Seasonally Inundated Shrubby Woodland occurs on flat terrain with soils that have variable levels of inundation at different times of the year. In winter, the heavy clay layer impedes drainage and hence surface water may lay for many months. Warmer conditions dry the soil, with summer heat baking hard the soil surface. The overstorey trees are predominantly large, sparse gum trees, with the understorey shrubs dense, but in isolated

patches, with much bare ground in between. Whilst much of the ground is un-vegetated, species diversity is quite high.

Three floristic communities occur within this EVC. *Plains* Seasonally Inundated Shrubby Woodland often occurs on the fringes of the study area where the outwash of the ranges meets the fertile plains. This community has affiliations with *Plains Lateritic* Heathy Woodland and *Greater Grampians* Plains Grassy Woodland and therefore has a higher species diversity than the second community. *Valley* Seasonally Inundated Shrubby Woodland occurs in the broad floodplains of the Victoria Valley and has associations with Alluvial Terraces Herb-rich Woodland, Shrubby Woodland and Shallow Freshwater Marsh. The third community, *Rocklands* Seasonally Inundated Shrubby Woodland was isolated from the above two floristic communities.

Forbs, grasses and heathy low shrubs are more common in *Plains* Seasonally Inundated Shrubby Woodland than *Valley* Seasonally Inundated Shrubby Woodland due to the former's affiliations with *Plains Lateritic* Heathy Woodland and *Greater Grampians* Plains Grassy Woodland. Yellow Gum *Eucalyptus leucoxylon* is the most common overstorey species in *Plains* Seasonally Inundated Shrubby Woodland, whilst River Red Gum *E. camaldulensis* dominates in *Valley* Seasonally Inundated Shrubby Woodland. This is indicative of the better drained soils in *Plains* Seasonally Inundated Shrubby Woodland.

Floristic Community 195-01 *Valley* Seasonally Inundated Shrubby Woodland

Valley Seasonally Inundated Shrubby Woodland inhabits the broad floodplains of the Victoria Valley and Glenelg River systems. It occurs on broad drainage lines and flats that are inundated for extended periods during winter. Surface soil is baked hard in summer, forming a shallow, powdery, sandy loam that is often hydrophobic. The soils are duplex, with an abrupt change in the profile from sand to drainage-impeding, light to medium clays. *Valley* Seasonally Inundated Shrubby Woodland often occurs on the periphery of Shallow Freshwater Marshes, where the water depth recedes during summer, allowing trees and shrubs to grow. It also inhabits ecological niches within the Glenelg River floodplain abutting *Grampians* Floodplain Thicket and the River itself.

River Red Gum *Eucalyptus camaldulensis* is common, but Swamp Gum *E. ovata* and Messmate *E. obliqua* may also be present. River Red Gum forms an open woodland, with tree height varying between 15-30m. Blackwood *Acacia melanoxylon* is the only common understorey tree. In contrast, *Plains* Seasonally Inundated Shrubby Woodland is dominated by Yellow Gum *E. leucoxylon* and Yellow Box *E. melliodora*, indicating a somewhat drier environment.

Shrubs are either clumped in small patches, or quite dense but evenly spread, with bare ground and leaf litter beneath. The shrubs that occur in this community are able to tolerate seasonal water fluctuations and include Prickly Tea-tree *Leptospermum continentale*, Totem-poles *Melaleuca decussata*, Manuka *L. scoparium*, Yellow Hakea *Hakea nodosa*, Mealy Honey-myrtle *Melaleuca squamea* and *Allocasuarina* spp. Small heath species found in *Plains* Seasonally Inundated Shrubby Woodland are absent in *Valley* Seasonally Inundated Shrubby Woodland.

Sedges and rushes comprise 30% of the ground layer species. The most common species are Soft Bog-sedge *Schoenus tesquorum*, Red-fruit Saw-sedge *Gahnia sieberiana*, Floating Club-sedge *Isolepis fluitans*, Pale Rush *Juncus pallidus*, Bare Twig-sedge *Baumea juncea*, Tiny Flat-sedge **Cyperus tenellus*, Plain Quillwort *Isoetes drummondii*, Little Club-sedge *I. marginata*, Hollow Rush *Juncus amabilis*, Bulbous Rush **J. bulbosus* and Joint-leaf Rush *J. holoschoenus*. Running Marsh-flower *Villarsia reniformis* is also indicative of the wet environment.

Forbs are also diverse and those able to tolerate this wet environment include Small St John's Wort *Hypericum gramineum*, Swamp Goodenia *Goodenia humilis*, Cat's Ears **Hypochoeris radicata*, Slender Aphelia *Aphelia gracilis*, Hairy Centrolepis *Centrolepis strigosa* ssp. *strigosa*, Kidney-weed *Dichondra repens*, Mossy Woodruff r *Asperula minima*, *Hydrocotyle* spp., Variable Stinkweed *Opercularia varia*, Matted Pratia *Pratia pedunculata* s.l. and Solenogyne *Solenogyne dominii*. Geophytes are not common, however Slender Sun-orchid *Thelymitra pauciflora* s.l. and Sheath Star *Hypoxis vaginata* are sometimes present. Unlike *Plains* Seasonally Inundated Shrubby Woodland with 10 common grass species, only two grasses are consistently recorded and these are Reed Bent-grass *Deyeuxia quadriseta* and Bristly Wallaby Grass *Austrodanthonia setacea.*

Mossy Woodruff r *Asperula minima* is the only significant species recorded in this community.

Floristic Community 195-02 *Plains* Seasonally Inundated Shrubby Woodland

Plains Seasonally Inundated Shrubby Woodland occurs on broad drainage lines and flats that are inundated for extended periods during winter. Surface soil is baked hard in summer, forming a shallow, powdery, sandy clay. The soils are duplex, with an abrupt change to drainage-impeding, light to heavy clays. Species diversity is quite high for such a seasonally variable environment and this may be due to its proximity in the landscape to Plains Grassy Woodland and Plains Lateritic Heathy Woodland. In particular, grass and heath species are shared from these two EVCs.

The overstorey of *Plains* Seasonally Inundated Shrubby Woodland consists of scattered Yellow Gum *Eucalyptus leucoxylon* 10-15m tall, occasionally reaching 30m. Yellow Box *E. melliodora* and Grey Box *E. microcarpa* sometimes occurs with Yellow Gum. There are no commonly occurring understorey trees or tall shrubs.

The understorey consists of a mosaic of often dense but separate stands of narrow-leaved shrubs such as Totem Poles *Melaleuca decussata,* Common Fringe-myrtle *Calytrix tetragona,* Varnish Wattle *Acacia verniciflua,* Prickly Moses *A. verticillata,* Prickly Tea-tree *Leptospermum continentale,* Heath Tea-tree *L. myrsinoides* and less commonly Scarlet Bottlebrush *Callistemon rugulosus.* Amongst this dense thicket, low, narrow and ericoid-leaved shrubs include Upright Guinea-flower *Hibbertia stricta*, Dwarf Hakea *Hakea rugosa*, Flame Heath *Astroloma conostephioides*, Cranberry Heath *A.. humifusum*, Common Eutaxia *Eutaxia microphylla*, Cat's Claws Grevillea *Grevillea alpina*, Honey-pots *Acrotriche serrulata* and Beaked Hakea *H. rostrata*.

Although ground cover is minimal, the species diversity is quite high. Sedges form a large component of the ground cover due to the seasonal fluctuations of inundation. Common Bog-sedge *Schoenus apogon*, Finger Rush *Juncus subsecundus,* Tiny Flat-sedge **Cyperus tenellus*, Dwarf Rush **Juncus capitatus,* Clustered Sword-sedge *Lepidosperma congestum*, Black Bristle-sedge *Chorizandra enodis,* Little Club-sedge *Isolepis marginata,* Black Rapier-sedge *L. carphoides* and Little Sword-sedge *L. curtisiae* are all common.

Common graminoids are Twining Fringe-lily *Thysanotus patersonii*, Milkmaids *Burchardia umbellata,* Black-anther Flax-lily *Dianella revoluta,* Small mat-rush *Lomandra sororia* and Yellow Rush-lily *Tricoryne elatior*.

Numerous forbs and grasses also occur. These include Hairy Centrolepis *C. strigosa* ssp. *strigosa*, Sheep's Burr *Acaena echinata*, Pointed Centrolepis *C. aristata,* Black's Goodenia *Goodenia blackiana*, Common Raspwort *Gonocarpus tetragynus*, Wiry Mitrewort *Mitrasacme paradoxa,* Stinking Pennywort *Hydrocotyle laxiflora*, Small St John's Wort *Hypericum gramineum,* Smooth Cat's Ear **Hypochoeris glabra*, Car's Ear **H. radicata*, Scaly Buttons *Leptorhynchos squamatus* and Variable Stinkweed *Opercularia varia*. Common grasses include Bristly Wallaby-grass *Austrodanthonia setacea*, Elegant Hair-grass **Aira elegans*, Lesser Quaking-grass **Briza minor*, Velvet Wallaby-grass *A.. pilosa*, Common Blown-grass *Agrostis avenacea* var. *avenacea*, Five-awned Spear-grass *Pentapogon quadrifidus*, Kneed Wallaby-grass *A. geniculata,* Weeping Grass *Microlaena stipoides* var. *stipoides*, Grey Tussock-grass *Poa sieberiana* var. *sieberiana* and Squirrel-tail Fescue **Vulpia bromoides*.

Significant species found in *Plains* Seasonally Inundated Shrubby Woodland are Small Milkwort v *Comesperma polygaloides*, Trailing Hop-bush Vv *Dodonea procumbens*, Clustered Daisy-bush v *Olearia suffruticosa*, Bent-grass v *Deyeuxia imbricata* and Short-leaf Bog-sedge r *Schoenus laevigatus.*

Floristic Community 195-03 *Rocklands* Seasonally Inundated Shrubby Woodland

Rocklands Seasonally Inundated Shrubby Woodland, in the draft mapping, was included in the floristic community *Valley* Seasonally Inundated Shrubby Woodland. In the final mapping it was separated because it was not sampled and was geographically isolated from the Glenelg River system where *Valley* Seasonally Inundated Shrubby Woodland occurs. It also includes man-made ecological environments, that is, dense stands of young River Red Gum *E. camaldulensis* within the Rocklands reservoir waterbody, which are seasonally inundated by deep water.

EVC 198 Sedgy Riparian Woodland

Sedgy Riparian Woodland occurs on riparian flats and along creek banks that frequently flood. It is also commonly found in the heads of gullies, some saddles and at water discharge sites. Soils vary from sandy loams to silty clay loams high in organic content. On the flatter sites, water may sit or run through the vegetation whereas gully sites have better drained, moister soils.

A canopy of Swamp Gum *Eucalyptus ovata* is present with tree height ranging from 15-30m. Field observations also suggest a consistent variation in tree height, thereby making it possible for this community to be classified as either a woodland or a forest. Messmate *E. obliqua* is the only other common tree found in this EVC. Understorey trees include both Blackwood *Acacia melanoxylon* and Black Wattle *A. mearnsii.*

Under this eucalypt layer, tall shrubs form a sparse understorey and include Prickly Moses *Acacia verticillata*, Scented Paperbark *Melaleuca squarrosa*, Wirilda *A. retinodes* var. *retinodes,* Woolly Tea-tree *Leptospermum lanigerum*, Manuka *L. scoparium* and tree form Silver Banksia *Banksia marginata*.

The ground layer is dominated by a dense cover of sedges and sedge-like species such as Red-fruit Saw-sedge *Gahnia sieberiana*, Square Twig-sedge *Baumea tetragona,* Tall Sedge *Carex appressa*, Leafy Flat-sedge *Cyperus lucidus*, Common Reed *Phragmites australis*, Tall Sword-sedge *Lepidosperma elatius* or Tassel Cord-rush *Restio tetraphyllus*. Tall Sword-sedge *Lepidosperma elatius* tends to dominate on gully or well-drained sites, whereas Square Twig-sedge *Baumea tetragona* and Tall Sedge *Carex appressa* tend to dominate at sites where there is flowing water.

Depending on the density of sedges and moisture availability, the ground cover has varying numbers of forbs, grasses and ferns. Weeping Grass *Microlaena stipoides* and Slender Tussock-grass *Poa tenera* frequently occur but never account for a significant proportion of the ground cover. Forbs include Centella *Centella cordifolia*, Shade Raspwort *Gonocarpus humilis*, Austral Brooklime *Gratiola peruviana* and Cat's Ear **Hypochoeris radicata*. Austral Bracken *Pteridium esculentum* is often present but rarely abundant. At wetter sites, Fishbone Water-fern *Blechnum nudum* occurs as a minor component of the vegetation.

Sedgy Riparian Forest is typically species poor. Significant species which occur are Showy Willow Herb d *Epilobium pallidiflorum* and Mossy Woodruff r As*perula minima.*

EVC 200 Shallow Freshwater Marsh
Shallow Freshwater Marsh occurs on floodplains where creeks and rivers broaden and decrease in flow. The soils are deep, anaerobic silts over which lay varying depths of water. Seasonal variation determines the depth of inundation, with water availability at the periphery of the marsh contracting during dry periods. In the Glenelg River system, Shallow Freshwater Marsh forms linear strips along riparian zones whereas in the Wannon valley and in State Forest west of the Grampians, spherical swamps not fed by streams are common. A unique example of Shallow Freshwater Marsh occurs on the top of a rocky outcrop system in a swale, west of Lake Wartook in the Mount Difficult Range.

This wetland has River Red Gum *Eucalyptus camaldulensis* skirting the fringes, with the main body of the swamp devoid of trees.

Shallow Freshwater Marsh is species poor, with Upright Milfoil *Myriophyllum crispatum* and Water Ribbons *Triglochin alcockiae* occurring in the deeper, flowing water. Fine Twig-sedge *Baumea arthrophylla* is also common. Fringe-dwelling species present which are influenced by depth and duration of inundation include Tall Spike-sedge *Eleocharis sphacelata*, Bulbous Rush **Juncus bulbosus*, Tall Rush *Juncus procerus*, Finger Rush *Juncus subsecundus*, Pithy Sword-sedge *Lepidosperma longitudinale* and Running Marsh-flower *Villarsia reniformis*.

EVC 278 Herb-rich Heathy Forest

Floristic Community 278-01 *Metamorphic* Herb-rich Heathy Forest
Metamorphic Herb-rich Heathy Forest occurs on mineralised metamorphosed sandstone formed from igneous intrusions. It occurs on the tops of ridges, where the soils are shallow and rocky and support a rich herb layer.

Brown Stringybark *Eucalyptus baxteri* and Messmate *E. obliqua* are the common tree species, forming a tall overstorey with Grampians Grey Gum *E. alaticaulis* sometimes being present further upslope. There is no understorey tree layer, with shrubs to 5m forming an open, lower stratum.

Narrow leaf shrubs are scattered and low in density. Species include Spreading Wattle *Acacia genistifolia*, Wirilda *A. retinodes* ssp. *retinodes*, Prickly Moses *A. verticillata*, Varnish Wattle *A. verniciflua*, Silver Banksia *Banksia marginata*, Sweet Bursaria *Bursaria spinosa*, Oyster Bay Cypress-pine *Callitris rhomboidea,* Grey Everlasting *Ozothamnus obcordatus* and Dusty Miller *Spyridium parvifolium*.

Small heathy species are abundant and include Honey-pots *Acrotriche serrulata*, Flame Heath *Astroloma conostephioides*, Cranberry Heath *A. humifusum*, Pine Heath *A. pinifolium*, Creeping Bossiaea *Bossiaea prostrata*, Daphne Heath *Brachyloma daphnoides*, Common Fringe-myrtle *Calytrix tetragona*, Common Correa *Correa reflexa*, Narrow-leaf Bitter-pea *Daviesia leptophylla*, Smooth Parrot-pea *Dillwynia glaberrima*, Showy Parrot-pea *D. sericea*, Common Heath *Epacris impressa*, Cat's Claw Grevillea *Grevillea alpina*, Variable Prickly Grevillea *G. aquifolium*, Bundled Guinea-flower *Hibbertia prostrata*, Silky Guinea-flower *H. sericea* s.l., Upright Guinea-flower *H. stricta*, Common Hovea *Hovea linearis*, Horny Cone-bush *Isopogon ceratophyllus*, Running Postman *Kennedia prostrata*, Common Lagenifera *Lagenifera stipitata*, Heath Tea-tree *Leptospermum myrsinoides*, Ruddy Beard-heath *Leucopogon rufus*, Common Beard-heath *L. virgatus*, Prickly Geebung *Persoonia juniperina*, Thyme Spurge *Phyllanthus hirtellus*, Smooth Rice-flower *Pimelea glauca,* Common Rice-flower *P. humilis*, Common Flat-pea *Platylobium obtusangulum*, Rough Bush-pea *Pultenaea scabra*, Golden Heath *Styphelia adscendens* and Pink-bells *Tetratheca ciliata*. Austral Grass-tree *Xanthorrhoea australis* is present in low numbers.

Many perennial forbs are scattered beneath the understorey shrubs. These include Sheep's Burr *Acaena echinata*, Woolly Everlasting *Argentipallium blandowskianum*, Mossy Woodruff r *Asperula minima*, Rayless Daisy *Brachyscome perpusilla*, Blue Pincushion *Brunonia australis*, Pointed Centrolepis *Centrolepis aristata*, Hairy Centrolepis *C. strigosa*, Slender Cicendia **Cicendia filiformis*, Austral Carrot *Daucus glochidiatus*, Tall Sundew *Drosera peltata* ssp. *auriculata*, Common Raspwort *Gonocarpus tetragynus*, Germander Raspwort *G. teucrioides*, Bent Goodenia *Goodenia geniculata*, Button Everlasting *Helichrysum scorpioides*, Small Pennywort *Hydrocotyle callicarpa*, Yellow Pennywort *H. foveolata*, Stinking Pennywort *H. laxiflora*, Small St John's Wort *Hypericum gramineum*, Yam Daisy *Microseris scapigera*, Wiry Mitrewort *Mitrasacme paradoxa*, Variable Stinkweed *Opercularia varia*, Variable Plantain *Plantago varia*, Small Poranthera *Poranthera microphylla*, Small Wrinklewort *Siloxerus multiflorus*, Spoon Cudweed *Stuartina muelleri,* Hairy Speedwell *Veronica calycina*, Hidden Violet *Viola cleistogamoides*, Ivy-leaf Violet *V. hederacea* ssp. *hederacea.*

Grasses are also common and include Small Hair-grass **Aira cupaniana*, elegant Hair-grass **A. elegans*, *Austrodanthonia* sp., Reed Bent-grass *Deyeuxia quadriseta*, Weeping Grass *Microlaena stipoides*, *Poa* sp. and Supple Spear-grass *Austrostipa mollis*.

Graminoids include Black-anther Flax-lily *Dianella revoluta*, Black Rapier-sedge *Lepidosperma carphoides*, Wire Rapier-sedge *L. semiteres*, Wattle Mat-rush *Lomandra filiformis*, Dwarf Mat-rush *L. nana* and Small Mat-rush *L. sororia*. Perennial geophytes include Milkmaids *Burchardia umbellata*, Pink Fingers *Caladenia carnea*, Blue Squill *Chamaescilla corymbosa* var. *corymbosa*, Common Bird-orchid *Chiloglottis valida* and Wax-lip Orchid *Glossodia major*.

Climbers present are Common Apple-berry *Billardiera scandens*, Downy Dodder-laurel *Cassytha pubescens* s.s., Love Creeper *Comesperma volubile* and Twining Fringe-lily *Thysanotus patersonii*.

Austral Bracken *Pteridium esculentum* is the only fern species recorded.

EVC 279 Heathland Thicket

Floristic Community 279-01 *Grampians* Heathland Thicket
Grampians Heathland Thicket occurs as isolated patches within larger areas of Sand Heathland. It can be similar, structurally, to *Grampians* Floodplain Thicket, however *Grampians* Heathland Thicket occurs in Sand Heathland, which is higher in the landscape profile than the communities on the floodplain. *Grampians* Heathland Thicket can form linear patches along drainage lines or form thicket islands in shallow depressions within expanses of Sand Heathland.

A dense, impenetrable thicket of Totem Poles *Melaleuca decussata* dominates this floristic community, with the occasional Manuka *Leptospermum scoparium* present. Due to the dense nature of the thicket, very little light reaches the ground stratum, so the ground is mostly bare, with occasional moss cover. These dense thickets form at the lower end of the landscape profile in which Sand Heathland dominates. Anecdotal observations suggest that some patches of *Grampians* Heathland Thicket may also be related to fire frequency effects, being patches of Sand Heathland which have escaped ecological burning by the Parks Service and developed into thickets.

EVC 280 Floodplain Thicket

Floristic Community 280-01 *Grampians* Floodplain Thicket
Grampians Floodplain Thicket occurs on floodplains in the Glenelg River and Wannon River Catchments. Water running off the ranges finally reaches the lowest part of the landscape profile, seasonally providing large volumes of water which cover these areas. The flat, alluvial landscape gives rise to a multitude of interlinking capillary channels, which form within the larger floodplain. It is on these channels and the interstitial zones between channels, that *Grampians* Floodplain Thicket thrives. Thickets are often impenetrable, however some structural variations do occur, probably due to varying disturbance intensity from flooding. Variations in floristics are most likely due to flooding frequency, period of inundation, position of the patch within the floodplain profile and the catchment within which it occurs. Soils are alluviums varying from black anaerobic alluvial clay sands to pale grey silty clays.

The dominant eucalypt is River Red Gum *Eucalyptus camaldulensis,* with Yellow Gum *E. leucoxylon* sub-dominant. Fringing Brady Swamp is a patch

of *Grampians* Floodplain Thicket that has Swamp Gum *E. ovata* overhanging the site. Occasionally, spindly and sparse Rough-barked Manna Gum *E. viminalis* ssp. *cygnetensis* is present although in many instances this floristic community is treeless. Blackwood *Acacia melanoxylon* is the only understorey tree in sites that have eucalypt cover.

The shrubs form a tall dense thicket, with dominant species including Totem-poles *Melaleuca decussata*, Slender Honey-myrtle *M. gibbosa,* Scented Paperbark *M. squarrosa*, Mealy Honey-myrtle *M. squamea*, Woolly Tea-tree *Leptospermum lanigerum* and Prickly tea-tree *L. continentale.* Occasional shrubs include Narrow-leaf Wattle *Acacia mucronata*, Wirilda *A. retinodes* ssp. *retinodes*, Prickly Moses *A. verticillata*, Slender She-oak *Allocasuarina misera*, Scarlet Bottlebrush *Callistemon rugulosus*, *Calytrix* sp., Yellow Hakea *Hakea nodosa* and Golden Spray *Viminaria juncea.* Parasitic climbers include Slender Dodder-laurel *Cassytha glabella* and Downy Dodder-laurel *C. pubescens.*

Various densities of sedge and restionaceous species can sometimes dominate the ground stratum. These include Tall Sedge *Carex appressa,* Red-fruit Saw-sedge *Gahnia sieberiana,* Tassel Rope-rush *Hypolaena fastigiata*, Pale Rush *Juncus pallidus, Lepyrodia* sp., Slender Twine-rush *Leptocarpus tenax,* Tassel Cord-rush *Restio tetraphyllus* and Common Bog-sedge *Schoenus apogon*.

Ground-dwelling herbs include Pointed Centrolepis *Centrolepis aristata,* Hairy Centrolepis *C. strigosa*, Blue Squill *Chamaescilla corymbosa* var. *corymbosa,* Tall Sundew *Drosera peltata* ssp. *peltata*, Tiny Sundew *D. pygmaea,* Creeping Raspwort *Gonocarpus micranthus,* Austral Brooklime *Gratiola peruviana, Villarsia* sp. and other tiny annual herbs.

EVC 281 Sedge-rich Wetland

Floristic Community 281-01 *Grampians* Sedge-rich Wetland
Grampians Sedge-rich Wetland occurs in small swamps in the northern part of the Grampians National Park or on seasonally inundated drainage lines on the plains in the Black Range. Swamp sites are most often permanent, but can dry in drought years or towards the end of summer. This community is restricted in distribution, with two of the sites in the northern part of the park nominated for state significance under the Flora and Fauna Guarantee Act (Meredith et al., 1992). *Grampians* Sedge-rich Wetland also occupies a number of specific ecological niches in the floodplain system of the Glenelg River. It occurs where floodwaters converge out of the channels under the floristic community *Grampians* Floodplain Thicket and flow into bends or low positions in the watercourse.

Unlike *Grampians* Floodplain Thicket, *Grampians* Sedge-rich Wetland is usually devoid of a shrub layer, possibly due to the scouring action of flooding and lying water. The community generally has a sparse overstorey of River Red Gum *E. camaldulensis*, with the ground layer consisting of sedges in patches and bare earth.

River Red Gum *Eucalyptus camaldulensis* is frequently present with Yellow Box *E. melliodora* sub-dominant. Overhanging branches of River Red Gum occur on the margin of the swamp.

Shrubs are few and sparse, skirting the edges of the swamp. Golden Wattle *Acacia pycnantha* fringes sites in the northern Grampians, whilst Prickly Tea-tree *Leptospermum continentale* occurs in the Black Range.

As the EVC name suggests, the dominant lifeforms are sedges, comprising a quarter of the species recorded. Common sedges include Black Bristle-sedge *Chorizandra enodis*, Common Spike-sedge *Eleocharis acuta*, Joint-leaf Rush *Juncus holoschoenus*, Common Sedge *Carex inversa*, Awned Club-sedge **Isolepis hystrix*, Toad Rush *Juncus bufonius*, Soft Bog-sedge *Schoenus tesquorum*, Rush Sedge *Carex tereticaulis*, Floating Club-sedge *I. fluitans*, Hollow Rush *J. amabilis*, Common Bog-sedge *S. apogon*, and Medusa Bog-sedge *S. latelaminatus*.

Of equal importance in the swamp environment are the aquatic perennials which include Running Marsh-flower *Villarsia reniformis*, Floating Pondweed *Potamogeton tricarinatus* s.l., Water-ribbons *Triglochin procerum* spp. agg. and Dwarf Brooklime Kk *Gratiola pumilo*.
Many forbs and grasses occur on the fringe of the swamp, where the water-level recedes during drier months. Forbs include Slender Dock *Rumex brownii*, Cat's Ear **Hypochoeris radicata*, Small Loosestrife *Lythrum hyssopifolia*, Wiry Mitrewort *Mitrasacme paradoxa*, Sheep's Burr *Acaena echinata*, Slender Cicendia **Cicendia filiformis*, Austral Carrot *Daucus glochidiatus*, Variable Willow-herb *Epilobium billardierianum*, Slender Goodenia *Goodenia gracilis*, Hairy Hawkbit **Leontodon taraxacoides*, Woolly-heads *Myriocephalus rhizocephalus*, Solenogyne *Solenogyne dominii* and Purple Bladderwort *Utricularia dichotoma*. Grasses are also common, which indicates the proximity to grassy woodlands as well as farmland. The main grasses include Long-nosed Swamp Wallaby-grass *Amphibromus macrorhinus*, Lesser Quaking-grass **Briza minor*, Brown-black Wallaby-grass *Austrodanthonia duttoniana*, Large Quaking-grass *B. maxima*, Mediterranean Barley-grass **Critesion hystrix*, Wimmera Rye-grass **Lolium rigidum* and Squirrel-tail Fescue **Vulpia bromoides*.

Common geophytes include Chocolate-lily *Arthropodium strictum*, Scented Leek-orchid *Prasophyllum odoratum*, Common Onion-grass **Romulea rosea* var. *australis*, Small Trigger-plant *Stylidium despectum*, Common Onion-orchid *Microtis unifolia*, Slender Sun-orchid *Thelymitra pauciflora* s.l. and Yellow Rush-lily *Tricoryne elatior*.

Significant species in *Grampians* Sedge-rich Wetland are few, but include Dwarf Brooklime Kk *Gratiola pumilo* and Gilgai Blown Grass v *Agrostis aemula* var. *setifolia*.

EVC 282 Shrubby Woodland
There are two floristic communities of Shrubby Woodland both occurring in all major catchments of the study area. *Grampians* Shrubby Woodland is confined to the valley floors of all major catchments within the study area, whilst *Sand* Shrubby Woodland extends from the edge of the valley floor, often along drainage lines. *Sand* Shrubby Woodland differs to *Grampians* Shrubby Woodland with the former occurring higher in the landscape profile, on deeper sands, with different overstorey species and dominated by restionaceous and sedge species rather than grasses and forbs.

Floristic Community 282-01 *Grampians* Shrubby Woodland
Within the study area, *Grampians* Shrubby Woodland is found on Pliocene-Pleistocene sediments with duplex soils. Varying depths of sandy loam up to 1m deep overlay a heavy clay subsoil (Lunt *et al.,* unpublished). It occurs around the perimeter of the Grampians National Park abutting private property, and along all major streams within the study area, such as along Scrubby Creek where it widens to form a broad, seasonally inundated floodplain associated with more permanent swamps. The Glenelg River floodplain, Briggs Ck at Roses Gap, McKenzie River, and Wannon River floodplain all have *Grampians* Shrubby Woodland present. Water availability is driven by seasonal inundation periods due to the impeding clay layer.

Grampians Shrubby Woodland has a variable structure and may occur as a woodland or an open forest. The dominant overstorey species is River Red Gum *Eucalyptus camaldulensis* 20-25m tall, often with Yellow Box *E. melliodora* sub-dominant. Yarra Gum *E. yarraensis* and Swamp Gum *E. ovata* are dominant at some sites.

An understorey tree layer, occasionally to 15m tall consists of Black Wattle *Acacia mearnsii* and less commonly Blackwood *A. melanoxylon.* Tree-form Silver Banksia *Banksia marginata* can also from part of the taller shrub layer. *Grampians* Shrubby Woodland receives its name from the often dense layer of smaller tea-tree shrubs including Prickly Tea-tree *Leptospermum continentale*, Manuka *Leptospermum scoparium*, and Heath Tea-tree *L. myrsinoides*. The ericoid-leaved Flame Heath *Astroloma conostephioides*, Cranberry Heath *A. humifusum* and Daphne Heath *Brachyloma daphnoides* also occur as low shrubs to 1m. Where the shrubs and smaller trees are more open, Austral Bracken *Pteridium esculentum* sometimes forms an open field layer, sometimes making it difficult to distinguish from *Grampians* Damp Sands Herb-rich Woodland.

The ground layer is dominated by Weeping Grass *Microlaena stipoides* and is rich in forbs. Creeping Cudweed *Euchiton gymnocephalus*, Cat's Ear **Hypochoeris radicata*, Grassland Wood-sorrel *Oxalis perennans*, Stinking Pennywort *Hydrocotyle laxiflora,* Small St John's Wort *Hypericum gramineum*, Common Lagenifera *Lagenifera stipitata*, Small Poranthera *Poranthera microphylla*, Common Woodrush *Luzula meridionalis*, Yellow Pennywort *Hydrocotyle foveolata*, Smooth Cat's Ear **Hypochoeris glabra*, Ivy-leaf Violet *Viola hederacea* ssp. *hederacea,* Mossy Woodruff r *Asperula minima*, Cotton Fireweed *Senecio quadridentatus* and Hidden Violet *Viola cleistogamoides* are the most common species, although numerous others are also present.

Short-stem Sedge *Carex breviculmis*, Common Bog-sedge *Schoenus apogon* and Finger Rush *Juncus subsecundus* are the only common sedges and rushes.

Introduced species are common in this floristic community, perhaps reflecting the past history of disturbance from grazing and timber harvesting, in addition to the relatively fertile soil.

There are two significant species in this community: Mossy Woodruff r *Asperula minima* and Rr *E. yarraensis*.
Floristic Community 282-02 *Sand* Shrubby Woodland
Sand Shrubby Woodland occurs on deep sands in drainage lines and on floodplains that have been covered with sand. Shrub density varies from dense thickets of Manuka to older patches with a tall Blackwood overstorey and an open shrub understorey. *Sand* Shrubby Woodland differs to *Grampians* Shrubby Woodland with the former occurring higher in the landscape profile, on deeper sands, with different overstorey species and

dominated by restionaceous and sedge species rather than grasses and forbs.

Sand Shrubby Woodland occurs where deeper sands meet heavier soils that retain moisture. It often occurs in the transition zone between *Grampians* Damp Sands Herb-rich Woodland and the following communities*: Grampians* Shrubby Woodland, *Sand* Heathy Woodland and *Grampians* Valley Grassy Forest. It can also occur as a drainage line or as a transition zone where Riparian Scrub, Sedgy Riparian Woodland, *Sand* Heathy Woodland or Sand Heathland meets either *Grampians* Shrubby Woodland or *Grampians* Alluvial Terraces Herb-rich Woodland on the alluvial floodplains. A considerable area of *Sand* Shrubby Woodland is found east of Mt William where it dominates in drainage lines and atypically on outwash slopes abutting *Grampians* Heathy Dry Forest and *Slopes Lateritic* Heathy Woodland upslope, and riparian EVCs downslope.

Sand Shrubby Woodland occupies an ecological niche that lies between a number of floristic communities and subsequently, overstorey species are variable, depending on the communities it is abutting. The suite of overstorey species include Brown Stringybark *Eucalyptus baxteri*, River Red Gum *E. camaldulensis*, Yellow Box *E. melliodora*, Messmate *E. obliqua*, Swamp Gum *E. ovata*, Rough-barked Manna Gum *E. viminalis* ssp. *cygnetensis* and Shining Peppermint *E. willisii*. Black Wattle *Acacia mearnsii* is often present as an understorey tree, with occasional Blackwood *A. melanoxylon*. In the northern Grampians, Sallow Wattle *A. longifolia* often dominates the understorey.

Narrow leaved shrubs such as Prickly Tea-tree *Leptospermum continentale*, Heathy Tea-tree *L. myrsinoides*, Manuka *L. scoparium* and tree form Silver Banksia *Banksia marginata* form a consistent understorey, with occasional Oyster Bay Cypress-pine *Callitris rhomboidea* and Austral Grass-tree *Xanthorrhoea australis* also being present. Manuka often forms dense thickets, especially on the eastern side of the Mount William range.

A few small heath species are typical of *Sand* Shrubby Woodland and these include Honey-pots *Acrotriche serrulata*, Flame Heath *Astroloma conostephioides*, Cranberry Heath *A. humifusum*, Daphne Heath *Brachyloma daphnoides*, Smooth Parrot-pea *Dillwynia glaberrima*, Bundled Guinea-flower *Hibbertia prostrata*, Twiggy Guinea-flower *H. virgata*, *H.* sp*.*, Common Beard-heath *Leucopogon virgatus*, Prickly Broom-heath *Monotoca scoparia* and Pink-bells *Tetratheca ciliata.*

Sedges and restionaceous species are low in number, but often high in density. Thatch Saw-sedge *Gahnia radula*, Tassel Rope-rush *Hypolaena fastigata*, Slender Twine-rush *Leptocarpus tenax*, and various restionaceous spp are often present beneath the shrub layer.

Herbs are sparse on the ground but include Tall Sundew *Drosera peltata* spp*. auriculata*, Scented Sundew *D. whittakeri*, *Geranium* sp., Common Raspwort *Gonocarpus tetragynus*, *Goodenia* sp., Button Everlasting *Helichrysum scorpioides*, Small St John's Wort *Hypericum gramineum*, Hairy Pennywort *Hydrocotyle hirta*, Smooth Cat's Ear **Hypochoeris glabra*, Cat's Ear **H. radicata*, *Lagenifera* sp., Hairy Speedwell *Veronica calycina* and Hidden Violet *Viola cleistogamoides*. Grasses include *Aira* sp*., Austrodanthonia* spp., Weeping Grass *Microlaena stipoides*, *Poa* spp., and *Austrostipa* spp.

Perennial geophytes include Blue Squill *Chamaescilla corymbosa* var*. corymbosa*, Common Bird-orchid *Chiloglottis valida*, Sheath Star *Hypoxis vaginata*, Red-beaks *Lyperanthus nigricans* and Grass Trigger-plant *Stylidium graminifolium*.

Graminoids include Black-anther Flax-lily *Dianella revoluta* s.l., Wattle Mat-rush *Lomandra filiformis* and Spiny-headed Mat-rush *L. longifolia*.

EVC 283 Plains Sedgy Woodland
Plains Sedgy Woodland sits low in the landscape profile and subsequently the clay layer is closer to the soil surface, impeding water drainage. This EVC often forms small sedgy depressions within *Greater Grampians* Plains Grassy Woodland and *Grampians* Alluvial Terraces Herb-rich Woodland. Thus, whilst it has a sedgy component, it also has grass, herb and geophyte species common to the surrounding woodlands. This EVC is found throughout the Greater Grampians Study Area**.**

Plains Sedgy Woodland is an open woodland dominated by Yellow Box *Eucalyptus melliodora*. River Red Gum *E. camaldulensis* is subdominant, with Yellow Gum *E. leucoxylon* also present. There are no understorey trees present in this EVC.

Shrubs are also lacking due to the wet nature of the environment. Small shrubs occasionally present include Cranberry Heath *Astroloma humifusum*, Spreading/Common Eutaxia *Eutaxia diffusa/microphylla* and Dwarf Hakea *Hakea rugosa*, each only recorded in one of the three quadrats.

Sedges are a dominant lifeform in Plains Sedgy Woodland. Those that commonly occur are Joint-leaf Rush *Juncus holoschoenus*, *Lepidosperma* spp., Black Bristle-sedge *Chorizandra enodis*, Small Spike-sedge *Eleocharis pusilla*, Hollow Rush *J. amabilis*, Pale Twig-sedge *Baumea acuta*, Fine/Soft Twig-sedge *B. arthrophylla/rubiginosa*, Tall Sedge *Carex appressa*, Rush-sedge *C. tereticaulis*, Common Spike-sedge *E. acuta*, Toad Rush *J. bufonius*, Wiry Rush *J. homalocaulis*, Finger Rush *J. subsecundus* and Common Bog-sedge *Schoenus apogon*.

Other species associated with seasonally inundated environments include Water Starwort **Callitriche hamulata*, Running Marsh-flower *Villarsia reniformis*, Small Swamp-daisy *Brachyscome uliginosa*, Common Sneezeweed *Centipeda cunninghamii*, Austral Water-mat *Lepilaena australis*, Upright Milfoil *Myriophyllum crispatum*, White Purslane *Neopaxia australasica* and Water-ribbons *Triglochin procerum* spp. agg.

Some of the grasses and forbs common to surrounding woodland vegetation are shared in Plains Sedgy Woodland. Grasses include Common Blown Grass *Agrostis avenacea* var. *avenacea*, Veined Swamp Wallaby-grass *Amphibromus nervosus*, *Briza* spp., Common Wheat-grass *Elymus scabrus*, Weeping Grass *Microlaena stipoides* var. *stipoides* and Wetland Wallaby-grass *Notodanthonia semiannularis*.

Dominant forbs include Hairy Hawkbit **Leontodon taraxacoides*, Solenogyne *Solenogyne dominii*, Pimpernel **Anagallis arvensis*, Variable Willow-herb *Epilobium billardierianum*, Blue Devil *Eryngium ovinum*, Varied Raspwort *Haloragis heterophylla*, Cat's Ear **Hypochoeris radicata*, Poison Lobelia *Lobelia pratioides*, Small Loosestrife *Lythrum hyssopifolia*, Clustered Dock **Rumex conglomeratus* and Sow-Thistle **Sonchus oleraceus.*

Perennial geophytes include *Hypoxis* sp*.*, Common Onion-grass **Romulea rosea* var. *australis*, Yellow Rush-lily *Tricoryne elatior*, Blue Squill *Chamaescilla corymbosa* var. *corymbosa* and Wax-lip Orchid *Glossodia major*.

EVC 284 Claypan Ephemeral Wetland
Claypan Ephemeral Wetland is found on the southern boundary of the Grampians National Park, just north of the Wannon River. It occurs on both private and public land in this area as a mosaic with *Grampians* Alluvial Terraces Herb-rich Woodland. This EVC occurs on large areas of cracking, silty clays which are seasonally inundated.

River Red Gum *Eucalyptus camaldulensis* grows on the margins of the wetland, overhanging from the *Grampians* Alluvial Terraces Herb-rich Woodland. Shrubs do not occur in this EVC.

Species indicative of seasonal variations in water inundation include *Centipeda ?cunninghamii*, *Isotoma* sp., *Juncus* sp., *Myriophyllum* sp*., Pratia* sp*., Ranunculus* sp., *?Samolus* sp. and *Villarsia* sp.

Other perennial forbs include Spear Thistle **Cirsium vulgare*, Kidney-Weed *Dichondra repens*, Hairy Hawkbit **Leontodon taraxacoides*, Solenogyne *Solenogyne dominii*, *Goodenia* sp., *Mentha* sp. and *Euchiton* sp. Grasses are few but include Australian Salt-grass *Distichlis distichophylla* and *Dichelachne/Deyeuxia* sp*.* Common Bog-sedge *Schoenus apogon* is the only common sedge.

EVC 285 Dry Creekline Woodland

Floristic Community 285-01 *Grampians* Dry Creekline Woodland
Grampians Dry Creekline Woodland is restricted to the drier, northern part of the Grampians National Park. It occurs on small ephemeral creeks that are dry during the summer period and subsequently it does not support a rich ground layer. *Grampians* Dry Creekline Woodland is often linear and the creeks are narrow (1-1.5m wide). Therefore, the vegetation quickly changes into other abutting floristic communities. Hence it is difficult to map and is often absorbed in much larger polygons of other communities. It has also been mapped in a complex with Sedgy Riparian Woodland or *Grampians* Damp Sands Herb-rich Woodland.

A mixture of overstorey species occur in *Grampians* Dry Creekline Woodland. These include Desert Stringybark *Eucalyptus arenacea*, Mountain Grey Gum *E. cypellocarpa*, Swamp Gum *E. ovata* and Manna Gum *E. viminalis* ssp*. viminalis* to 15m.

Narrow-leaved shrubs are common, but not dense. Species present are Sallow Wattle *Acacia longifolia,* Common Fringe-myrtle *Calytrix tetragona*, Hairy Correa *Correa aemula*, Wedge-leaf Hop-bush *Dodonea viscosa* ssp*. cuneata*, Hop Goodenia *Goodenia ovata,* Shrubby Velvet-bush *Lasiopetalum macrophyllum,* Manuka *Leptospermum scoparium,* Victorian Christmas-bush *Prostanthera lasianthos* and Grampians Thryptomene *Thryptomene calycina*. Coarse Dodder-laurel *Cassytha melantha* is found entwined amongst the shrubs.

Austral Bracken *Pteridium esculentum* is often dense above a species-poor ground layer. Most of the ground layer is bare, with much leaf litter. Forbs

are few, sparse and comprised of *Asperula/Galium* sp., *Hydrocotyle ?hirta*, *Lagenifera* sp., *Lobelia/Pratia* sp., *Senecio* sp. and Hidden Violet *Viola cleistogamoides*. The only grass recorded is Weeping Grass *Microlaena stipoides* var. *stipoides*.

Large sedges are present but not dominant and include Red-fruit Saw-sedge *Gahnia sieberiana* and Variable Sword-sedge *Lepidosperma laterale*.

EVC 292 Red Gum Wetland
Red Gum Wetland only occurs in the south-east end of the park in the vicinity of Brady Swamp. It occurs in drainage lines or depressions and seasonally inundated areas, with the clay soil surface cracking during dry conditions. It lies in a zone between Shallow Fresh Water Marsh, *Grampians* Floodplain Thicket on the Wannon River and *Grampians* Shrubby Woodland.

River Red Gum *Eucalyptus camaldulensis* is the only eucalypt to occur in this EVC and has a spreading woodland form. Blackwood *Acacia melanoxylon* is present but not in high numbers. Tall Sedge *Carex appressa* is always present and does not extend beyond the periphery of the Red Gum crowns. Tall Sedge is also very dense, accounting for 80-90% of the ground cover. Amongst the Tall Sedge are the occasional Red-fruit Saw-sedge *Gahnia sieberiana*, *Juncus* spp., Prickly Tea-tree *Leptospermum continentale* and Common Tussock-grass *Poa labillardierei*.

Smaller herbs include *Agrostis* sp., Spear Thistle **Cirsium vulgare, Cyperus sp.*, *Euchiton* sp., *Marsilea* sp., *Ranunculus* sp., *?Stellaria media*, and *Trifolium* sp.

EVC 300 Reed Swamp
Reed Swamp occurs along the Wannon River system in the southern part of the Grampians National Park in the vicinity of Brady Swamp.

Reed Swamp is dominated by either Cumbungi *Typha* sp. or Common Reed *Phragmites australis*. Small aquatic and semi-aquatic species occur amongst the reeds, however they are not visible during inundation. Occasional Woolly Tea-tree *Leptospermum lanigerum,* may be dotted along the fringes of the swamp. Red Gum Wetland dominated by River Red Gum *Eucalyptus camaldulensis* is often found abutting Reed Swamp.

EVC 710 Damp Heathland
Damp Heathland occurs low in the landscape profile, with water often lying on the soil surface. It is often found between *Grampians* Shallow Sand Heathland and Wet Heathland. This EVC often forms broad patches surrounding smaller depressions of Wet Heathland.

Damp Heathland is normally treeless although Rough-barked Manna Gum *E. viminalis* ssp. *cygnetensis* can sometimes occur. Shrubs form a dense heathland, with Slender She-oak *Allocasuarina misera*, Silver Banksia *Banksia marginata*, Common Heath *Epacris impressa*, Woolly-style Heath *E. lanuginosa*, Yellow Hakea *Hakea nodosa,* Dagger Hakea *Hakea teretifolia*, Prickly Tea-tree *Leptospermum continentale*, Totem-poles *Melaleuca decussata*, Slender Honey-myrtle *M. gibbosa,* Mealy Honey-myrtle *M. squamea*, Scented Paperbark *M. squarrosa,* Pink Swamp-heath *Sprengelia incarnata* and Golden Spray *Viminaria juncea* often being present. Slender Dodder-laurel *Cassytha glabella* entwines itself through the shrub layer.

The ground layer is often dense with restionaceous species, similar to those in Sand Heathland and Wet Heathland. These include Slender Twine-rush *Leptocarpus tenax,* Square Twig-sedge *Baumea tetragona*, Red-fruit Saw-sedge *Gahnia sieberiana*, *Lepidosperma* sp. and *Schoenus* spp. Austral Grass-tree *Xanthorrhoea australis* and *Xanthorrhoea ?caespitosa* can also be present.

Ground herbs include Swamp Selaginella *Selaginella uliginosa* and *?Pratia/Lobelia* sp.

PORTLAND - WIMMERA VEGETATION DESCRIPTIONS

EVC 3 Damp Sands Herb-rich Woodland
Grassy or Austral Bracken-dominated eucalypt woodland or forest with large range of herbs including several annuals. Occurs on moderately fertile, relatively well-drained, sandy or loamy topsoils over heavier subsoils (duplex soils). Often associated with limestone or shallow aeolian deposits, not on volcanic substrates except rarely where overlain by shallow sand deposits. Soils are generally moist in winter and dry in summer, which promotes geophytic and annual species. Previously widespread and locally extensive within the study area but now largely cleared. Recorded from all bioregions in study area.

***Glenelg Plain* Damp Sands Herb-rich Woodland**
Floristics: Dominated by *Eucalyptus baxteri* ± *Eucalyptus viminalis*. *Acacia mearnsii* is characteristic of this community. Rich in geophytes and grasses when intact.
Structure: Woodland to open-forest 20–25 m tall.
Habitat: Moderately fertile, relatively well-drained soils, usually derived from limestone.
Nearest relative: Heathy Herb-rich Woodland, which is intermediate with Heathy Woodland.
Comments: Many remnants degraded by loss of species and weed invasion. Invasion by Coast/Sallow Wattle *Acacia longifolia*, primarily due to lack of fire, is a major management issue in southern areas including Lower Glenelg National Park. Most of the pine plantations in the region were established on land supporting this EVC.

***Goldfields* Damp Sands Herb-rich Woodland**
Floristics: Dominated by *Eucalyptus viminalis* with an open understorey of *Banksia marginata* (tree form), *Acacia mearnsii*, *Acacia melanoxylon*. *Pteridium esculentum* and *Brachyloma daphnoides* are prominent in the ground-layer with more open areas dominated by grasses, geophytes and annuals. The ground-layer is generally weedy.
Structure: Woodland 15–20 m tall.
Habitat: Sand lunettes.
Nearest relative: Heathy Woodland.

***Grampians* Damp Sands Herb-rich Woodland**
Floristics: Dominated by *Eucalyptus viminalis* and *E. ovata*. *Acacia mearnsii* and/or
A. melanoxylon form a secondary tree stratum. The understorey is open and generally supports scattered heathy shrubs, dense *Pteridium esculentum* or *Microlaena stipoides*.
Structure: Woodland to open-forest.
Habitat: Loamy sands associated with creeks and some areas of outwash sands.
Nearest relative: *Grampians* Herb-rich Foothill Forest.
Comments: Described by Tumino and Roberts (1998).

***Victorian Volcanic Plain* Damp Sands Herb-rich Woodland**
Floristics: Dominated by *Eucalyptus viminalis* ± *E. baxteri* ± *E. ovata*. *Pteridium esculentum* is typically conspicuous, often with *Gahnia radula* and *Xanthorrhoea minor* in understoreys which are rich in herbs and grasses when intact.
Structure: Woodland 12–25 m tall.
Habitat: Relatively well-drained sites on shallow typically reddish sands of at least moderate fertility overlying Quaternary basalt.
Nearest relatives: Plains Grassy Woodland, Herb-rich Foothill Forest, Lowland Forest.

***Warrnambool Plain* Damp Sands Herb-rich Woodland**
Floristics: Dominated by *Eucalyptus viminalis* ± *E. ovata* ± *Allocasuarina verticillata*, rich in geophytes and grasses when intact.
Structure: Woodland or open-forest (5–)10–20 m tall, stunted where exposed to salt-laden wind 500 m from coast. Trees are typically low-branching and spreading.
Habitat: Relatively well-drained sites of moderate fertility, strongly associated with limestone soils including sinkhole (karst) terrain but also on well-drained paludal soils.
Nearest relative: Herb-rich Foothill Forest.

***Wimmera* Damp Sands Herb-rich Woodland**
Floristics: Dominated by *Eucalyptus viminalis* ssp. *cygnetensis* ± *Eucalyptus camaldulensis* ± *Banksia marginata* (tree form), rich in geophytes, annual herbs and grasses when intact. Bracken is often a feature of disturbed sites.
Structure: Woodland or open-forest 10–20 m tall, stunted where moisture availability is low. Trees are typically low-branching and spreading.
Habitat: Relatively well-drained sites of moderate fertility, strongly associated with Quaternary aeolian and lunette sand deposits.
Nearest relative: Shallow Sands Woodland.
Comments: Damp Sands Herb-rich Woodland reaches its low-rainfall limit in the southern Wimmera where it is often restricted to a narrow band on the sheltered eastern edge of aeolian sand dunes. It is well represented in public land blocks but is subject to high burning frequencies, resulting in Bracken-dominated sites. High quality examples require better protection.

EVC 6 Sand Heathland
Generally treeless heath with occasional scattered trees. Occurs in a variety of sandy situations including deep aeolian sand dunes, outwash sands and on shallow sand sheets covering plains and floodplains. Soils are infertile and dry, particularly in summer. Relatively widespread and common within parts of the study area. Some areas are being developed for pine plantations within the Glenelg Plain. Recorded from four bioregions (Glenelg Plain, Goldfields, Grampians, Wimmera).

***Glenelg Plain* Sand Heathland**
Floristics: Dominated by shrubs such as *Leptospermum myrsinoides*, *Banksia marginata*, *Leptospermum continentale*, *Astroloma conostephioides*, *Allocasuarina muckliniana*. Common ground species include *Hypolaena fastigiata*, *Lepidosperma congestum*, *Gonocarpus tetragynus*, *Argentipallium obtusifolium*.
Structure: Heathland <2 m tall.
Habitat: Quaternary dunefields.
Nearest relatives: Heathy Woodland, Damp Heathland.

***Goldfields* Sand Heathland**
Floristics: Dominated by *Xanthorrhoea australis* with shrubs such as *Brachyloma daphnoides*, *Banksia marginata*, *B. ornata*. An unusual feature is the prominence of *Triodia scariosa*, which is more typical of semi-arid environments. *Hypolaena fastigiata* and *Lepidosperma congestum* are prominent ground-covers.
Structure: Low heathland
Habitat: Deep sand dunes.
Nearest relative: Heathy Woodland
Comments: Restricted environment associated with outwash sands, probably reworked into dunes by wind action.

***Grampians* Sand Heathland**
Floristics: Dominated by low shrubs including *Leptospermum myrsinoides* and *Banksia marginata,* the ground-layer consists of various sedges such as *Hypolaena fastigiata*, *Lepidosperma* spp. and herbs.
Structure: Heathland to low open-woodland; trees are uncommon and if present are often small and spindly.
Habitat: Free-draining outwash sands, generally flat in profile, covering broad areas.
Nearest relative: Damp Heathland.
Comments: This EVC was mapped as a small area to the north of Rocklands Reservoir. The floristics of the area have changed since construction of the dam and the EVC is now bounded on one side by Seasonally Inundated Shrubby Woodland fringing the reservoir (this explains the presence of *Eucalyptus camaldulensis* in the quadrat - see below).

***Wimmera 1* Sand Heathland**
Floristics: Dominated by *Leptospermum myrsinoides*, *Banksia ornata*, *Astroloma conostephioides*, *Allocasuarina muckliniana*. Common ground species include *Hypolaena fastigiata*, *Lepidosperma carphoides*, *L. congestum*, *Lepidobolus drapetocoleus*. *Triodia scariosa* is an occasional but striking presence within this heathland. Grasses, herbs and geophytes form a sparse ground-cover.
Structure: Heathland 0.5–1 m tall, occasionally with scattered mallee-form trees.
Habitat: Quaternary dunefields.
Nearest relative: Heathy Woodland.
Comments: Boundaries between this EVC and Heathy Woodland may have been influenced by altered fire regimes.

***Wimmera 2* Sand Heathland**
Floristics: Dominated by *Leptospermum continentale* and a range of small shrubs and sedges.
Structure: Closed heath to 0.5 m tall to low open-woodland to 5 m tall. Trees, if present are generally of poor form and multi-stemmed.
Habitat: Broad gently-sloping outwash basins between aeolian sand dunes, sites may be poorly drained and soils may be waterlogged in winter due to a clay layer
40–60 cm beneath the sand.
Nearest relative: Damp Heathland
Comments: Very restricted EVC in the study area that is poorly understood in terms of its ecology and biogeography.

EVC 8 Wet Heathland
Heathland (or scrub if long unburnt) dominated by dense shrubs. Occurs on infertile sites subject to prolonged waterlogging in winter and drought in summer. Infertile sites that are wetter in summer support Riparian Scrub or wetland vegetation. Recorded from one bioregion (Glenelg Plain).

Wet Heathland
Floristics: Dominated by shrubs such as *Melaleuca squarrosa, Leptospermum continentale*, *Hakea nodosa*, *Allocasuarina paludosa*, *Melaleuca squamea* and sedge *Gymnoschoenus sphaerocephalus*.

Structure: Closed heathland, or closed-scrub (> 2 m tall) when long unburnt.
Habitat: Relatively infertile sites subject to prolonged waterlogging in winter and drought in summer. Restricted to areas of relatively high winter rainfall.
Nearest relative: Damp Heathland.
Comments: Delineation between this EVC and Damp Heathland, which are clearly different at their extremes, may be somewhat arbitrary as there appears to be a floristic continuum.

EVC 10 Estuarine Wetland
Treeless sedge-dominated wetland vegetation in estuaries. Vegetation is determined by fluctuating salinity, which varies in time from occasionally fresh to brackish or occasionally saline according to river flood and marine tide events. Soils are heavy silts and clays. Quadrats are recorded from the Warrnambool Plain within the study area but this EVC occurs or originally occurred in all estuaries within the study area (Glenelg Plain, Victorian Volcanic Plain at Portland, Warrnambool Plain) .

Lower Estuary **Estuarine Wetland**
Floristics: Dominated by sedge *Gahnia filum*, comprising a small number of salt-tolerant (halophytic) herbs.
Structure: Sedgeland 1.5 m tall.
Habitat: Outer (landward) zones of large estuaries, subject to fluctuating salinity including occasional freshwater/brackish floods and tidal inundation.
Nearest relative: Coastal Salt Marsh.
Comments: The stand at Curdies Inlet is one of the largest in south-east Australia (J. Yugovic pers. obs.) and requires detailed survey. Small stands of *Estuarine Flats* Coastal Tussock Grassland occur within this area but are below mapping threshold.

Upper Estuary **Estuarine Wetland**
Floristics: Dominated by *Juncus kraussii*, comprising a range of moderately salt-tolerant and some typically freshwater species. *Phragmites australis* is scattered throughout the community.
Structure: Rushland 1.0 m tall.
Habitat: Upper reaches of estuary, less saline than for Estuarine Wetland (Community 1).
Nearest relative: Estuarine Wetland (Community 1).
Comments: Estuarine vegetation within the study area requires further survey.

EVC 13 Brackish Sedgeland
Sedgeland with grassy or herbaceous ground-layer. Sedges present are usually indicative of saline sites, but ground-layer is depauperate with few if any true halophytic species. Often on apparently calcareous paludal deposits. While potentially frequently or seasonally inundated, it is suspected that sites may drain rapidly. Probably previously uncommon within study area, currently very few relatively intact examples. Recorded from one bioregion within study area (Dundas Tablelands).

Brackish Sedgeland
Floristics: Dominated by *Gahnia filum*, *Baumea juncea*, *Leptocarpus brownii* and/or *Distichlis distichophylla*. *Austrodanthonia* spp. and a large number of ephemeral herbs can be conspicuous in more intact sites.
Structure: Sedgeland 0.5–2 m in height.
Habitat: Primarily calcareous to slightly saline swamp deposits.
Nearest relative: Seasonally Inundated Shrubby Woodland.

EVC 16 Lowland Forest
Eucalypt forest with large range of shrubs and herbs, on relatively fertile, moderately well-drained soils in areas of relatively high rainfall. Many occurrences are on basalt or on shallow aeolian deposits with basalt within the root zone of trees; also on limestone and other substrates. Replaces Herb-rich Foothill Forest along increasing rainfall gradients. Restricted to the south of the study area and still largely extant which is unusual for an extensive pre-1750 EVC in the region. Recorded from three bioregions within the study area (Glenelg Plain, Victorian Volcanic Plain, Warrnambool Plain).

Glenelg Plain **Lowland Forest**
Floristics: Dominated by a range of eucalypts including *Eucalyptus willisii*, *E. baxteri*, *E. obliqua* and to a lesser extent *E. viminalis*. Occasional taller shrubs or small trees such as *Acacia melanoxylon*, *Pomaderris racemosa*, *Exocarpos cupressiformis*. Typically there is a moderately dense layer of ericoid-leaved shrubs, such as *A. verticillata*, *Leptospermum continentale* and *Coprosma quadrifida*, over a ground-cover of heathy subshrubs, Austral Bracken and a variety of herbs, grasses and climbers.
Structure: Open-forest.
Habitat: Occurs on undifferentiated Tertiary sediments and on the margins of Quaternary aeolian deposits and Tertiary sediments where loamy soils have developed. Soils are well drained and relatively fertile.
Nearest relative: Herb-rich Foothill Forest.

Victorian Volcanic Plain **Lowland Forest**
Floristics: Dominated by *Eucalyptus obliqua* ± *E. willisii* ± *E. aromaphloia* ± *E. baxteri*. Understorey usually rich in shrubs. Forest Wire-grass *Tetrarrhena juncea*, characteristic of this EVC elsewhere in Victoria, is conspicuously absent but does not occur in far south-west Victoria. Depth of aeolian sand sheet where present over basalt influences floristics, with more heath elements on deeper sand.
Structure: Forest (20–)25–30 m tall, trees characteristically tall and straight.
Habitat: Relatively fertile, moderately well-drained soils; on basalt or shallow aeolian deposits over basalt. Occurs in higher rainfall areas e.g. fault-bounded Normanby Platform on which the Cobboboonee State Forest is situated.
Nearest relative: Herb-rich Foothill Forest.

Warrnambool Plain **Lowland Forest**
Floristics: Dominated by *Eucalyptus obliqua* ± *E. viminalis*. Understorey usually has high shrub cover, especially from *Acacia*s, largely depending on fire regime; Forest Wire-grass *Tetrarrhena juncea* is usually prominent.
Structure: Forest c. 30 m in height.
Habitat: Moderately well-drained limestone soils.
Nearest relative: Herb-rich Foothill Forest.

EVC 18 Riparian Forest
Eucalypt forest found along sheltered, permanent creeks and rivers. Dominated by tall eucalypts, this EVC also has an open to sparse secondary tree layer of wattles and scattered dense patches of shrubs, ferns, grasses and herbs. The soil is fertile alluvium, regularly inundated and permanently moist. This produces multi-layered, species-rich vegetation. Weed levels are typically high due to fertile conditions and regular flood disturbance. Narrow ecological range within the study area and therefore naturally rare. Recorded from three bioregions within study area (Glenelg Plain, Victorian Volcanic Plain, Warrnambool Plain). Also occurs in the Grampians (Tumino and Roberts 1998).

Glenelg Plain **Riparian Forest**
Floristics: Dominated by *Eucalyptus ovata* with a secondary tree layer of *Acacia melanoxylon*. Patches of tall shrubs include *Leptospermum lanigerum*, *Pomaderris aspera*, *Coprosma quadrifida*. More exposed ground is blanketed with ferns, grasses, sedges and herbs.
Structure: Open-forest.
Habitat: Alluvial flats along sheltered permanent streams.
Nearest relative: Swamp Scrub.
Comments: Most remnants degraded by weed invasion but still support a high diversity of native species many of which are restricted to this or other riparian EVCs.

Victorian Volcanic Plain **Riparian Forest**
Floristics: Dominated by *Eucalyptus ovata* ± *E. viminalis* with a secondary tree layer of *Acacia melanoxylon*. Shrubs include *Leptospermum lanigerum*, *Pomaderris aspera*, *Coprosma quadrifida*. Soft Tree-fern *Dicksonia antarctica* is sometimes present. More exposed ground supports ferns, grasses, sedges and herbs.
Structure: Open-forest 30 m tall; closed-scrub where fire-damaged with eucalypt mortality.
Habitat: Alluvial flat along sheltered permanent stream.
Nearest relative: Swamp Scrub.
Comments: The example along the Fitzroy River is regenerating from severe fire and supports a dense scrubby understorey. The example along Brucknell Creek falls into two bioregions technically. There are grounds for combining this community with *Warrnambool Plain* Riparian Forest.

Warrnambool Plain **Riparian Forest**
Floristics: Dominated by *Eucalyptus viminalis*. *Acacia melanoxylon*, *Pomaderris aspera*. *Leptospermum lanigerum* and *Coprosma quadrifida* are prominent in the mid-storey. The ground-layer is rich in grasses, sedges and other herbs.
Structure: Forest.
Habitat: Alluvium along permanent stream.
Nearest relative: Swamp Scrub.

EVC 19 Riparian Shrubland
Treeless shrubland or with sparse eucalypts, on rocky substrates with a variety of sedges, grasses and herbs, many at low frequencies. Occurs along perennial streams in gorge tracts, mainly on basalt but sometimes also limestone geologies. Formerly relatively restricted, now mostly cleared. Recorded from two bioregions within study area (Victorian Volcanic Plain, Warrnambool Plain).

Riparian Shrubland
Floristics: Typically dominated by *Leptospermum lanigerum* and/or *Callistemon sieberi*, with *Hymenanthera dentata* and *Bursaria spinosa*. Major ground-layer species include *Carex appressa* and *Poa labillardierei*. *Eucalyptus camaldulensis* occasionally present.
Structure: Shrubland 2–4 m, to open-woodland 10–20 m.
Habitat: Rocky stream banks along perennial streams subject to flood events.

Nearest relative: Escarpment Shrubland, Riparian Woodland.

EVC 20 Heathy Dry Forest
Open-forest dominated by a variety of eucalypts, mainly *Eucalyptus macrorhyncha*, *E. polyanthemos* and *E. tricarpa*, with an understorey dominated by narrow and ericoid-leaved shrubs. Occurs on ridge tops and upper slopes of low hills and lower slopes of more prominent ranges. Shallow stony soils derived from Ordovician and Cambrian sediments create growing conditions of low fertility and poor water availability. Four floristic communities of this EVC are described by Muir *et al*. (1995) although many of the quadrats used in this analysis are not included in their work. Recorded from the Goldfields and Wimmera bioregions. Also occurs in the Grampians (Tumino and Roberts 1998).

***Goldfields* Heathy Dry Forest**
Floristics: Dominated by *Eucalyptus macrorhyncha* and *E. polyanthemos* ± *E. goniocalyx*. Prominent shrubs include *Acacia pycnantha*, *Astroloma conostephioides*, *Brachyloma* spp., *Dillwynia cinerascens*. Tussock grasses *Joycea pallida* and *Poa sieberiana* are prominent ground-covers.
Structure: Open-forest.
Habitat: Ridge tops and upper slopes of low hills and lower slopes of more prominent ranges.
Nearest relative: Box Ironbark Forest.

***Wimmera* Heathy Dry Forest**
Floristics: Dominated by *Eucalyptus macrorhyncha* and *E. tricarpa* ± *E. goniocalyx*. Prominent shrubs include *Acacia pycnantha*, *A. genistifolia*, *Astroloma conostephioides*, *Brachyloma* spp., *Dillwynia cinerascens*. Tussock grasses *Joycea pallida* and *Poa sieberiana* are prominent in this species-rich community.
Structure: Open-forest.
Habitat: Ridge tops and upper slopes of low hills.
Nearest relative: Box Ironbark Forest.

EVC 22 Grassy Dry Forest
Eucalypt woodland or open-forest on moderately fertile soils derived from Ordovician shales and sandstones. Generally little or no shrub layer. Ground-layer often sparse and dominated by tussock grasses. Most remnants appear to be disturbed by past clearing and grazing. Recorded from two bioregions within study area (Goldfields, Grampians) but there are no available quadrat data from the study area to enable determination of floristic communities. Floristic communities of this EVC are described by Tumino and Roberts (1998) and Muir *et al.* (1995).

Grassy Dry Forest
Floristics: Dominated by variety of eucalypts including *Eucalyptus macrorhyncha*, *E. goniocalyx*, *E. polyanthemos*, *E. melliodora*, *E. rubida*. Shrub layer often absent or consists of sparse low shrubs such as *Daviesia leptophylla*, *Acacia myrtifolia*, *Ozothamnus obcordatus*. Ground-layer dominated by tussock grasses such as *Poa sieberiana*, *Joycea pallida*.
Structure: Woodland or open-forest 6–15 m tall. Trees are typically relatively young regrowth.
Habitat: Steep to gentle slopes and ridges.
Nearest relative: Grassy Woodland.

EVC 23 Herb-rich Foothill Forest
Grassy or Austral Bracken-dominated eucalypt forest or woodland with large range of herbs. Occurs on relatively fertile, moderately well-drained soils, often on basalt, in areas of relatively moderate to high rainfall. Replaces Damp Sands Herb-rich Woodland along increasing rainfall gradients or with change to (richer) basalt soils; on basalt gradually replaced by Lowland Forest along increasing rainfall gradients, by Plains Grassy Woodland along decreasing rainfall gradients. Previously widespread and locally extensive in the south of the study area, now largely cleared. The term 'foothill' is consistent with the state wide EVC typology (NRE in prep.) although this EVC is not restricted to foothills. Recorded from three bioregions (Glenelg Plain, Victorian Volcanic Plain, Warrnambool Plain).

***Glenelg Plain* Herb-rich Foothill Forest**
Floristics: Dominated by *Eucalyptus ovata* ± *E. viminalis*. Tussock-grass *Poa labillardierei* and fern *Adiantum aethiopicum* are prominent in the understorey.
Structure: Forest or woodland c. 20 m in height.
Habitat: Moderately well-drained sites, often associated with sheltered, relatively damp gullies.
Nearest relatives: Damp Sands Herb-rich Woodland, Creekline Herb-rich Woodland.
Comments: Little is known of the pre-1750 vegetation of the isolated basalt section of Cape Bridgewater which may have been a form of Herb-rich Foothill Forest with coastal elements; according to Gibbons and Downes (1964) it was 'probably a scrub of coastal tea-tree [*Melaleuca lanceolata*] with manna gum'.

***Victorian Volcanic Plain 1* Herb-rich Foothill Forest**
Floristics: Dominated by *Eucalyptus obliqua* ± *E. ovata* ± *E. viminalis*.
Structure: Forest 15–20 m in height.
Habitat: Moderately well-drained basalt soils.
Nearest relative: *Victorian Volcanic Plain* Herb-rich Foothill Forest (Community 2).
Comments: Many remnants degraded by loss of species and weed invasion. Further survey required at Framlingham to resolve floristic communities.

***Victorian Volcanic Plain 2* Herb-rich Foothill Forest**
Floristics: Dominated by *Eucalyptus obliqua* ± *E. ovata* ± *E. viminalis*.
Structure: Forest (20–)25–30(– 40) m in height.
Habitat: Moderately well-drained basalt soils.
Nearest relative: Lowland Forest.
Comments: Occurrence beside the Surrey River (D38000) is unusual with tall (40 m) trees and a relatively mesic understorey.

***Warrnambool Plain* Herb-rich Foothill Forest**
Floristics: Dominated by *Eucalyptus obliqua* ± *E. ovata* ± *E. willisii*.
Structure: Forest (15–)20–25 m in height.
Habitat: Moderately well-drained limestone or aeolian soils.
Nearest relative: Damp Sands Herb-rich Woodland.
Comments: Relationship with Damp Sands Herb-rich Woodland needs further investigation.

EVC 28 Rocky Outcrop Shrubland
Shrubland associated with rock outcrops, generally in mosaic with Rocky Outcrop Herbland. Subject to microclimatic extremes, being typically damp to wet in winter and dry in summer. There is generally insufficient soil to support tree growth. Described from the Grampians by Tumino and Roberts (1998). This study identified additional areas on the northern tip of the Black Range, Mt Talbot, Mt Arapiles and on the Dundas Tablelands; quadrat data were collected from the Grampians and Black Range in this study. Recorded from two bioregions (Grampians, Dundas Tablelands).

Rocky Outcrop Shrubland

Floristics: Eucalypt overstorey is occasionally absent. Trees are sparse and spindly when present and include *Eucalyptus alaticaulis*, *E. baxteri* and/or *E. goniocalyx*. Common shrubs include *Ozothamnus obcordatus*, *Dodonaea viscosa* ssp. *cuneata*, *Leptospermum* spp., *Callitris rhomboidea*, *Calytrix tetragona*. Common herbs include *Drosera peltata* ssp. *auriculata*, *Centrolepis* spp., *Calandrinia calyptrata*.
Structure: Open-shrubland.
Habitat: On sandstone or, less frequently, on granitic rock outcrops.
Nearest relative: Rocky Outcrop Herbland.
Comments: A relatively intact EVC due to the naturally stressful environment.

EVC 30 Wet Forest
Tall eucalypt forest with tree ferns in sheltered fern gully. Moisture and fertility levels are relatively high, while light levels on the ground are relatively low. Isolated occurrence, related to Wet Forest in the Otway Ranges but lacking several key species. Recorded from Glenelg Plain bioregion.

***Glenelg Plain* Wet Forest**
Floristics: Dominated by *Eucalyptus ovata* with *Acacia melanoxylon* forming a mid-storey. Tree ferns *Dicksonia antarctica* and *Todea barbara*, and ground ferns such as *Polystichum proliferum*, *Blechnum wattsii* and *Blechnum nudum* are prominent.
Structure: Forest 30–40 m tall, tree ferns form open to closed stratum in gully
Habitat: Deep, sheltered gully. Geology map indicates limestone, but basalt boulders are common in streambed; basalt would increase nutrient levels within system.
Nearest relative: Riparian Forest.
Comments: Similar to Riparian Forest but considered a form of Wet Forest due to mesic understorey (B. Peel, NRE pers. comm.). Supports only occurrence of fern ally *Tmesipteris obliqua* in far south-west Victoria, epiphytic on *Dicksonia* (14 plants confined to 100 m section). Also supports rare grass *Agrostis rudis*.

EVC 47 Valley Grassy Forest
Grassy eucalypt forest on lower slopes with more fertile soils. Soils are loams to sandy loams with a high organic content and often on eastern or southern slopes. The tall open nature of this community made it both productive and easily accessible to timber harvesting. One additional quadrat was recorded during this study. Recorded from the Grampians bioregion.

***Grampians* Valley Grassy Forest**
Floristics: Dominated by *Eucalyptus macrorhyncha* with a few scattered shrubs in the understorey. Overstorey is atypical compared to that described from within Grampians National Park (Tumino and Roberts 1998). Ground-layer dominated by rich array of grasses, herbs and sedges.
Structure: Woodland to forest 15–25 m tall.
Habitat: Gentle outwash slopes.
Nearest relative: Hills Herb-rich Woodland.

Comments: This EVC is described by Tumino and Roberts (1998).

EVC 48 Heathy Woodland
Eucalypt-dominated woodland lacking a secondary tree layer and generally supporting a diverse array of narrow or ericoid-leaved shrubs except where frequent fire has reduced this to a dense cover of Austral Bracken. Geophytes and annuals can be quite common but the ground cover is normally fairly sparse. Spans a variety of geologies but is generally associated with nutrient poor soils including deep sands (aeolian or outwash) and Tertiary sand/clay which have been altered to form quartzite gravel (Muir *et al.* 1995, Tumino and Roberts 1998). Remains widespread although depleted as the relatively poor soils are not attractive for agriculture. More recently has been cleared to establish pine plantations. Recorded from all bioregions except Warrnambool Plain and Dundas Tablelands.

***Glenelg Plain* Heathy Woodland**
Floristics: Dominated by *E. baxteri* and/or *E. willisii*. Heathy shrubs prominent in understorey. Abundant *Leptospermum myrsinoides* is very characteristic of this community.
Structure: Woodland 10–15 m tall over shrubby understorey.
Habitat: Relatively infertile, well-drained sandy soils associated with aeolian deposits or deeply weathered Bridgewater Limestone.
Nearest relatives: Sand Heathland, Heathy Herb-rich Woodland.
Comments: Many remnants are intact due to natural resistance to weed invasion, but too frequent burning may lead to over-dominance by Austral Bracken and reduced diversity.

***Goldfields* Heathy Woodland**
Floristics: Dominated by *Eucalyptus goniocalyx* and *E. leucoxylon* ± *E. macrorhyncha* ± *E. melliodora* ± *E. willisii* over a dense heath layer.
Structure: Open-woodland with a relatively dense heathy understorey.
Habitat: Gently undulating plains, rises and low hills. On Tertiary sands (often with a thin covering of clay) and sandstone (often locally altered to quartzite gravel) (Muir et al. 1995).
Nearest relative: Heathy Dry Forest.

***Grampians 1* Heathy Woodland**
Floristics: Dominated by *Eucalyptus arenacea* ± *E. goniocalyx*. *Callitris rhomboidea* frequently reaches canopy height. Prominent shrub layer dominated by shrubs such as *Allocasuarina muelleriana*, *Calytrix tetragona*, *Leptospermum myrsinoides*. Litter and bare ground are the most common components of the woodland floor although *Hypolaena fastigiata* is generally prevalent and annual herbs and geophytes are common.
Structure: Woodland 10–20 m tall.
Habitat: Well drained deep loamy sands on gentle outwash slopes.
Nearest relative: Lateritic Woodland.
Comments: Occurs in the lowest rainfall areas of the Grampians and this in association with deep sand increases the effective aridity of this environment. Quadrat D14107 was considered unclassified by Tumino and Roberts (1998).

***Grampians 2* Heathy Woodland**
Floristics: *Eucalyptus obliqua* and *E. arenacea* are often co-dominant with dense, low, twisted canopies forming a distinctive feature of this community. The diverse understorey is dominated by narrow, ericoid-leaved shrubs while *Xanthorrhoea australis* is prominent. Grasses and herbs are common in this species-rich community.
Structure: Woodland 10–15 m tall.
Habitat: Lower slopes where laterites have formed on a sedimentary geology and on rises within broader areas of Shallow Sands Woodland and Plains Grassy Woodland.
Nearest relative: Lateritic Woodland.
Comments: Described from 10 quadrats in Tumino and Roberts (1998).

Grampians 3 (Mount Arapiles) Heathy Woodland
Floristics: Dominated by Eucalyptus goniocalyx with occasional E. leucoxylon also present. Dense heathy understorey dominated by Calytrix tetragona, Astroloma conostephioides, Brachyloma daphnoides, Hibbertia sericea. Coarse sands and outcropping rocks are sparsely covered by Gonocarpus elatus, Wahlenbergia gracilenta and a range of other annuals and geophytes.
Structure: Woodland to 12 m tall.
Habitat: Sandy slopes of Mt Arapiles.
Nearest relative: Rocky Outcrop Shrubland.
Comments: An outlier of the Grampians Bioregion.

***Victorian Volcanic Plain* Heathy Woodland**
Floristics: Dominated by *E. baxteri* and/or *E. willisii* and generally rich in species.
Structure: Woodland 10–20 m tall over shrubby understorey.
Habitat: Relatively infertile, moderately well-drained soils associated with aeolian deposits often overlying basalt with varying thickness. Less well-drained than *Glenelg Plain* Heathy Woodland as indicated by more *Gahnia radula* and less *Leptospermum myrsinoides*.
Nearest relatives: Damp Heathy Woodland, Lowland Forest.
Comments: Variable unit with tendency from typical Heathy Woodland (e.g. *Glenelg Plain* Heathy Woodland) to Damp Heathy Woodland according to drainage.

***Wimmera Sand Sheet* Heathy Woodland**
Floristics: Dominated by *Eucalyptus arenacea* and only rarely with other trees. Tall understorey shrubs or small trees are rare. Common shrubs include *Brachyloma daphnoides*, *Astroloma conostephioides*, *Calytrix tetragona*, *Banksia ornata*, *B. marginata*, *Leptospermum myrsinoides*, *Xanthorrhoea minor*. Ground cover is generally sparse but *Hypolaena fastigiata* is often prominent, while *Austrostipa mollis* is the most common grass.
Structure: Woodland 8–15 m tall.
Habitat: Deep aeolian sands.
Nearest relative: Sand Heathland.

***Wimmera Western Goldfields* Heathy Woodland**
Floristics: Dominated by *Eucalyptus goniocalyx* and *E. leucoxylon* ± *E. macrorhyncha* ± *E. melliodora* ± *E. tricarpa*. The understorey is a mixture of shrubs typical of the three adjacent bioregions with prominent species including *Acacia pycnantha*, *A. genistifolia*, *Hibbertia humifusa*, *Astroloma conostephioides*, *Lissanthe strigosa*. The ground cover is rich in orchids, lilies and other geophytes.
Structure: Woodland 10–20 m tall.
Habitat: Gently undulating plains, low rises and low hills covered with Tertiary sands which generally have been converted to quartzite gravel.
Nearest relative: Box Ironbark Forest.

EVC 50 Coastal Heathland
Low heathland on exposed coastal bluffs. The vegetation includes coastal and hinterland elements and is stunted by wind and salt-pruning. Unlike other heathlands in the region, fire may not be required for maintenance of this community. Recorded from one bioregion within study area (Glenelg Plain).

Coastal Heathland
Floristics: Dominated by shrubs including *Spyridium parvifolium*, *Pultenaea stricta*, *Leptospermum continentale*, *Correa reflexa*, *Banksia marginata*, *Pultenaea prolifera*.
Structure: Low shrubland 10–20 cm high. Shrubs are stunted by wind and salt.
Habitat: Windswept edges of coastal bluff.
Nearest relative: Damp Heathland.
Comments: Similar vegetation occurs east of the study area on bluffs above Two Mile Bay, Port Campbell National Park (Meredith et al. 1996). Quadrat D09018 appears ecotonal.

EVC 53 Swamp Scrub
Closed-scrub on frequently wet sites usually dominated by *Leptospermum lanigerum*. Largely confined to alluvial deposits along streams or paludal deposits in basins, occasionally associated with seepages on valley walls. Previously locally extensive but now almost entirely cleared and drained. Recorded from four bioregions within study area (Dundas Tablelands, Glenelg Plain, Victorian Volcanic Plain, Warrnambool Plain).

***Dundas Tablelands 1* Swamp Scrub**
Floristics: Dominated by *Leptospermum obovatum*. Conspicuous ground-layer species include *Goodenia humilis*, *Villarsia umbricola*, *Amphibromus recurvatus*, *Juncus* spp.
Structure: Closed-scrub to 4 m height, with occasional emergent *Eucalyptus camaldulensis*.
Habitat: Shallow gradient drainage basin on alluvium.
Nearest relative: Seasonally Inundated Shrubby Woodland.

***Dundas Tablelands 2* Swamp Scrub**
Floristics: Dominated by *Leptospermum lanigerum*, rich in large sedges, grasses and rhizomatous herbs.
Structure: Closed-scrub to 5 m height, with occasional emergent *Eucalyptus ovata*.
Habitat: Upper catchments of spring-fed permanent streams where a downstream constriction has lead to a build-up of organically-rich alluvial sediment forming a distinctly flat-bottomed 'U-shaped' valley. Soils are fine silts which are inundated during the wetter months and stay moist for most of the year.
Nearest relative: Sandy Stream Woodland

***Glenelg Plain* Swamp Scrub**
Floristics: Dominated by *Leptospermum lanigerum* ± *Melaleuca squarrosa* or rarely by *Melaleuca squamea* ± emergent/overhanging *Eucalyptus ovata*.
Structure: Open to closed-scrub ± emergent eucalypts.
Habitat: Poorly-drained sites with high nutrient and water availability.
Nearest relative: Riparian Scrub (which occurs on less fertile sites).
Comments: Quadrat D38023 (Moleside Creek) is atypical and represents a small shaded rocky section (below mapping threshold) set in what is otherwise Riparian Scrub along creek.

***Victorian Volcanic Plain* Swamp Scrub**
Floristics: Dominated by *Leptospermum lanigerum* ± emergent/overhanging *Eucalyptus ovata* with understorey species adapted to damp shady conditions.
Structure: Open to closed-scrub ± emergent eucalypts.
Habitat: Poorly-drained sites with high nutrient and water availability.
Nearest relative: Riparian Forest (which occurs on better drained sites along permanent streams).

***Warrnambool Plain* Swamp Scrub**
Floristics: Dominated by *Leptospermum lanigerum*± emergent/overhanging *Eucalyptus ovata*.
Structure: Open to closed-scrub 5–15+ m tall ± emergent eucalypts.
Habitat: Streams or swamps on alluvial or paludal deposits.
Nearest relative: Riparian Forest.
Comments: Merges into Riparian Forest along Brucknell Creek (Ralph Illidge Sanctuary).

EVC 55 Plains Grassy Woodland
Grassy eucalypt woodland with inter-tussock spaces potentially supporting a large range of herbs, mostly with perennial rootstocks, but occasionally with higher component of annual species. Occurs on fertile, sometimes seasonally waterlogged, mostly silty, loamy or clay topsoils, but occasionally sandy, with heavy subsoils. Mostly on volcanic and more fertile Tertiary or Quaternary soils on terrain of low relief. Previously widespread and extensive over a large proportion of the study area but now largely reduced to narrow strips along roadsides and stands of veteran trees over pasture within paddocks. The floristic affiliations of grassy woodland vegetation around the periphery of parts of the Grampians, and previously mapped as Plains Grassy Woodland, requires further investigation. Recorded from all bioregions within study area except Warrnambool Plain.

***Dundas Tablelands* Plains Grassy Woodland**
Floristics: Dominated by *Eucalyptus camaldulensis* ± *E. ovata*, *Allocasuarina verticillata* (where trees still present). In relatively intact sites, ground-layer dominated by *Themeda triandra* with a range of associated herbs.
Structure: Woodland, mostly 20–30 m tall. Most remnant understorey confined to roadsides, and many remnants are now treeless.
Habitat: Plains and gentle slopes, including more fertile Tertiary cappings and stream flats.
Nearest relatives: Plains Grassy Woodland / Damp Sands Herb-rich Woodland Complex, Plains Grassland.

***Glenelg Plain* Plains Grassy Woodland**
Floristics: Dominated by *Eucalyptus camaldulensis* (presumed) over a range of grasses and herbs dominated by *Themeda triandra*.
Structure: Woodland to open-woodland. Cleared areas have a grassland structure.
Habitat: Quaternary paludal deposits.
Nearest relative: Damp Sands Herb-rich Woodland.

***Goldfields 1* Plains Grassy Woodland**
Floristics: Remnants dominated by a variety of trees including *Eucalyptus melliodora*, *E. leucoxylon* and *E. camaldulensis* although the latter is presumed to be the norm in the original form of this community. Other trees or shrubs such as *Banksia marginata*, *Allocasuarina luehmannii* and *Acacia pycnantha* were possibly more prevalent but now occur only as scattered individuals. Relatively intact remnants have a very species-rich ground cover dominated by grasses, herbs, geophytes and forbs.
Structure: Open-woodland.
Habitat: Broad flat to undulating plains generally associated with larger watercourses. Soils derived from Quaternary fluvial gravel, sand and silt.
Nearest relative: Plains Grassland.

***Goldfields 2* Plains Grassy Woodland**
Floristics: Originally dominated by *Eucalyptus camaldulensis* (± *E. melliodora* north-east of the Grampians) but now essentially cleared, with a wide range of grasses, particularly *Themeda triandra*, and small herbs with perennial rootstocks. Modified treeless remnants are dominated by *Themeda triandra*.
Structure: Open-woodland 12–25 m tall, now usually a tussock grassland mostly less than 0.5 m in height (derived from former woodland).
Habitat: Lower slopes and plains, on fertile loam to clay-loam soils, often with buckshot.
Nearest relative: Plains Grassland.

***Grampians* Plains Grassy Woodland**
Floristics: Originally dominated by *Eucalyptus camaldulensis* but clearing has changed many stands to grassland dominated by *Themeda triandra*, *Calocephalus citreus* and other grasses and herbs.
Structure: Originally woodland/open-woodland.
Habitat: Plains and undulating lower slopes.
Nearest relative: Shallow Sands Woodland.

***Victorian Volcanic Plain* Plains Grassy Woodland**
Floristics: Dominated by *Eucalyptus camaldulensis* in lower rainfall areas, replaced by *E. ovata*, *E. viminalis* and *Acacia melanoxylon* above approximately 700 mm annual rainfall, with grassy ground-layer and herb-rich in relatively intact remnants. Ground-layer varies with management history, roadside remnants mostly dominated by *Themeda triandra*, previously grazed remnants usually dominated by *Austrostipa* spp. and *Austrodanthonia* spp. or introduced grasses. *Microlaena stipoides* can be prevalent under denser canopies.
Structure: Woodland, (6–)10–30 metres tall. Many roadside remnants currently treeless.
E. ovata is relatively fire-sensitive and was easily displaced from agricultural land.
Habitat: Quaternary basalt soils, extending to some drier Quaternary paludal or fertile Tertiary soils.
Nearest relatives: Plains Grassland, Stony Knoll Shrubland.

EVC 56 Floodplain Riparian Woodland
Amphibious and aquatic herb and sedge-dominated eucalypt woodland with occasional tall shrubs also present. Occurs along major rivers of the plains, often where extensive floodplains develop on fertile sand, silt or silty loam alluvial soils. Sites may be inundated by water for part of the year and ponding may occur during the drier months. Billabongs and old anabranches are common. High volume seasonal flows may be common. Formerly widespread in the study area along all major creeks and rivers, now greatly reduced in area due to clearing for agriculture. Remnant areas are subject to high levels of disturbance from grazing, timber cutting, recreational vehicles and weed invasion. This EVC could in places be considered a mosaic of Riparian Woodland and various wetland EVCs but the delineation of any such wetlands would mostly be difficult due to subtle microtopographic change. Virtually extinct with few on no remaining occurrences to sample. Recorded from four bioregions (Dundas Tablelands, Glenelg Plain, Victorian Volcanic Plain, Wimmera).

Floodplain Riparian Woodland
Floristics: Typically dominated by *Eucalyptus camaldulensis*, can include *E. viminalis* and
E. ovata at higher rainfalls, and including treeless wetland areas.
Ground-layer variable, woodland areas typically dominated by *Poa labillardierei*, variously with *Carex* spp., *Phragmites australis*, *Persicaria* spp., and aquatics in wetter situations.
Structure: Woodland to grassland, sedgeland or herbland.
Habitat: Alluvial soils of high fertility.
Nearest relative: Creekline Grassy Woodland, Riparian Woodland, Aquatic Herbland (billabongs).

EVC 61 Box Ironbark Forest
Recorded predominantly from the Goldfields bioregion but with a minor occurrence in the Wimmera. This EVC is described by Muir *et al.* (1995) as Box Ironbark Forest (Western Goldfields).

***Goldfields* Box Ironbark Forest**
Floristics: Dominated by a variety of trees, most commonly *Eucalyptus leucoxylon*. Taller shrubs include *Acacia pycnantha*, *A. genistifolia*, *A. paradoxa*; common subshrubs include *Lissanthe strigosa* and *Astroloma* spp. Ground-cover comprises a variety of grasses and herbs while at one site the vulnerable, prostrate subshrub *Dodonaea procumbens* was common.
Structure: Open-forest
Habitat: Undulating rises to low hills with shallow, nutrient poor, stony soils derived from Ordovician sediments.
Nearest relative: Heathy Dry Forest.

***Wimmera* Box Ironbark Forest**
Floristics: Dominated by a variety of trees, most commonly *Eucalyptus leucoxylon*. Taller shrubs include *Acacia pycnantha* and *A. genistifolia* while common subshrubs include *Lissanthe strigosa* and *Brachyloma daphnoides*. The ground cover supports a variety of grasses and herbs.
Structure: Open-forest.
Habitat: Undulating rises to low hills with shallow, nutrient poor, stony soils derived from Ordovician sediments.
Nearest relative: Heathy Dry Forest.

EVC 67 Alluvial Terraces Herb-rich Woodland
Woodland on broad alluvial plains and along ephemeral drainage lines. Soils are generally poorly drained duplex soils with sandy loam overlying a heavier clay subsoil. A striking feature is the high species-richness of the ground-layer and the low biomass of this cover, particularly in summer. Now rare and generally degraded by agricultural clearing and grazing by stock. The analysis here contains only three quadrats from this significantly depleted community. Muir *et al.* (1995) include over 20 quadrats (including two used in this analysis) and provide a description of this EVC. The delineation of this EVC across Victoria is unclear and requires further investigation. Recorded from four bioregions within the study area (Dundas Tableland, Goldfields, Grampians, Wimmera).

***Goldfields* Alluvial Terraces Herb-rich Woodland**
Floristics: Dominated by *Eucalyptus melliodora* ± *E. goniocalyx*. An open to sparse shrub layer of *Acacia pycnantha* and *A. paradoxa* occurs over a patchy, often sparse but species-rich ground cover dominated by annual grasses and herbs.
Structure: Open-woodland.
Habitat: Alluvial plains and the alluvial terraces of minor ephemeral drainage lines.
Nearest relatives: Plains Grassy Woodland, Valley Grassy Forest.

***Grampians* Alluvial Terraces Herb-rich Woodland**
Floristics: Dominated by *Eucalyptus aromaphloia* and *Eucalyptus melliodora* with an open understorey of *Acacia retinodes*. Scattered sub-shrubs include *Astroloma* spp., *Brachyloma daphnoides*, *Grevillea alpina*, *Hibbertia* spp. The ground often appears quite bare and supports a range of annuals and geophytes.
Structure: Woodland to open-forest 20–30 m tall.
Habitat: Ephemeral drainage lines and broad flood plains.
Nearest relative: Plains Grassy Woodland.
Comments: Disturbance from flooding provides a significant opportunity for weed invasion; the number of introduced species is usually high. This floristic community is described by Tumino and Roberts (1998).

EVC 68 Creekline Grassy Woodland
Eucalypt-dominated woodland with mostly grassy/sedgy to herbaceous ground-layer. Occurs on low-gradient ephemeral to intermittent drainage lines, typically on fertile colluvial/alluvial soils, on a wide range of suitably fertile geological substrates. These minor drainage lines can include a range of graminoid and herbaceous species tolerant of waterlogged soils, and are presumed to have sometimes resembled a linear wetland or system of interconnected small ponds. Formerly widespread in narrow bands within suitable habitat, now almost entirely cleared or eroded as a consequence of altered hydrology. Recorded from three bioregions within the study area (Dundas Tablelands, Goldfields, Victorian Volcanic Plain).

Creekline Grassy Woodland
Floristics: Dominated by *Eucalyptus camaldulensis* rarely with *E. ovata*, major ground-layer species include *Poa labillardierei*, *Microlaena stipoides*, *Juncus* spp., *Cyperus* spp., *Carex* spp.
Structure: Woodland/open-woodland 12–15 m tall, trees are generally well-formed and straight growing.
Habitat: Ephemeral creeks.
Nearest relatives: Riparian Woodland, Sandy Stream Woodland.

EVC 71 Hills Herb-rich Woodland
Grassy or herb-dominated eucalypt woodland, often with no shrub layer. Soils are generally shallow but fertile, and outcropping rock is not uncommon. This seasonally dry environment is favourable for both annual and perennial grasses and herbs. The environment varies from relatively flat ground to ridge tops on sedimentary sandstones to undulating rounded granite hills. Regarded as one of the most species-rich temperate communities in the world (Tumino and Roberts 1999). Recorded from four bioregions within study area (Dundas Tablelands, Grampians, Goldfields, Wimmera).

***Dundas Tablelands* Hills Herb-rich Woodland**
Floristics: Dominated by *Eucalyptus goniocalyx* and *Eucalyptus melliodora*. Shrubs are largely absent and the ground-layer may be variously grassy (on deeper soils) or dominated by annual herbs where outcropping occurs.
Structure: Woodland 10–12 m tall on outcropping areas and 12–15 m tall in areas with deeper soils. Trees are typically low-branching and spreading with a DBH of 1.0–1.3 m in rocky areas.
Habitat: Relatively well-drained sites of moderate fertility, strongly associated with shallow granite-like soils.
Nearest relative: Plains Grassy Woodland.

***Goldfields* Hills Herb-rich Woodland**
Floristics: Dominated by *Eucalyptus goniocalyx* and *E. melliodora* ± *E. aromaphloia*. Occasional shrubs include *Brachyloma daphnoides*, *Acacia mearnsii*, *A. paradoxa*. The ground cover is best observed in spring and consists of a species-rich carpet of annuals and herbs. The fern *Cheilanthes austrotenuifolia* and the herb *Gonocarpus elatus* are often prominent.
Structure: Woodland 8–15 m tall.
Habitat: Rocky sites including areas of Parilla Sand.
Nearest relative: Grassy Woodland.

***Grampians* Hills Herb-rich Woodland**
Floristics: Dominated by *Eucalyptus goniocalyx* and/or *Eucalyptus melliodora* ± *Eucalyptus obliqua* ± *Eucalyptus aromaphloia*. Shrubs are largely absent (although sometimes present as low ground covers) and the ground-layer is variously dominated by perennial and annual herbs and grasses.
Structure: Woodland 12–15 m tall on outcropping areas and 12–15 m tall in areas with deeper soils. Trees may be low-branching and spreading in rocky areas or well-formed and straight-growing on deeper soils.
Habitat: Relatively well-drained sites of moderate fertility, strongly associated with shallow granite sandy soils.
Nearest relative: Plains Grassy Woodland.

***Wimmera* Hills Herb-rich Woodland**
Floristics: Dominated by *Eucalyptus goniocalyx* and *E. melliodora* with a low, sparse shrub layer of *Ozothamnus obcordatus* and *Brachyloma daphnoides*. Species-rich ground cover dominated by *Hydrocotyle laxiflora*, *Gonocarpus elatus*, *Siloxerus multiflorus*.
Structure: Woodland 5–10 m tall.
Habitat: Low rolling hills.
Nearest relative: *Wimmera Low Rises* Grassy Woodland.

EVC 83 Swampy Riparian Woodland
Woodland or shrubland over sedgy to grassy-herbaceous ground-layer. Occurs on fertile but poorly drained alluvial soils on streams traversing terrain of very low gradients. Previously extremely rare and localised in the study area, now almost entirely cleared. Recorded from two bioregions within study area (Glenelg Plain, Victorian Volcanic Plain). Remnants on Victorian Volcanic Plain (e.g. Muston Creek near Caramut, Muddy Creek south-east of Hamilton) extremely degraded, not sampled.

Swampy Riparian Woodland
Floristics: Dominated by *Eucalyptus ovata*, with a sparse shrub layer of *Leptospermum lanigerum* and a grassy-herbaceous to sedgy ground-layer, with major species at the sampled site including *Pentapogon quadrifidus*, *Cyperus lucidus*, *Pratia pedunculata*, *Triglochin striatum*, *Acaena novae-zelandiae*.
Structure: Woodland 6–15+ m tall, stature varying with degree of waterlogging.
Habitat: Occurs on fertile but poorly drained alluvial soils on streams.
Nearest relative: Riparian Woodland / Riparian Forest, Plains Swampy Woodland / Swamp Scrub.

EVC 93 Broombush Mallee
Tall shrubland dominated by eucalypts and broombush with an understorey consisting of narrow, ericoid-leaved shrubs. The ground is largely bare with leaf litter although grasses and other herbs are present. The harsh, infertile lateritic soil has prolific ironstone nodules at or close to the surface which reduce infiltration of water. Recorded from a few locations in the Wimmera, this EVC has a very limited distribution within the study area and is generally associated with more arid environments to the north. Recorded from the Wimmera bioregion within study area.

***Wimmera* Broombush Mallee**
Floristics: Dominated by *Melaleuca uncinata* and *Eucalyptus viridis*. Smaller shrubs include *M. wilsonii*, *Micromyrtus ciliata*, *Lissanthe strigosa*. Grasses, herbs and annuals form a sparse ground cover.
Structure: Tall shrubland.
Habitat: Lateritic soils within but not on the dunefields of the Wimmera plain.
Nearest relative: Heathy Woodland.
Comments: Very few weeds were observed in this environment.

EVC 103 Riverine Grassy Chenopod Woodland
Grassy and low chenopod-dominated eucalypt woodland or forest with large range of herbs including several annuals. Occurs on fertile, silty clay-loams associated with alluvial terraces of major rivers in the north of the study area. Sites are associated with recent Quaternary swamp deposits and may be occasionally inundated during flood events. Clay soils are generally waterlogged in winter and dry and cracking in summer. Previously locally extensive within study area along major rivers in the Wimmera with <500 mm annual rainfall. Now largely cleared and almost extinct. Recorded from one bioregion (Wimmera).

***Wimmera* Riverine Grassy Chenopod Woodland**
Floristics: Dominated by *Eucalyptus largiflorens* and *Eucalyptus microcarpa*, rich in perennial and annual herbs and low-growing chenopods.
Structure: Woodland or open-forest 10–15 m tall, trees may be straight and well-formed in well drained areas or stunted and multi-branched in heavily waterlogged areas.
Habitat: Silty clay loams on alluvial terraces of major Wimmera rivers in areas
with <500 mm annual rainfall.
Nearest relative: Plains Grassy Woodland.

EVC 124 Grey Clay Drainage Line Herbland/Sedgeland
Vegetation of variable floristics and structure along slightly mineralised drainage lines, including a range of habitats such as shallow ephemeral to seasonal wetland on flats, dwarf herbland on stream banks in association with tussock grassland, and sedge-lined ponds with aquatics. Occurs on very heavy grey-black clay soils. Generally lacking woody species, but occasionally with small populations of remnant *Leptospermum lanigerum*. Variously dominated by grasses,

sedges and herbs, a number of which are indicative of mineralisation. Formerly rare and localised within study area, now almost entirely cleared. Recorded from one bioregion within study area (Victorian Volcanic Plain).

Grey Clay Drainage Line Herbland/Sedgeland
Floristics: Dominated by various mixtures of grasses (*Poa labillardierei*, *Agrostis* spp., *Distichlis distichophylla)*, sedges/rushes (*Eleocharis acuta*, *Schoenus nitens*, locally with *Carex* spp., *Schoenoplectus* spp., *Bolboschoenus caldwellii*, *Juncus kraussii*), herbs (notably small somewhat salt-tolerant species, e.g. *Selliera radicans*, *Wilsonia rotundifolia*, *Pratia irrigua*, *Ranunculus diminutus*, *Triglochin striatum*) and aquatic herbs (e.g. locally in sedge-lined pools with *Triglochin procera* and *Potamogeton pectinatus*).
Structure: Tussock grassland (to 1 m height), sedgeland (variable, from a few centimetres to 1–2 metres tall in localised bands, or herbland (mostly 0.02–0.2 m tall), possibly formerly including open-shrubland 2–3 metres tall.
Habitat: Slightly mineralised drainage lines on very heavy grey-black clay soils.
Nearest relatives: Creekline Tussock Grassland, Brackish Drainage line Herbland/Sedgeland.

EVC 125 Plains Grassy Wetland
Primarily grassy (to sedgy-herbaceous) vegetation of ephemeral to seasonal wetlands on fertile soils of volcanic and sedimentary plains, sometimes with scattered or fringing eucalypts or lignum shrubs. The grassy/sedgy-herbaceous ground-layer comprises various balances of true aquatics and species tolerant of intermittent to seasonal inundation. The vegetation ranges from extremely species-poor to species-rich on some verges or shallower more ephemeral sites. Occurs in seasonally wet depressions on plains, typically associated with heavy paludal soils. Previously widespread and common in suitable habitat but now largely cleared and remnants mostly under threat. Recorded from two bioregions within study area (Victorian Volcanic Plain, Wimmera).

Victorian Volcanic Plain 1 **Plains Grassy Wetland**
Floristics: Dominated by grasses (principally *Glyceria australis*, *Austrodanthonia duttoniana*, *Poa labillardierei*, *Amphibromus nervosus*), with sedges and herbs (notably *Eleocharis acuta*, *Juncus holoschoenus*, *Eryngium vesiculosum*, *Lobelia pratioides*) often conspicuous. Sites range from low to high species-richness. Outer fringes and more ephemeral sites can support a wide range of graminoid and herbaceous species tolerant of intermittent inundation. The relationship between mapping and classification is complicated by the linking of quadrats from the wet cores of drier systems with sites from drier margins of wetter systems.
Structure: Open-grassland, mostly 0.5–1.0 m in height.
Habitat: Shallow seasonally wet depressions and poorly defined drainage systems, on heavy grey-black clay soils.
Nearest relative: Red Gum Wetland

Victorian Volcanic Plain 2 **Plains Grassy Wetland**
Floristics: Dominated by *Glyceria australis*, often with *Eleocharis acuta*, consistently very species-poor. Most of the few associated species are typically aquatic or very inundation-tolerant herbs. Some sites appear to be always species-poor, others reveal increased floristic diversity following seasonal retreat of wetland inundation.
Structure: Open-grassland.
Habitat: Seasonally wet depressions and poorly defined drainage systems, with very heavy grey-black clay soils, prone to turbidity during inundation.
Nearest relative: Other Plains Grassy Wetland communities, Plains Sedgy Wetland.
Comments: The more floristically diverse outer verges of most remnants are degraded by loss of species and weed invasion.

Wimmera 1 **Plains Grassy Wetland**
Floristics: Dominated by *Eleocharis acuta* and grasses, usually *Eragrostis infecunda* ± *Amphibromus nervosus*, *Danthonia duttoniana* and *Agrostis avenacea* var. *avenacea*, ± *Eucalyptus largiflorens* and *Allocasuarina luehmannii*, with moderate to high species-richness, and typically including a range of herbs tolerant of inundation.
Structure: Grassland/herbland, mostly 0.3–1 m in height, or open-woodland to 15 m.
Habitat: Seasonally inundated depressions on fertile heavy soils.
Nearest relative: Red Gum Wetland.

Wimmera 2 **Plains Grassy Wetland**
Floristics: Dominated by mixtures of *Austrodanthonia duttoniana*, *Amphibromus nervosus*, *Juncus flavidus*, *Eleocharis acuta*, *Schoenus tesquorum*. Species-richness is moderate to high, and a wide range of herbs is typically present.
Structure: Grassland mostly less than 1 m in height.
Habitat: Seasonally wet heavy soils in shallow depressions and poorly defined drainage systems on fertile plains.
Nearest relative: Red Gum Wetland.

EVC 132 Plains Grassland
Tussock grassland, sometimes with scattered woody plants, typically rich in (usually perennial) herbs when intact. Occurs on fertile, usually heavy loam or clay soils, sometimes seasonally waterlogged or collecting small ephemeral pools in gilgai depressions. Mostly on basalt derived soils, but extending to some sedimentary soils, especially in lower rainfall areas. Previously widespread and locally extensive in the north of the study area but now largely extinct and restricted to poor-quality sites along some road reserves. Recorded from two bioregions (Victorian Volcanic Plain, Wimmera).

Victorian Volcanic Plain 1 **Plains Grassland**
Floristics: Dominated by *Themeda triandra*, with low diversity of associated grasses and small herbs (mean number of native species 15).
Structure: Closed tussock grassland (mostly less than 0.5 m in height), sometimes with scattered woody plants (to 20 m). Some sites potentially derived from woodland.
Habitat: Fertile, basaltic, loamy to silty or clay-loam topsoils over heavy subsoils, sometimes seasonally waterlogged.
Nearest relatives: Plains Grassland / Plains Grassy Woodland Complex, Plains Grassy Woodland.
Comments: Floristic classification is at least in part a reflection of the management history of the respective sites, where diversity has been reduced by sward closure, grazing and weed invasion in some instances.

Victorian Volcanic Plain 2 **Plains Grassland**
Floristics: Dominated by *Themeda triandra*, sometimes as co-dominant with *Poa* spp., *Austrodanthonia* spp. or *Austrostipa* spp., originally in part with scattered woody plants, primarily species of *Eucalyptus*, *Acacia*, *Bursaria*, *Hymenanthera*, *Allocasuarina*, with a low to moderate diversity of associated grasses and small herbs with perennial rootstocks (mean total number of native species 25). This community may include prior Stony Knoll Shrubland.
Structure: Tussock grassland mostly less than 0.5 m in height, sometimes with scattered woody plants (to 20 tall, mostly much smaller). Some sites potentially derived from former shrubland or woodland (Stony Knoll Shrubland).
Habitat: As well as to some extent reflecting disturbance, floristics also indicate an affiliation with more freely draining red loamy-soils of more elevated rocky crests and low stony knolls.
Nearest relatives: Plains Grassland / Plains Grassy Woodland Complex, Plains Grassy Woodland, Plains Grassland / Stony Knoll Shrubland Mosaic.
Comments: Floristic classification is at least in part a reflection of the management history of the respective sites, where diversity has been influenced by possible tree removal, the extent and duration of sward closure, grazing and weed invasions. Most remnants are degraded by loss of species and weed invasion.

Victorian Volcanic Plain 3 **Plains Grassland**
Floristics: Dominated by *Themeda triandra*, sometimes as co-dominant with *Poa* spp., *Austrodanthonia* spp. or *Austrostipa* spp., possibly in part originally with at least scattered woody plants, primarily species of *Eucalyptus* and *Acacia*, with a moderate to high diversity (mean total native species 43) of associated grasses and small herbs with perennial rootstocks.
Structure: Tussock grassland mostly less than 0.5 m tall. Some sites possibly former woodland.
Habitat: Fertile soils derived from basalt. Floristics suggest that while most sites are on loamy to silty or clay-loam topsoils over heavy subsoils and can be seasonally waterlogged, some sites are on drier red loamy soils.
Nearest relative: Plains Grassland / Plains Grassy Woodland Complex, Plains Grassy Woodland.
Comments: Floristic classification is at least in part a reflection of the management history of the respective sites, where diversity has been influenced by the extent and duration of sward closure, grazing and weed invasions. Most relatively species-rich remnants on roadsides and, where still regularly burnt, rail reserves. Most remnants subject to on-going degradation by loss of species and weed invasion.

Wimmera **Plains Grassland**
Floristics: Dominated by a number of grasses, herbs and small shrubs, particularly members of the Chenopodiaceae, ± *Allocasuarina luehmannii*.
Structure: Open to closed-grassland to low open-herbland or shrubland with very occasional trees at low frequencies.
Habitat: Areas experiencing <500 mm per annum on grey/red duplex clay-soils derived from Quaternary swamp deposits and Tertiary sands, silts and clays.
Nearest relative: Plains Grassy Woodland.

EVC 133 Limestone Pomaderris Shrubland
Shrubland on exposed limestone cliff above Glenelg River. Recorded only from the Glenelg Plain bioregion within the study area (also known from eastern Victoria).

***Glenelg Plain* Limestone Pomaderris Shrubland**
Floristics: Dominated by *Pomaderris halmaturina* with emergent *Allocasuarina verticillata* with a range of shrubs, grasses and other herbs. The fern *Pteris tremula* is largely confined to shady microsites such as crevices.
Structure: Shrubland 2–3 m tall with emergent trees to 5 m tall.
Habitat: Rocky limestone cliff and cliff top.
Nearest relative: Escarpment Shrubland.
Comments: Degraded by weed invasion at Lookout but improves to the south. Similar to Escarpment Shrubland elsewhere along the Glenelg River but at present considered to be Limestone Pomaderris Shrubland (B. Peel, NRE, pers. comm.). Further survey of escarpment vegetation along the river is required for resolution.

EVC 136 Sedge Wetland
Sedge-dominated seasonal wetland, usually of low diversity in central areas, but richer on verges and in some more ephemeral forms of the EVC. Frequently on soils of high organic content, in depressions within sandy terrain. Scattered distribution within higher rainfall areas. While reduced by draining and clearing, this is to a far less extent than in the case of seasonal wetlands on more fertile soils. Several communities are likely to be present within this EVC according to degree and duration of inundation. Recorded from three bioregions within the study area (Dundas Tablelands, Glenelg Plain, Victorian Volcanic Plain).

***Group 1* Sedge Wetland**
Floristics: Dominated by *Chorizandra australis* and *Baumea articulata*, with aquatic herbs including *Myriophyllum* spp. and *Villarsia reniformis*; drier verges dominated by *Lepidosperma longitudinale* with a wider range of small sedges and herbs.
Structure: Sedgeland 1–3 m tall, with aquatic herbs sometimes providing substantial cover in wetter versions of the EVC.
Habitat: Organic soils, in wetland basins on or adjacent to edges of lower fertility sandy soils, with higher sand content around verges. Central areas remain wet on a semi-continuous basis, fringes are typically intermittently wet.
Nearest relatives: Aquatic Herbland, Plains Sedgy Wetland.

***Group 2* Sedge Wetland**
Floristics: Dominated by *Lepidosperma longitudinale*, with fringing verge of *Melaleuca squarrosa* and *Restio tetraphyllus*.
Structure: Sedgeland, 1–2 m tall, with taller scrub verge.
Habitat: Seasonal wetland within highest rainfall forest areas on south-west verge of the volcanic plain, on organic soils.
Nearest relatives: Plains Sedgy Wetland, Aquatic Herbland.
Comments: Remnants minimal, inadequately known.

EVC 155 Bird Colony Succulent Herbland
Succulent herbland on coastal sand, restricted to Short-tailed Shearwater *Puffinus tenuirostris* (mutton bird) colonies. Succulent herbland is the climax vegetation of many seabird colonies in southern Australia and New Zealand (Yugovic 1998). Recorded from one bioregion within study area.

Bird Colony Succulent Herbland
Floristics: Dominated by succulent herb *Tetragonia implexicoma*. Other prominent succulent herbs are *Rhagodia candolleana*, *Carpobrotus rossii.* Introduced grasses and other herbs are frequent, especially in gaps created by bird disturbance.
Structure: Closed herbland 0.1 m in height.
Habitat: Nutrient enriched sandy substrates associated with shearwater breeding colonies.
Nearest relative: Coastal Tussock Grassland.
Comments: The 'Pea Soup' colony is on the mainland which is a rare phenomenon; this EVC is almost entirely restricted to islands throughout its range.

EVC 160 Coastal Dune Scrub
Scrub or shrubland on coastal sand dunes subject to strong salt-laden winds. Occurs extensively along the coast wherever sand dunes, as opposed to rocky cliffs and bluffs, are present. More protected, less saline and largely consolidated dunefields further inland support(ed) Calcarenite Dune Woodland. Recently stabilised sections of the Discovery Bay and Bridgewater Bay dunes support this EVC. Recorded from two bioregions within the study area (Glenelg Plain, Warrnambool Plain).

Coastal Dune Scrub
Floristics: Dominated by *Leucopogon parviflorus* and/or *Acacia longifolia* var. *sophorae* with a range of salt-tolerant species requiring good drainage.
Structure: Scrub or shrubland 2-3 m tall.
Habitat: Unconsolidated coastal sand dunes.
Nearest relative: Coastal Headland Scrub
Comments: Mapping of this EVC and Coastal Headland Scrub was in part based on geological mapping—verification required in areas without access. European grass *Ammophila arenaria*, previously planted as a sand binder, is a major threat to this vegetation type.

EVC 161 Coastal Headland Scrub
Scrub or shrubland on coastal cliffs and bluffs subject to strong salt-laden winds and salt spray. Occurs extensively along rocky sections of the coast. Further survey and analysis is required to determine relationships between communities of this EVC in Victoria. Recorded from all coastal bioregions within the study area (Glenelg Plain, Victorian Volcanic Plain, Warrnambool Plain).

***Glenelg Plain* Coastal Headland Scrub**
Floristics: Dominated by *Leucopogon parviflorus*, *Pultenaea canaliculata*, *Lepidosperma gladiatum* with a range of other salt and wind tolerant species.
Structure: Low shrubland 0.5–1.0+ m.
Habitat: Rocky coastal cliffs and bluffs exposed to strong salt-laden winds and salt spray, drainage poor compared to Coastal Dune Scrub.
Nearest relatives: Coastal Dune Scrub, Spray-zone Coastal Shrubland.
Comments: Wind-blown sand overlying rock results in vegetation resembling Coastal Dune Scrub; the two EVCs can intergrade with depth of sand over short distances.

***Warrnambool Plain* Coastal Headland Scrub**
Floristics: Dominated by *Leucopogon parviflorus* with a range of other salt and wind tolerant species.
Structure: Low shrubland 0.5+ m.
Habitat: Rocky coastal cliffs and bluffs exposed to strong salt-laden winds and salt spray, drainage poor compared to Coastal Dune Scrub.
Nearest relatives: Coastal Dune Scrub, Spray-zone Coastal Shrubland.
Comments: Wind-blown sand overlying rock results in vegetation resembling Coastal Dune Scrub; the two EVCs can intergrade with depth of sand over short distances. Forms a mosaic with Coastal Tussock Grassland in areas and may have occupied areas now supporting this EVC before grazing and burning associated with European colonisation.

EVC 163 Coastal Tussock Grassland
Tussock grassland ± emergent shrubs on coastal cliffs and bluffs or estuaries. Soils are saline and, on cliffs and bluffs, also exposed to strong salt-laden winds, thus precluding tree growth. Comprises two floristic communities in different ecological situations although both dominated by the same grass *Poa poiformis*. Recorded from one bioregion within study area (Warrnambool Plain) but likely to have also occurred in estuaries of the other coastal bioregions (Glenelg Plain, Victorian Volcanic Plain).

***Headland* Coastal Tussock Grassland**
Floristics: Dominated by tussock grasses *Poa poiformis* and *Themeda triandra*, with the shrub *Leucopogon parviflorus* as a common associate.
Structure: Closed-grassland or open-shrubland.
Habitat: Rocky coasts with at least some soil development.
Nearest relative: Coastal Headland Scrub.
Comments: Except for narrow strip along cliff tops, likely to have extended inland at the expense of Coastal Headland Scrub with European land use.

***Estuarine Flats* Coastal Tussock Grassland**
Floristics: Dominated by *Poa poiformis*, comprising a small number of salt-tolerant (halophytic) herbs such as *Distichlis distichophylla*.
Structure: Grassland 1.0 m tall.
Habitat: Sand deposits (cheniers) on estuarine flats and on outer (landward) zone of estuaries. Subject to fluctuating salinity but rarely if ever flooded by tides.
Nearest relative: Estuarine Wetland.
Comments: Stands observed at Curdies Inlet are below mapping threshold but the area requires detailed survey.

EVC 164 Creekline Herb-rich Woodland
Woodland associated with soaks and intermittent creek flats. Dominated by *Eucalyptus ovata* with a grassy understorey including herbs adapted to occasional waterlogging. Surrounded by EVCs of significantly drier environments. Loam or clay loam soils with a high water holding capacity and usually moist. Naturally restricted. Recorded from two bioregions (Glenelg Plain, Goldfields).

***Goldfields* Creekline Herb-rich Woodland**
Floristics: Dominated by *Eucalyptus ovata* ± *E. camaldulensis* ± *E. aromaphloia*, with open secondary tree layer of *Acacia mearnsii*. Open shrub layer dominated by *Leptospermum continentale* with dense, species-rich ground cover of *Pentapogon quadrifidus*, *Schoenus apogon* and other grasses and herbs.
Structure: Woodland/open-woodland.
Habitat: Soaks and ephemeral streams with a low gradient and broad floodplain.
Nearest relative: Creekline Grassy Woodland.
Comments: Floristically distinct from the other community in this EVC and linked by similar environments.

EVC 175 Grassy Woodland
Variable woodland variously dominated by *Eucalyptus leucoxylon, E. microcarpa*, *E. melliodora*, *E. camaldulensis*, *E. goniocalyx* or *E. viminalis*. There may be a shrub layer of species such as *Acacia brachybotrya*, *A. montana*, *A. mearnsii*, *A. paradoxa*, *Myoporum* spp., *Dodonaea viscosa* or *Cassinia arcuata*. There is a diverse ground-layer of grasses and herbs. Occurs on sites with moderate fertility such as alluvial flats, undulating hills and, in the Dundas, on tabletop slopes, on a variety of geologies including Tertiary marine and fluvial sediments and Cretaceous sediments. Previously widespread and locally extensive but now largely cleared. Remnants are generally heavily grazed. Recorded from five bioregions (Wimmera, Goldfields, Dundas Tablelands, Victorian Volcanic Plain, Warrnambool). There are not sufficient remnants/available data to describe most of these forms at present.

***Goldfields Low Rises* Grassy Woodland**
Floristics: Generally dominated by an open tree layer of *Eucalyptus microcarpa* ± *E. melliodora* with an open shrub layer of *Acacia pycnantha* ± *A. verniciflua* ± *A. microcarpa*. Rich in grasses and geophytes when intact.
Structure: Open-woodland 20–25 m tall with an open shrub layer 2–3 m tall, grassy herb-rich ground cover.
Habitat: Occurs on gently undulating terrain. Soils generally derived from a variety of substrates including marine and fluvial sediments.
Nearest relative: Box Ironbark Forest.

***Wimmera Low Rises* Grassy Woodland**
Floristics: Generally dominated by an open tree layer of *Eucalyptus leucoxylon* and/or *E. microcarpa* ± *E. goniocalyx* ± *E. melliodora*. Often with an open shrub layer. Rich in grasses and geophytes when intact.
Structure: Open-woodland 20–25 m tall ± an open shrub layer 2–3 m tall, grassy herb-rich ground cover.
Habitat: Occurs on sites of moderate fertility and water availability such as the floodplains of minor creeks and gently undulating terrain. Soils generally derived from a variety of substrates including marine and fluvial sediments.
Nearest relative: Plains Grassy Woodland.
Comments: Within the study area *Low Rises* Grassy Woodland occurs on the low hills between the Wimmera plains proper and the Goldfields Bioregion boundary.

EVC 179 Heathy Herb-Rich Woodland
Eucalypt woodland or open-forest generally with a Austral Bracken-dominated understorey. Wattles, such as *Acacia melanoxylon*, *A. mearnsii*, *A. verticillata*, *A. paradoxa* and, less frequently, *A. retinodes* are generally present. The understorey comprises a range of heathy shrubs and subshrubs, grasses and herbs. Occurs on Quaternary aeolian deposits with relatively well-drained sandy soils often with limestone at depth. Soil and ecological characteristics are intermediate between Damp Sands Herb-rich Woodland and Heathy Woodland but as this vegetation type often occupies large areas and appears to include species which distinguish it from these EVCs, it is considered to be a pure EVC rather than a complex. Recorded from two bioregions in study area (Glenelg Plain, Wimmera), also occurs in the Grampians National Park (Tumino and Robert 1998).

***Glenelg Plain* Heathy Herb-rich Woodland**
Floristics: Dominated by *Eucalyptus baxteri* ± *Eucalyptus viminalis* with an understorey in which *Leptospermum continentale*, *Xanthorrhoea minor*, *X. caespitosa*, *Pteridium esculentum* are prominent. Includes species of heathy habitats such as *Leptospermum myrsinoides* and *Hypolaena fastigiata* as well as species typical of more fertile habitats such as *Themeda triandra, Hypericum gramineum* and *Wurmbea dioica*.
Structure: Woodland 15–20 m tall.
Habitat: Moderately fertile sandy substrates in the vicinity of, but not on, limestone.
Nearest relatives: Heathy Woodland, Damps Sands Herb-rich Woodland.
Comments: Frequently occurs on aeolian sand deposits near limestone; trees roots are likely to reach the underlying limestone and redistribute nutrients to the otherwise nutrient-poor surface soil layers, resulting in this intermediate vegetation type.

***Wimmera* Heathy Herb-rich Woodland**
Floristics: Dominated by *Eucalyptus arenacea* or *E. viminalis*, generally with an understorey dominated by *Acacia paradoxa*, *Astroloma conostephioides*, *Brachyloma daphnoides*. Ground-layer supports a variety of herbs and grasses.
Structure: Woodland c. 10 m tall.
Habitat: Quaternary aeolian sands on the southern margins of this bioregion.
Nearest relatives: Heathy Woodland, Damp Sands Herb-rich Woodland.
Comments: High fire frequencies may distort the floristics of this community.

EVC 191 Riparian Scrub
Closed-scrub along damp drainage lines in relatively infertile environments, usually set in Heathy Woodland. More fertile but similarly wet environments support Swamp Scrub. Recorded from one bioregion within the study area (Glenelg Plain).

Riparian Scrub
Floristics: Dominated by *Melaleuca squarrosa*. The scrambling fern *Gleichenia microphylla* is also very characteristic of this community.
Structure: Closed-scrub.
Habitat: Drainage lines within relatively infertile habitats such as heathy woodlands.
Nearest relative: Swamp Scrub.
Comments: When long unburnt (which rarely happens), Wet Heathland can resemble this EVC.

EVC 193 Rocky Outcrop Herbland
Herbland associated with rock outcrops, generally in mosaic with Rocky Outcrop Shrubland. Subject to microclimatic extremes, being typically damp to wet in winter and dry in summer. There is generally insufficient soil to support tree growth. Described from the Grampians by Tumino and Roberts (1998). Recorded from two bioregions in the study area (Dundas Tablelands, Grampians).

Rocky Outcrop Herbland
Floristics: In the Grampians, trees are rare although scattered spindly specimens of *Eucalyptus goniocalyx* or *E. baxteri* can occur. Scattered shrubs such as *Calytrix tetragona*, *Leptospermum turbinatum*, *Ozothamnus obcordatus* may also be present. Most prominent life forms are grasses, forbs and other geophytes (Tumino and Roberts 1998).
Structure: Open-herbland.
Habitat: Associated with skeletal soils of rock outcrops, most frequently with north and west aspects.
Nearest relative: Rocky Outcrop Shrubland.

EVC 195 Seasonally Inundated Shrubby Woodland
Shrub-dominated eucalypt woodland with a range of sedges and grasses and herbs including a number of annuals. Occurs on moderately fertile, poorly-drained, shallow sand or silty topsoils over heavier clay subsoils of the plains that naturally impede drainage. Often associated with recent Quaternary swamp deposits and broad, seasonal drainage lines and outwash flats between sand dunes. Soils are generally inundated or waterlogged in winter and baked hard in summer, which promotes sedges and annual species. Formerly locally extensive within the north and west of the study area but now largely cleared and degraded by grazing. Still relatively common in some areas. Recorded from three bioregions within study area (Grampians, Glenelg Plain, Wimmera).

***Glenelg Plain* Seasonally Inundated Shrubby Woodland**
Floristics: Dominated by *Eucalyptus leucoxylon* ± *Eucalyptus viminalis* ssp. *cygnetensis* ± *Eucalyptus ovata* ± *Eucalyptus fasciculosa*, with a shrubby understorey, rich in grasses and herbs.
Structure: Woodland (10–)12–15 m tall, trees are generally well formed and straight-growing.
Habitat: Seasonally waterlogged depressions between aeolian sand dunes in areas with
<600 mm annual rainfall on shallow, coarse red-yellow sandy topsoils above an impervious clay subsoil which is baked hard in summer.
Nearest relative: Plains Sedgy Woodland.
Comments: Examples with *Eucalyptus fasciculosa* are a high priority for protection.

***Grampians* Seasonally Inundated Shrubby Woodland**
Floristics: Dominated by *Eucalyptus leucoxylon* ± *E. melliodora* with an understorey of often dense but separate clumps of shrubs such as *Callistemon rugulosus*, *Melaleuca gibbosa*, *Calytrix tetragona*, *Leptospermum* spp., *Hakea rugosa*, *H. rostrata*. Prominent ground covers include *Lepyrodia muelleri*, *Schoenus apogon*, *Leptocarpus brownii*.
Structure: Woodland to open-woodland.
Habitat: Broad drainage lines and flats that are inundated for extended periods over winter.
Nearest relative: Lateritic Woodland, Alluvial Terraces Herb-rich Woodland.
Comments: This EVC is described by Tumino and Roberts (1998) as two floristic communities including *Plains* and *Valley* Seasonally inundated Shrubby Woodland, although quadrat D14109 is classified as Shallow Sands Heathland.

***Wimmera 1* Seasonally Inundated Shrubby Woodland**
Floristics: Dominated by *Eucalyptus leucoxylon* above a low shrub layer of *Melaleuca gibbosa* ± *Melaleuca brevifolia*, rich in geophytes, annual herbs, sedges and grasses.
Structure: Woodland 12–15 m tall, trees are generally well-formed and straight-growing.
Habitat: Seasonally waterlogged depressions between aeolian sand dunes in areas with <600 mm annual rainfall on shallow, coarse red-

yellow sandy topsoils above an impervious clay subsoil which is baked hard in summer.
Nearest relative: Plains Sedgy Woodland.

***Wimmera 2* Seasonally Inundated Shrubby Woodland**
Floristics: Dominated by *Eucalyptus camaldulensis* above a tall shrub layer of *Callistemon rugulosus* and *Melaleuca* spp., rich in sedges and annual species, with large amount of bare ground.
Structure: Open-woodland 12–15 m tall, trees are generally well-formed and straight-growing.
Habitat: Upper level floodplains of the Wimmera River at the outwash/plains interface in areas with <600 mm annual rainfall. Occupies areas that are inundated for extended periods during winter on fine silty clay soils that are baked hard in summer.
Nearest relative: Plains Sedgy Woodland.

EVC 198 Sedgy Riparian Woodland
Forest or woodland with sedge-dominated understorey, on flats along creeks and drainage lines in moderately fertile habitats. Often occurs along streams and drainage lines within Lowland Forest. Watercourse within flats may be poorly defined. Recorded from three bioregions within study area (Grampians, Victorian Volcanic Plain, Warrnambool Plain).

***Grampians* Sedgy Riparian Woodland**
Floristics: Dominated by *Eucalyptus ovata* or less frequently *E. obliqua* with a sparse understorey of smaller trees (*Acacia melanoxylon*, *A. mearnsii*) and tall shrubs (*Melaleuca squarrosa*, *Leptospermum lanigerum*, *A. retinodes*, *Banksia marginata*). The ground cover is dominated by a variety of sedges such as *Carex appressa*, *Lepidosperma elatius*, *Cyperus lucidus*. See following table and Tumino and Roberts (1998).
Structure: Woodland to forest.
Habitat: Riparian flats and frequently flooded creek banks.
Nearest relative: Riparian Scrub.
Comments: Described by Tumino and Roberts (1998).

***Victorian Volcanic Plain* Sedgy Riparian Woodland**
Floristics: Dominated by *Eucalyptus ovata* and *Acacia melanoxylon* with *Leptospermum continentale* and usually *Lepidosperma longitudinale* (sometimes *L. elatius*, *L. laterale*, and/or *Gahnia trifida*). Species-richness is moderate to high, and a large number of herbs can be present, most of which are tolerant of waterlogged soils.
Structure: Woodland 8–30+ m tall.
Habitat: Flats prone to waterlogging on clay-loam soils of high fertility on high rainfall volcanic plains.
Nearest relative: Plains Swampy Woodland.

***Warrnambool Plain* Sedgy Riparian Woodland**
Floristics: Dominated by *Eucalyptus ovata*; sedges *Lepidosperma laterale, Carex gaudichaudiana* and *Carex* sp. are prominent in the understorey. Although recorded as *Lepidosperma laterale*, this species may be *Lepidosperma elatius*.
Structure: Forest c. 20 m tall.
Habitat: Drainage lines within forest with intermittent flow.
Nearest relative: Lowland Forest.
Comments: Site too small to be mapped at 1:100 000.

EVC 200 Shallow Freshwater Marsh
Wetlands which, while still shallow, are more deeply inundated and for longer periods than Freshwater Meadow (EVC 680). While this hydrological regime delimits a range of possible wetland EVCs, only on a very local scale does it imply a particular EVC with any certainty. On the volcanic plains and more fertile Tertiary soils, shallow freshwater marsh is usually indicative of Plains Sedgy Wetland, or poorly characterised species-poor variants of Plains Grassy Wetland in drier areas. It can also refer to sites supporting Swamp Scrub along impeded drainage lines in higher rainfall areas of plains. In relevant sections of the Wimmera Plains, Shallow Freshwater Marsh is usually indicative of Red Gum Wetland. In drier areas of the plains (both sedimentary and volcanic), Shallow Freshwater Marsh includes small areas of a range of restricted wetland types, including Cane-grass Wetland, Lignum – Cane-grass Wetland, Lignum Swamp, Brackish Wetland or Brackish Sedgeland. On less fertile sandy country, it typically indicates Sedge Wetland, or, rarely, Brackish Sedgeland (e.g. Casterton area). On floodplains, Shallow Freshwater Marsh has typically been treated as part of Floodplain Riparian Woodland (Floodplain Wetland).

EVC 203 Stony Rises Woodland
Eucalypt woodland on stony rises (highly irregular terrain on recent basalt flows). Soils are fertile and well-drained but shallow or skeletal. Limited soil development outside of rock-cracks and dry summers promote annuals and deep-rooted perennials. Recorded from the Victorian Volcanic Plain.

Stony Rises Woodland
Floristics: Dominated by *Eucalyptus viminalis* and *Acacia melanoxylon*. Prominent understorey species include *Pteridium esculentum*, *Poa ensiformis*, *Cassinia longifolia*, *Senecio pinnatifolius*, *Acaena novae-zelandiae*. Annual weeds are common.
Structure: Woodland 20 m tall.
Habitat: Basalt stony rises. Irregular, rough, rocky surface with hummocks, hollows and shady microsites, relatively good drainage, limited soil development.
Nearest relative: Damp Sands Herb-rich Woodland (this does not occur on basalt).

EVC 264 Sand Ridge Woodland
Grassy or low shrub-dominated pine-box woodland with large range of annual herbs. Occurs on moderately fertile, deep (>1.5 m) well-drained, sandy soils. Often associated with aeolian deposits including lunettes in association with larger rivers and wetlands. Soils are generally moist in winter and dry in summer, which promotes geophytic and annual species. Previously restricted in the north of study area but now largely cleared and degraded by rabbit grazing and weed invasion. Recorded from one bioregion (Wimmera) within study area.

***Wimmera* Sand Ridge Woodland**
Floristics: Dominated by *Callitris gracilis* ± *Eucalyptus melliodora* ± *Eucalyptus leucoxylon*, rich in grasses, annual herbs and geophytes, low heathy shrubs may be locally common.
Structure: Woodland 12–15 m tall, trees are generally evenly-spaced and well-formed.
Habitat: Source-bordering dunes composed of deep (>1.5 m) sandy soil in areas of 400–500 mm rainfall per annum.
Nearest relative: Damp Sands Herb-rich Woodland.

EVC 279 Heathland Thicket
Heathland recorded only from the Grampians bioregion where it is relatively rare and restricted. Often occurs within depressions surrounded by broader areas of Sand Heathland and just enters the present study area. Described from the Grampians by Tumino and Roberts (1998).

***Grampians* Heathland Thicket**
Floristics: Not well-defined but includes dense *Melaleuca decussata* with occasional *Leptospermum scoparium*. As the shrubs are very dense, the ground cover is often bare with occasional moss cover (Tumino and Roberts 1998).
Structure: Heathland (height not stated Tumino and Roberts 1998).
Habitat: Depressions or drainage lines within Sand Heathland..
Nearest relative: Seasonally Inundated Shrubby Woodland.
Comments: Floristic composition and ecology need further definition.

EVC 280 Floodplain Thicket
Woodland or scrub found on floodplains within the Glenelg and Wannon catchments. Broad alluvial flats give rise to a multitude of interlinking channels and it is within these channels that Floodplain Thicket occurs. Floristic variations within this EVC are likely to result from variations in the frequency and length of time of inundation. Soils vary from black alluvial clays to pale grey silty clays. Recorded from two bioregions within the study area (Dundas Tablelands, Grampians).

***Grampians and Dundas Tablelands* Floodplain Thicket**
Floristics: Dominated by *Eucalyptus camaldulensis*. Shrubs such as *Melaleuca decussata*, *M. gibbosa*, *M. squarrosa*, *Leptospermum lanigerum* and *L. continentale* form a dense thicket over a range of sedges and herbs. See Tumino and Roberts (1998).
Structure: Woodland to scrub.
Habitat: Riparian zones and seasonal floodways.
Nearest relative: Seasonally Inundated Shrubby Woodland.

EVC 282 Shrubby Woodland
Eucalypt woodland with an often dense shrubby understorey. Ground cover variously dominated by restionaceous and sedge species or grasses and forbs. Soils generally duplex with sandy loam overlying heavy clay subsoil. Restricted to valley floors of all major catchments within the Grampians bioregion. Recorded from the Grampians bioregion and described by Tumino and Roberts (1998).

***Grampians* Shrubby Woodland**
Floristics: Dominated by *Eucalyptus camaldulensis* with *E. melliodora* as a subdominant ± *E. ovata*. *Acacia mearnsii*, or less frequently *A. melanoxylon*, occurs as an understorey tree. The dense shrub layer is dominated by *Banksia marginata*, *Leptospermum* spp. and small shrubs such as *Astroloma conostephioides* and *Brachyloma daphnoides*. The ground-layer is dominated by *Microlaena stipoides* and is rich in forbs.
Structure: Woodland.
Habitat: Occurs on Pliocene–Pleistocene sediments with duplex soils.
Nearest relative: Heathy Woodland.

EVC 283 Plains Sedgy Woodland
Woodland in shallow depressions associated with broad plains or floodplains. Shrubs and understorey trees are generally absent with sedges predominating in the ground layer. Soils are poorly drained, cracking clays which can seasonally form shallow freshwater marshes. This EVC has undergone timber harvesting, draining for agriculture and

grazing (mainly in the Wimmera), although relatively intact examples can still be found. Recorded from the Wimmera and Grampians bioregions.

***Grampians* Plains Sedgy Woodland**
Floristics: Dominated by a variety of eucalypts and occasionally with scattered *Allocasuarina* spp. Shrubs such as *Hakea* spp., *Acacia pycnantha*, *Leptospermum myrsinoides* and *Allocasuarina paludosa* may be present, but only as scattered individuals. *Chorizandra enodis* is the only consistent species to occur as a ground cover with numerous other sedges, grasses and herbs also common.
Structure: Woodland.
Habitat: Slight depressions and poorly drained areas.
Nearest relative: Sedge-rich Wetland.
Comments: Many remnants relatively intact. Plains Sedgy Woodland within the Grampians Bioregion is described by Tumino and Roberts (1998).

***Wimmera 1* Plains Sedgy Woodland**
Floristics: Dominated by *Eucalyptus leucoxylon* ± *E. camaldulensis* ± *E. fasciculosa* ± *Allocasuarina luehmannii*. Sparse shrub cover often present, includes *Hakea rugosa*, *Acacia paradoxa*. Dense ground cover of *Chorizandra enodis*. Annuals, herbs and grasses common, often with many species at low frequencies.
Structure: Woodland.
Habitat: Seasonally inundated shallow depressions on broad plains.
Nearest relative: Seasonally Inundated Shrubby Woodland.
Comments: Despite the visual impression given by the two-way table, this is the most species-rich floristic community of this EVC in the bioregion. Further sampling is required to adequately define the communities in this EVC. This appears to be the driest version.

***Wimmera 2* Plains Sedgy Woodland**
Floristics: Dominated by *Eucalyptus leucoxylon* ± *E. microcarpa* ± *E. leucoxylon*. Sparse shrub cover often present, includes *Hakea rugosa*, *Melaleuca* spp., *Callistemon rugulosus*. Dense ground cover of *Chorizandra enodis*. Annuals, herbs and grasses common, often with many species at low frequencies. Species indicative of wet environments include *Villarsia reniformis*, *Isolepis* spp., *Juncus* spp., *Eryngium* spp.
Structure: Woodland.
Habitat: Seasonally inundated shallow depressions on broad plains.
Nearest relative: Seasonally Inundated Shrubby Woodland.
Comments: Further sampling is required to adequately define the communities in this EVC. This appears to be a wetter floristic community than Community 1.

***Wimmera 3* Plains Sedgy Woodland**
Floristics: Dominated by *Eucalyptus camaldulensis* ± *E. leucoxylon* ± *E. largiflorens* ± *E. microcarpa* ± *E. melliodora* ± *Allocasuarina luehmannii*. Sparse shrub cover occasionally present including *Hakea* spp. Dense ground cover of *Chorizandra enodis*. Annuals, herbs and grasses common. Species indicative of a wet, frequently inundated environment include *Centipeda cunninghamii*, *Agrostis avenacea*, *Juncus* spp., *Isolepis* spp., *Potamogeton tricarinatus*.
Structure: Woodland.
Habitat: Seasonally inundated shallow depressions surrounded by aeolian dunes.
Nearest relative: Some forms of Red Gum Wetland.
Comments: Appears to be the wettest version of this EVC in the bioregion.

EVC 285 Dry Creekline Woodland
Shrub-dominated eucalypt woodland with a range of sedges and herbs. Occurs along small, narrow, ephemeral streams flowing north and west from the Grampians towards drier regions to the north. Streams are largely dry in summer and often contain coarse alluvial sand deposits derived from a variety of different parent geologies but notably Carboniferous granites and sandstones. Previously restricted in the study area, extant examples are subject to grazing, particularly on flatter slopes. Generally low timber production value. Recorded from one bioregion (Grampians) within study area.

***Grampians* Dry Creekline Woodland**
Floristics: Dominated by a variety of eucalypts, often from adjoining EVCs. Common species include *Eucalyptus arenacea*, *Eucalyptus goniocalyx*, *Eucalyptus obliqua*, *Eucalyptus viminalis* ssp. *cygnetensis*. Shrubs are prominent and sedges may be present in streambeds, grasses and herbs are generally in low numbers.
Structure: Woodland to open-forest 10–15 m tall, depending on site conditions and adjoining EVCs.
Habitat: Small, ephemeral streams with relatively steep gradients (10-20°) draining north and west on coarse granitic or sandstone-derived sands.
Nearest relative: Sedgy Riparian Woodland.
Comments: This EVC is better represented in the Grampians National Park and Black Range State Park. Also described by Tumino and Roberts (1998).

EVC 291 Cane Grass Wetland
Open-grassland, typically very species-poor except on outer verges, often with monospecific (or virtually so) cane-grass dominated centres. On very heavy grey clay soils, prone to turbidity when inundated and extreme cracking when dry. Previously rare and localised within the study area, few relatively intact remnants persist. Recorded from one bioregion within study area (Wimmera), although it does occur on the Victorian Volcanic Plain near but outside the study area boundary, and prior restricted occurrences within the study area are possible.

Cane Grass Wetland
Floristics: Dominated by *Eragrostis infecunda*, typically very species-poor except around outer verges. Where present in more central areas, associated species are often annuals such as *Agrostis avenacea* var. *avenacea* or herbaceous aquatics such as *Potamogeton tricarinatus*. Often fringed by *Muehlenbeckia florulenta*, occasionally with scattered eucalypts.
Structure: Open-grassland.
Habitat: Seasonally to intermittently (mostly) shallowly inundated depressions, typically with heavy grey clay soils.
Nearest relative: Lignum Cane Grass Swamp (in relation to more species-rich outer fringes only) and some variants of Plains Grassy Wetland.

EVC 292 Red Gum Wetland
Eucalypt woodland with sedgy or grassy-herbaceous ground-layer, comprising various balances of true aquatics and species tolerant of intermittent to seasonal inundation. Occurs in seasonally wet depressions on plains, typically associated with heavy paludal soils, sometimes with gilgai development. Previously common in suitable habitat but now largely cleared. Recorded from two bioregions within study area (Grampians, Wimmera).

***Grampians* Red Gum Wetland**
Floristics: Dominated by *Eucalyptus camaldulensis* with a sparse shrub cover of *Melaleuca squamea*. Ground cover is dominated by *Carex tertecaulis*, *Isolepis fluitans*, *Myriophyllum simulans* and a variety of other sedges and semiaquatic plants.
Structure: Woodland.
Habitat: Drainage lines, swampy depressions and seasonally inundated areas.
Nearest relative: Aquatic Herbland.
Comments: *Grampians* Red Gum Wetland was described by Tumino and Roberts (1998) but the single quadrat within the present study area was classified as *Valley* Seasonally Inundated Shrubby Woodland by Tumino and Roberts (1998).

***Wimmera 1* Red Gum Wetland**
Floristics: Dominated by *Eucalyptus camaldulensis*, with ground-layer typically dominated by aquatic herbs (including *Myriophyllum* spp., *Villarsia reniformis*, *Potamogeton tricarinatus*), at least in wet central areas. A range of inundation-tolerant herbs, sedges and grasses is often also present, principally on drier verges which are quite species-rich, and floristics can resemble Plains Grassy Wetland.
Structure: Woodland to open-woodland, trees to 30+ m, primarily over a strata of aquatic herbs and inundation tolerant herbs, sedges and grasses.
Habitat: Seasonal wetland (sometimes with more consistently wet centres) in depressions on heavy soils within fertile plains.
Nearest relative: Red Gum Wetland / Aquatic Herbland Mosaic, Plains Grassy Wetland, Plains Sedgy Wetland.
Comments: Includes FFG listed community Red Gum Swamp (Community No. 1).

***Wimmera 2* Red Gum Wetland**
Floristics: Dominated by *Eucalyptus camaldulensis* and *Allocasuarina luehmannii*, ± *E. leucoxylon*, *E. melliodora* and *E. microcarpa*, ground strata sedgy (notably with *Chorizandra enodis* and *Lepidosperma congestum*), with sparse shrubs and a very diverse range of waterlogging tolerant grasses, geophytes and herbs, many at low frequencies.
Structure: Woodland or open-woodland (12–25+ m) or low sedgeland (0.2–0.5 m) to open-shrubland (1–2 m) in wetter portions.
Habitat: Shallow seasonal/intermittent wetland on pale grey-pink hard-setting gritty silt soils with heavy subsoils, on shallow depressions within shallower sand sheet areas.
Nearest relative: Plains Sedgy Woodland, Seasonally Inundated Shrubby Woodland, Plains Grassy Wetland.

***Wimmera 3* Red Gum Wetland**
Floristics: Dominated by *Eucalyptus camaldulensis* with relatively species-rich ground-layer typically dominated by inundation tolerant grasses, herbs and Nardoo. Main species include *Eragrostis infecunda*, *Agrostis avenacea* var. *avenacea*, *Eryngium vesiculosum*, *Marsilea drummondii*, *Brachyscome basaltica* and *Craspedia paludicola*. This drier version of the EVC has strong floristic affinities with Plains Grassy Wetland.
Structure: Woodland or open-woodland, generally to 20–30 m tall.
Habitat: Seasonally wet depressions on fertile heavy soils
Nearest relative: Plains Grassy Wetland.

EVC 295 Riverine Grassy Woodland
Grass-dominated eucalypt woodland or forest with occasional tall shrubs and trees also present. Occurs on extensive floodplains with fertile sand, silt or silty loam alluvial soils. Sites are generally infrequently flooded. Formerly restricted in the study area to downstream areas of the Wimmera River floodplain, now substantially reduced by clearing for agriculture and floristically and structurally simplified by grazing. Remnant areas are subject to high levels of disturbance from grazing, timber cutting, recreational vehicles and weed invasion. Recorded from one bioregion (Wimmera) within study area.

***Wimmera* Riverine Grassy Woodland**
Floristics: Dominated by *Eucalyptus camaldulensis*, high cover of grasses (eg. *Austrodanthonia* spp.) and numerous herbs (eg. *Wahlenbergia* spp., *Senecio quadridentatus*, *Rumex brownii*). See following table (in part).
Structure: Woodland or open-forest 12–15 m tall, trees are generally well-formed, straight-growing and single-stemmed.
Habitat: Infrequently flooded sites within primary alluvial floodplain of the Wimmera River in areas with <400 mm annual rainfall. Soils are generally sandy or silty loams.
Nearest relative: Riverine Grassy Chenopod Woodland.

EVC 298 Riverine Sedgy Forest
Tussock-grass and sedge-dominated eucalypt woodland or forest with occasional tall shrubs and trees also present. Smaller areas of treeless wetland and floodway vegetation (amphibious and/or aquatic herbs) are also often present. Occurs where extensive floodplains develop on fertile sand, silt or silty loam alluvial soils transported by regular flood events. Sites may be inundated by water for part of the year and permanent billabongs and old anabranches are common. Formerly restricted in the study area to downstream areas of the Wimmera River floodplain, now substantially reduced by clearing for agriculture and conversion of areas to irrigation farming. Remnant areas are subject to high levels of disturbance from grazing, timber cutting, recreational vehicles and weed invasion. Recorded from one bioregion within study area.

***Wimmera* Riverine Sedgy Forest**
Floristics: Dominated by *Eucalyptus camaldulensis*, with a high cover of tussock-grasses, sedges (e.g. *Carex* spp., *Cyperus* spp., *Isolepis* spp.) and rushes and a range of aquatic/amphibious herbs (e.g. *Centipeda cunninghamii*, *Calotis scapigera*, *Crassula helmsii*, *Triglochin* spp., *Myriophyllum* spp.).
Structure: Open-forest or woodland 12–18 m tall, trees are generally well formed, straight-growing and single-stemmed.
Habitat: Seasonally or regularly-flooded alluvial floodplains of the Wimmera River in areas with <400 mm annual rainfall. Soils are generally sandy or silty (sometimes gravelly) loams. Numerous billabongs, floodways and old anabranches are a feature.
Nearest relative: Floodplain Riparian Woodland.

EVC 636 Brackish Lake Mosaic
Mosaic of wetland EVCs in which deeper central areas support Brackish Aquatic Herbland (see table below). Verges support a more species-rich herbland or sedgeland in which *Bolboschoenus caldwellii*, *Schoenus nitens*, *Schoenoplectus pungens*, *Cyperus gymnocaulos* and *Eleocharis* spp. are prominent. Brackish Wetland 656 sometimes occurs in this mosaic, but other poorly understood EVCs are also present. Typically fringed by *Eucalyptus camaldulensis*-dominated woodland. The floristic composition of the verge is influenced by factors such as salinity, exposure, aspect and steepness (see Permanent Open Freshwater 682). Always rare in study area, current examples mostly with increased salinity due to hydrological alteration. Recorded from one bioregion (Victorian Volcanic Plain).

Brackish Lake Mosaic (Brackish Aquatic Herbland component)
Floristics: This component dominated by *Myriophyllum verrucosum*, with *M. muelleri*, sometimes with *Triglochin procerum* and *Lilaeopsis polyantha*.
Structure: Herbland (aquatic) to sedgeland, submergent to weakly emergent.
Habitat: Inundated depressions, including along poorly defined drainage lines. Floristic composition indicates the presence of salinity, but not at levels which greatly restrict species-richness.
Nearest relatives: Brackish Wetland, Estuarine Wetland, Grey Clay Drainage Line Herbland/Sedgeland.

EVC 640 Creekline Sedgy Woodland
Sedge and rush-dominated eucalypt woodland with amphibious herbs along creek-banks and adjacent wet flats. Occurs along smaller intermittent creeks on the floodplains of larger rivers in lower rainfall areas in the north of the study area. Previously widespread and locally extensive but now largely cleared and degraded. Recorded from one bioregion within study area (Wimmera).

Creekline Sedgy Woodland
Floristics: Dominated by *Eucalyptus camaldulensis* ± *E. microcarpa,* major ground-layer species include *Carex tereticaulis*, *Carex appressa*, *Juncus* spp., *Cyperus gunnii* and a range of amphibious herbs.
Structure: Woodland or open-woodland 12–15 m tall, trees are generally well-formed, straight growing and single-stemmed.
Habitat: Coarse sand and stony alluvial soils along ephemeral creeks with very low gradients within Plains Grassy Woodland. Annual rainfall is <600 mm per annum.
Nearest relative: Creekline Grassy Woodland
Comments: May be endemic to Wimmera bioregion. Very few high quality examples exist although further survey of all public land water frontages is required to accurately determine this.

EVC 641 Riparian Woodland
Woodland dominated by *Eucalyptus camaldulensis* over tussock grass *Poa labillardierei* dominated understorey, beside permanent streams, typically on narrow alluvial deposits. Tall shrubs may be present and amphibious herbs may occur in occasional ponds and beside creeks. While flooding may be common, sites are rarely inundated for lengthy periods. High volume seasonal flows may be common. Formerly widespread along major creeks and rivers on the plains within the study area, now greatly reduced in area due to clearing for agriculture. Remnant areas are subject to high levels of disturbance from grazing, timber cutting, recreational vehicles and weed invasion. Recorded from four bioregions (Wimmera, Glenelg Plain, Dundas Tablelands, Victorian Volcanic Plain).

***Glenelg Plain and Dundas Tablelands* Riparian Woodland**
Floristics: Dominated by *Eucalyptus camaldulensis*, relatively intact understoreys dominated by *Poa labillardierei*.
Structure: Woodland to 30 m in height.
Habitat: Narrow alluvial deposits along permanent streams.
Nearest relative: Plains Grassy Woodland.
Comments: The Glenelg Plain and Dundas Tablelands are considered to share the same riparian woodland system. Almost all stands of remnant *E. camaldulensis* have introduced understoreys due to stock grazing, superphosphate application and other disturbances. Remnants with predominantly indigenous understoreys are often degraded by loss of species and weed invasion. This environment is prone to weed invasion due to high nutrient levels, flood disturbance and streams dispersing weed species.

***Victorian Volcanic Plain* Riparian Woodland**
Floristics: Dominated by *Eucalyptus camaldulensis*, typically with *Poa labillardierei*, sedges and in-stream aquatics sometimes conspicuous in more intact sites.
Structure: Woodland 10–30 m tall.
Habitat: Alluvial soils on verges of permanent streams, including in-stream ponds.
Nearest relative: Creekline Grassy Woodland, Floodplain Riparian Woodland.

***Wimmera* Riparian Woodland**
Floristics: The quadrats presented here were taken within ponded areas and represent the wettest end of the floristic continuum within Riparian Woodland. They were dominated by *Eucalyptus camaldulensis* and were rich in amphibious and aquatic herbs, sedges, rushes and grasses. Most of the community has an understorey dominated by *Poa labillardierei* when undisturbed.
Structure: Woodland to open-forest 12–18 m tall. Trees are generally well formed and straight-growing.
Habitat: Fertile alluvial soils along major rivers and streams subject to lengthy periods of seasonal inundation.
Nearest relative: Floodplain Riparian Woodland.

EVC 642 Basalt Shrubby Woodland
Eucalypt-dominated woodland with grassy/shrubby understorey, presumed originally quite species-rich. Occurs on fertile, mostly loamy basalt soils at higher rainfalls. Previously extensive in south-eastern section of the Volcanic Plain, but now almost entirely cleared. Recorded from one bioregion within study area (Victorian Volcanic Plain).

Basalt Shrubby Woodland
Floristics: Dominated by *Eucalyptus ovata* and *Acacia melanoxylon* ± *E. viminalis*. The understorey apparently included a shrubby component (most common remnant species *Leptospermum continentale*, *Acacia verticillata*). Major ground-layer species include *Themeda triandra*, *Poa morrisii*, *Austrostipa pubinodis*, *Pteridium esculentum.* A range of other grasses and small dicot herbs present in more intact sites.
Structure: Woodland 10–25 m tall, varying with site qualities such as exposure and wetness.
Habitat: Well-drained to seasonally damp fertile soils in higher rainfall areas of volcanic plain.
Nearest relative: Plains Grassy Woodland, Damp Sands Herb-rich Woodland, Herb-rich Foothill Forest.

EVC 643 Brackish Drainage Line Herbland/Sedgeland
Usually sedgeland or herbland, structurally variable, with a range of variously salt-tolerant herbs, but samphires only minor component if present, occurs on heavy clay and organic/alluvial soils along salinised minor drainage lines. Previously rare and localised within study area,

now mostly cleared. Recorded from two bioregions within study area (Dundas Tablelands, Victorian Volcanic Plain).

Brackish Drainage Line Herbland/Sedgeland
Floristics: Potentially co-dominated by a wide range of somewhat salt-tolerant species, including sedges and rushes/reeds (*Eleocharis acuta*, *Bolboschoenus caldwellii*, *Schoenoplectus pungens*, *Juncus kraussii*, *Phragmites australis*), smaller grasses (*Distichlis distichophylla*) and herbs (e.g. *Selliera radicans*, *Triglochin striatum*, *Pratia irrigua*, *Mimulus repens*, *Wilsonia rotundifolia*).
Structure: Sedgeland or herbland, sometimes reed-bed, mostly 0.2–1 m in height.
Habitat: Frequently saturated heavy clay and organic/alluvial soils along salinised minor drainage lines, mostly on basaltic or fertile Tertiary terrain.
Nearest relative: Estuarine Wetland, Inland Saltmarsh, Brackish Wetland.

EVC 644 Cinder Cone Woodland
Woodland with grassy understorey associated with tuff (volcanic ash) volcanoes. Poorly understood and almost extinct. Recorded from one bioregion within study area (Victorian Volcanic Plain).

Cinder Cone Woodland
Floristics: Dominated by *Eucalyptus viminalis* and/or *E. ovata*, with a grassy or Austral Bracken-dominated understorey in which *Poa labillardierei* is prominent, at least on southern aspects. Floristics poorly known due to lack of unmodified remnants.
Structure: Woodland.
Habitat: Ash deposits on the Tower Hill volcano and possibly nearby.
Nearest relatives: Scoria Cone Woodland, Plains Grassy Woodland.
Comments: The best known surviving remnant (D27985) lacks tree cover; it has a south aspect, further research is needed to infer the original vegetation on other aspects. Relationship with Scoria Cone Woodland is unclear and there may not be sufficient remnants of these EVCs in Victoria to clarify this.

EVC 647 Plains Sedgy Wetland
Primarily sedgy-herbaceous vegetation of ephemeral to seasonal wetlands on fertile soils of volcanic and sedimentary plains, sometimes with scattered or fringing eucalypts or Tea-tree/Paperbark shrubs in higher rainfall areas. A range of aquatic herbs can be present, and species-richness is mostly relatively low to moderate, but higher towards drier margins. Occurs in seasonally wet depressions on plains, typically associated with silty peaty or heavy clay paludal soils. Plains Sedgy Wetland typically occurs in sites of most sustained and deeper inundation than Plains Grassy Wetland. Previously widespread and relatively common in restricted suitable habitat, but now largely cleared and remnants mostly under threat. Recorded from two bioregions within study area (Dundas Tablelands, Victorian Volcanic Plain).

***Dundas Tablelands* Plains Sedgy Wetland**
Floristics: Dominated by the sedges *Baumea arthrophylla* and *Eleocharis acuta*, and herbs such as *Villarsia reniformis*, *Isolepis fluitans*, *Myriophyllum crispatum*, *Goodenia humilis* and *Centella cordifolia*. Except on ephemerally wet fringes, grasses are a relatively minor component, the major species being *Agrostis avenacea* var. *perennis* and *Amphibromus recurvatus*.
Structure: Sedgeland, open-sedgeland or herbland (height ranging from mostly shortly emergent herbland to sedgeland 0.3–1 m tall).
Habitat: Seasonally inundated depressions on tablelands, soils silty/peaty within relatively fertile Tertiary geologies on terrain of locally low relief.
Nearest relative: Plains Grassy Wetland, Aquatic Herbland.

***Victorian Volcanic Plain* Plains Sedgy Wetland**
Floristics: Variously dominated by *Carex tereticaulis*, *Amphibromus sinuatus* and aquatic herbs (notably *Stellaria angustifolia*, *Isolepis fluitans*, *Myriophyllum* spp., *Triglochin procerum*, *Neopaxia australasica*). In higher rainfall versions such as Annya Forest, *Juncus procerus* and *Carex appressa* may be the largest graminoids present. These variants, with a somewhat similar but less-rich aquatic flora, are presumed to represent an undescribed additional community.
Structure: Open-sedgeland (to 1.5 m) to mat-forming or weakly emergent aquatic herbland.
Habitat: Occurs in seasonally wet depressions on plains, typically associated with silty peaty paludal soils over heavy clays.
Nearest relative: Plains Grassy Wetland, Aquatic Herbland.

EVC 648 Saline Lake Verge Herbland/Sedgeland
Variously sedgeland, herbland or grassland vegetation occurring on the fringes of saline semi-permanent to permanent wetlands. On lower rainfall volcanic plains and fertile Tertiary or Quaternary soils of sedimentary origin, these wetland types are typically fringed by low vegetation dominated by salt-tolerant grasses and herbs, or succulent chenopods. Central wet areas usually support a herbland dominated by fine-stemmed submerged aquatic monocots. These EVCs have generally been combined and mapped as Saline Lake Mosaic. Soils are generally heavy grey clays, sometimes with a shallow sandy covering, and are intermittently inundated to moist for most of the year. Scattered within the study area but now largely modified by grazing and hydrological alteration. Recorded from two bioregions within the study area (Wimmera, Victorian Volcanic Plain).

Saline Lake Verge Herbland/Sedgeland
Floristics: Dominated by *Puccinellia stricta* var. *perlaxa*, *Sarcocornia quinqueflora* and/or *Distichlis distichophylla*. A range of salt tolerant herbs, sedges and small grasses can also be present on the upper edges of this zone or in less saline examples. *Muehlenbeckia florulenta* was sometimes also present in this zone.
Structure: Grassland or herbland, sometimes (partially) open-shrubland, mostly
(0.05–)0.2–0.6 m in height.
Habitat: Verges of salinised water bodies, associated with heavy soils or superficial sandy overlays.
Nearest relative: Inland Saltmarsh, Brackish Wetland.

EVC 649 Stony Knoll Shrubland
Shrubland or non-eucalypt woodland with grassy understorey on low stony rises (knolls) on basalt flows. Soils are fertile and well-drained but shallow. Limited soil development and dry summers promote annuals and deep-rooted perennials in the vegetation. Extremely little remains of this ecosystem. Recorded from two bioregions (Dundas Tablelands, Victorian Volcanic Plain).

Stony Knoll Shrubland
Floristics: Originally dominated by shrubs including *Bursaria spinosa*, *Acacia verticillata* and *Hymenanthera dentata* with grassy or (in southern parts) Austral Bracken-dominated understorey in which *Themeda triandra* and *Austrostipa* spp. were prominent. Trees *Allocasuarina verticillata*, *Acacia mearnsii*, *Banksia marginata* and *Acacia implexa* were variously present.
Structure: Grassland to 1 m in height/open-shrubland 1–2 m in height/woodland 5–10 m in height.
Habitat: Rocky basalt rises, more weathered than for Stony Rises Woodland, with friable red loam soils in spaces between rocky paving.
Nearest relative: Plains Grassland / Plains Grassy Woodland Complex.
Comments: The few remnants have undergone loss of sensitive species and weed invasion. Near the coast, coastal shrubs such as *Leucopogon parvifolius* and *Adriana quadripartita* are present; further research may indicate another floristic community, but these species may have spread inland following a reduction in fire frequency. Further variation in original floristics according to rainfall across the range of this EVC is anticipated.

EVC 651 Plains Swampy Woodland
Eucalypt woodland with ground-layer dominated by tussock grasses and/or sedges, rich in herbs when relatively intact. Occurs on poorly drained, seasonally waterlogged heavy soils, primarily on paludal deposits on the volcanic plains but extending to suitable substrates within landscapes of sedimentary origin. Previously of scattered distribution, mainly in higher rainfall areas. Almost entirely cleared. Recorded from two bioregions (Glenelg Plain, Victorian Volcanic Plain).

Plains Swampy Woodland
Floristics: Dominated by *Eucalyptus ovata*, occasionally *E. camaldulensis*. *Acacia melanoxylon* also frequently present. Shrubs, if present, include *Ozothamnus ferrugineus*, *Leptospermum continentale*, *Allocasuarina paludosa* (in highest rainfall areas). Sedges are frequently conspicuous, most commonly *Carex* spp., but also including *Gahnia trifida* and *Schoenus tesquorum* at Annya. Grasses (notably *Poa* spp.) tolerant of waterlogging and a range of herbs occur in relatively intact sites.
Structure: Woodland (6–)10–20 m tall, stunted in most waterlogged sites, with sedgy-grassy understorey, shrubbier in highest rainfall situations.
Habitat: Seasonally waterlogged flats, mainly on heavy soils of paludal origin.
Nearest relative: Plains Grassy Wetland, Plains Grassy Woodland.

EVC 652 Lunette Woodland
Eucalypt woodland with unknown prior floristics but presumed to be grassy/herbaceous. Defined by landform and remnant trees. Occurs on generally fertile, relatively well-drained, clay-loam soils. Previously widespread within the north of the study area on lunettes but now largely cleared and intact areas are extremely rare. Recorded from four bioregions (Dundas Tablelands, Goldfields, Victorian Volcanic Plain, Wimmera).

Lunette Woodland
Floristics: Dominated by *Eucalyptus camaldulensis* and *Eucalyptus melliodora*.
Structure: Woodland to open-forest 12–15 m tall, often with a very open understorey, trees are well-formed and generally single-stemmed.
Habitat: Low (to a few metres) and spreading source-bordering lunettes composed of fine silty clay-loams in areas of 500–600 mm annual rainfall.
Nearest relative: Plains Grassy Woodland.

EVC 653 Aquatic Herbland
Herbland of permanent to semi-permanent wetlands, dominated by sedges (especially on shallower verges) and/or aquatic herbs. Occurs on fertile paludal soils, typically heavy clays beneath organic accumulations. Previously widespread within restricted areas of suitable habitat across the study area but now greatly reduced through draining and use for agriculture. Recorded from five bioregions (Dundas Tablelands, Glenelg Plain, Victorian Volcanic Plain, Warrnambool Plain, Wimmera).

Aquatic Herbland
Floristics: Dominated by *Eleocharis sphacelata*, *Triglochin procerum* and *Myriophyllum* spp., sometimes with other aquatics such as *Potamogeton tricarinatus* and *Villarsia reniformis* also conspicuous.
Structure: Sedgeland or herbland, with submerged and floating to (mostly less than 0.5 m) emergent aquatic species.
Habitat: Deeper, more continuously inundated wetlands, with heavy clay soils beneath organic layers.
Nearest relatives: Plains Sedgy Wetland, wetlands within Floodplain Riparian Woodland and Riparian Woodland.
Comments: Reasonably resilient flora capable of invading suitable artificial waterbodies.

EVC 654 Creekline Tussock Grassland
Tussock grassland, with herbaceous component in inter-tussock spaces. Occurs along poorly defined ephemeral to intermittent drainage lines, sometimes on alluvial flats, typically on heavy dark soils derived from volcanic substrates. Can include a range of graminoid and herbaceous species tolerant of waterlogged soils and presumed to have sometimes resembled a linear wetland or system of interconnected small ponds. Formerly widespread in narrow bands within suitable habitat, now almost entirely cleared. Recorded from one bioregion within study area (Victorian Volcanic Plain).

Creekline Tussock Grassland
Floristics: Treeless, dominated by *Poa labillardierei*, presumably sometimes replaced by sedges and herbs in wetter situations.
Structure: Grassland to 1 m, with very small-scale areas of sedgeland or herbland.
Habitat: Poorly-drained soils of high fertility along low gradient drainage lines.
Nearest relative: Creekline Grassy Woodland.

EVC 655 Lignum Cane Grass Swamp
Lignum-dominated shrubland with Cane-grass dominated predominantly grassy-herbaceous associated flora of low to medium species-richness. Most associated species are to some extent halophytic. Occurs on brackish heavy soils. Previously extremely localised within study area, substantially further reduced by agricultural activities. Recorded from one bioregion (Victorian Volcanic Plain) within study area, but likely to have included at least minor occurrences in suitable habitat in low rainfall parts of the Wimmera.

Lignum Cane Grass Swamp
Floristics: Dominated by *Muehlenbeckia florulenta* in association with *Eragrostis infecunda*, low to moderate species-richness, including herbs indicative of salinity (e.g. *Pratia irrigua*, *Wilsonia rotundifolia*, *Triglochin striatum*, *Agrostis* spp.).
Structure: Shrubland to open-shrubland 1.5–2.5 m in height.
Habitat: Intermittently to seasonally inundated, on salinised heavy grey clay soils on flats in wetland basins, isolated occurrences within lower rainfall basaltic terrain.
Nearest relative: Cane Grass Wetland, Brackish Wetland.

EVC 656 Brackish Wetland
Sedgeland or herbland, occasionally grassland, dominated by salt-tolerant species, but samphires typically with low cover, if present. Typically occurs on heavy, at least seasonally shallowly inundated to waterlogged soils, on a range of geologies. Previously rare and localised within study area, now mostly degraded by grazing, nutrient run-off and other disturbances. Recorded from two bioregions within study area (Victorian Volcanic Plains, Wimmera).

***Victorian Volcanic Plains* Brackish Wetland**
Floristics: Variously dominated or co-dominated by a wide range of sedges or rushes including *Bolboschoenus caldwellii*, *Gahnia filum*, *Juncus kraussii*, *Schoenoplectus pungens*, and/or herbs including *Mimulus repens*, *Triglochin striatum*, *Lilaeopsis polyantha*, sometimes also *Triglochin procerum*.
Structure: Sedgeland mostly to 1–2 m height, or herbland to 0.2 m height.
Habitat: Inundated depressions, including along poorly defined drainage lines. Floristic composition indicates the presence of salinity, but not at levels which greatly restrict species-richness.
Nearest relative: Brackish Lake, Estuarine Wetland, Grey Clay Drainage Line Herbland/Sedgeland.

***Wimmera* Brackish Wetland**
Floristics: Dominated by *Juncus kraussii* and *Gahnia filum*, with *Wilsonia rotundifolia*, *Lawrencia squamata* and introduced annual grasses.
Structure: Sedgeland/herbland.
Habitat: Seasonally wet salinised flats.
Nearest relative: Brackish Drainage Line Herbland/Sedgeland, Inland Salt Marsh.

EVC 657 Freshwater Lignum Shrubland
Lignum-dominated shrubland with predominantly grassy-herbaceous associated flora. Occurs on fertile heavy soils, mostly on the fringe of other wetland types. Recorded from two bioregions within study area (Wimmera, Victorian Volcanic Plain).

Freshwater Lignum Shrubland
Floristics: Dominated by *Muehlenbeckia florulenta*, with *Austrodanthonia duttoniana* common at the least degraded remnant examined.
Structure: Shrubland 1.5–3 m in height.
Habitat: Non-saline wetland verges in lowest rainfall areas, sometimes in association with low stony exposures and possible ground-water seepage.
Nearest relative: Plains Grassy Wetland.

EVC 659 Plains Riparian Shrubby Woodland
Shrub-dominated eucalypt woodland with large range of grasses, sedges and perennial herbs. Occurs on moderately fertile, relatively well-drained, sandy alluvial topsoils over heavier subsoils. Associated with Quaternary alluvial deposits along narrow, seasonal streams in low-rainfall (500–600 mm) plains areas. Sites are characterised by a naturally incised channel to 1 m deep with adjoining sand piles deposited during peak flows. Previously restricted within the study area and currently reasonably well represented throughout its narrow range. Generally high timber production value and easy accessibility. Recorded from one bioregion (Wimmera) within study area.

Plains Riparian Shrubby Woodland
Floristics: Dominated by *Eucalyptus camaldulensis* and *Eucalyptus microcarpa*, high cover of tall shrubs including *Acacia retinodes* var. *retinodes* ± *Callistemon rugulosus* and high proportion of sedges and rushes.
Structure: Woodland 12–15 m tall, trees are generally well-formed and straight growing.
Habitat: Seasonal creeks containing large deposits of coarse sand alluvium in areas of 500–600 mm annual rainfall. May be subject to high flows during wetter months and summer storm events but are mostly dry during summer.
Nearest relative: Shrubby Woodland.
Comments: May be endemic to Wimmera bioregion.

EVC 663 Black Box Lignum Woodland
Eucalypt-dominated shrubby woodland to open-woodland or shrubland, on inundation-prone heavy grey soils in lowest rainfall areas. Can be rich in herbaceous species. Previously very rare and localised with study area, no relatively intact examples known from study area. Recorded from one bioregion within study area (Wimmera).

Black Box Lignum Woodland
Floristics: Dominated by *Eucalyptus largiflorens*, with *Muehlenbeckia florulenta* and a grassy-herbaceous/sedgy ground-layer. Frequent associates include *Eragrostis infecunda*, *Pratia concolor*, *Austrodanthonia duttoniana*, *Eleocharis acuta*, *Marsilea drummondii*.
Structure: Woodland 4–12 m in height, to open-woodland or shrubland mostly 1–2(–4) m in height.
Habitat: Heavy grey clay soils in depressions or floodways prone to seasonal inundation.
Nearest relative: Some lower rainfall variants of Plains Grassy Wetland.

EVC 664 Limestone Ridge Woodland
Acacia woodland with dense sedgy understorey on limestone ridges with limited soil development. The rarity or absence of eucalypts, which is probably due to high soil alkalinity, is of considerable ecological interest. Recorded from one bioregion within study area (Glenelg Plain).

***Glenelg Plain* Limestone Ridge Woodland**
Floristics: Dominated by *Acacia pycnantha*, understorey with abundant *Lepidosperma canescens*. Other prominent species include *Austrostipa flavescens*, *Acrotriche affinis*, *Leucopogon parviflorus*. Eucalypts mostly absent.
Structure: Woodland c. 8 m in height over dense sedgy understorey c. 0.5 m in height.
Habitat: Limestone ridges with shallow brown sandy loam to 30 cm deep, probably highly alkaline and thus unsuitable for local eucalypts. Shallow soils appear to result in *Acacia* falling over frequently.
Nearest relative: Limestone Woodland.
Comments: Apparent natural rarity/absence of eucalypts is of considerable ecological interest.

EVC 665 Coastal Mallee Scrub
Mallee eucalypt scrub confined to Cape Nelson. The multi-stemmed habit of Coast Gum *Eucalyptus diversifolia* is a feature of this distinctive community which combines coastal and heath elements. Soil salinity and alkalinity determine the characteristics of this ecosystem which also occurs in South Australia, Cape Nelson being an isolated occurrence. Recorded from one bioregion (Glenelg Plain).

Coastal Mallee Scrub
Floristics: Dominated by *Eucalyptus diversifolia* ± *Melaleuca lanceolata*, shrubs include *Acacia longifolia* var. *sophorae*, *Leucopogon parviflorus*, *Spyridium vexilliferum*, *Acacia myrtifolia*. Prominent ground-layer species include *Lepidosperma canescens*, *Dianella revoluta*, *Austrostipa flavescens*. Combines a few heathy elements such as *Astroloma conostephioides* (which is lime-tolerant) with coastal elements. Diversity is higher near gaps in the canopy and along the edges of Cape Nelson Road.
Structure: Open to closed-scrub c. 4 m in height, rarely much taller.
Habitat: Shallow alkaline sandy soils over limestone, salt spray influences salt levels in system. *E. diversifolia* is one of the few eucalypts in Victoria adapted to grow on alkaline soils.
Nearest relative: Coastal Headland Scrub.
Comments: *Eucalyptus diversifolia* is restricted in Victoria to Cape Nelson where it is the dominant eucalypt.

EVC 670 Limestone Woodland
Eucalypt woodland or various scrubs on red sandy soils derived from limestone or sand stripped from limestone and redeposited. The vegetation is strongly influenced by relatively high nutrient levels and alkalinity, with Heathy Woodland developed on the interspersed and more weathered acid grey/white sands. The dunes supporting Heathy Woodland have been more mobile in prehistoric times although they are derived from the same parent material—Quaternary Bridgewater Formation limestone, and appear to partially cover the red soil surface. Recorded from one bioregion within study area.

***Glenelg Plain 1* Limestone Woodland**
Floristics: Dominated by *Eucalyptus baxteri* with dense to sparse *Acacia pycnantha* depending on time since fire. Shrubs *Melaleuca lanceolata*, *Pomaderris halmaturina, Leucopogon parviflorus*, *Astroloma conostephioides* are prominent. Ground-layer diverse, includes *Dianella brevicaulis*, *Senecio pinnatifolius*.
Structure: Woodland/open-woodland c. 15 m in height, locally dense *Acacia* shrub stratum, sparse ground-layer.
Habitat: Red sandy soil (terra rossa).
Nearest relative: Limestone Ridge Woodland.
Comments: 1:25,000 mapping is required to further resolve the Limestone Woodland / Heathy Woodland mosaic. Relationships between this community and other lime-based EVCs/communities on the Glenelg Plain requires further research.

***Glenelg Plain 2* Limestone Woodland**
Floristics: Dominated by *Eucalyptus leucoxylon* ± *E. fasciculosa* with an open heathy, shrubby or sedgy understorey. Common associates include *Astroloma humifusum*, *Hakea* spp., *Leptospermum continentale, Acacia mearnsii, Acacia pycnantha*, *Banksia marginata*.
Structure: Woodland or open-forest 10–25 m tall. Trees are typically single-stemmed and straight-growing.
Habitat: Known only from Quaternary aeolian dune fields where the underlying limestone is either exposed or only covered by a thin layer of sand. Soils supporting this woodland are typically reddish sandy terra rossa loams and outcropping limestone common.
Nearest relative: Shallow Sands Woodland.

EVC 671 Limestone Rise Grassland
Unsampled vegetation type dominated by grasses and herbs. Occurs on shallow soils with limestone parent material close to the surface and often outcropping. Soils are generally wet in winter and dry in summer, which promotes geophytic and annual species. Appears to be naturally rare within Victoria but may be more common in South Australia. All known remnants appear to be disturbed by past grazing and are weed invaded. Recorded from one bioregion within study area (Glenelg Plain).

***Glenelg Plain* Limestone Rise Grassland**
Floristics: Original vegetation probably dominated by grasses such as *Poa labillardierei*, *Themeda triandra*, *Austrodanthonia* spp. When intact it would have been rich in geophytes and other herbs.
Structure: Grassland with scattered *Eucalyptus ovata*, *Leucopogon lanceolatus* and *Lomandra longifolia* at its margins.
Habitat: Only known from areas of Quaternary aeolian dune fields where the underlying limestone remains exposed. The soil supporting this grassland are typically reddish loams (terra rossa) or grey cracking clays. Limestone parent material relatively close to the surface and often outcropping.
Nearest relative: Limestone Rise Woodland.

EVC 673 Dune Soak Woodland
Sedge and shrub-dominated eucalypt woodland with a number of herbs and grasses adapted to seasonal waterlogging. Occurs on moderately fertile, poorly-drained, sandy or sandy loam topsoils over heavier subsoils. Often found at interface between Quaternary aeolian and swamp deposits. Soils are generally waterlogged in winter and stay moist (at least at depth) in summer. Formerly uncommon in study area, now rare following subsequent clearing for agriculture and degradation from grazing. Recorded from one bioregion within study area (Wimmera).

Dune Soak Woodland
Floristics: Dominated by *Eucalyptus ovata* with shrub layer of mostly *Leptospermum continentale* and a ground-layer dominated by *Lepidosperma longitudinale*.
Structure: Woodland or open-forest 12–15 m tall. Trees are typically low-branching and spreading.
Habitat: Poorly-drained sites on sandy loams derived from former swamp deposits at edges of steep aeolian sand dunes. The underlying geology causes water to soak out from under the dunes where it collects in narrow depressions at the edge of the plain.
Nearest relative: Damp Sands Herb-rich Woodland.

EVC 674 Sandy Stream Woodland
Reed, sedge or shrub-dominated woodland with a large range of amphibious herbs. Occupies the beds of seasonal creeks where large amounts of course sand have been deposited by past flows, often resulting in a distinctive 'U' shape to the drainage line. Sites periodically inundated through the wetter months and soils moist throughout the year. Unknown elsewhere in Victoria and restricted to moderately high rainfall areas (>600 mm) where coarse parent material available upstream (e.g. aeolian sand deposits) is carried down steep gradients and deposited as gradients flatten out. Most extant areas are degraded by grazing and weed invasion. Recorded from one bioregion within the study area (Dundas Tablelands).

Sandy Stream Woodland
Floristics: Dominated by *Eucalyptus camaldulensis* ± *Eucalyptus ovata*, often with a distinctive shrub and reed layer of *Leptospermum lanigerum*, *L. obovatum*, *L. continentale*, *Acacia* spp., *Phragmites australis*, *Typha* spp.
Structure: Open-woodland 12–15 m tall above a shrub layer to 4 m.
Habitat: Deep (to 30 cm) coarse sand deposits of Quaternary aeolian or Ordovician granite origin along seasonal streams.
Nearest relative: Creekline Grassy Woodland.

EVC 676 Salt Paperbark Woodland
Low non-eucalypt woodland with herbaceous ground-layer dominated by halophytic chenopods and other succulent herbs with a range of annual grasses and herbs. Occurs on sandy soils with large salt concentrations on the leeward side of large permanent saline lakes and as a ring around smaller semi-permanent saline lakes. Previously widespread and locally extensive within the north of the study area but now cleared from large parts of its former range and subject to grazing on private land. Recorded from one bioregion within study area.

***Wimmera* Salt Paperbark Woodland**
Floristics: Dominated by (sometimes patchy) *Melaleuca halmaturorum*, with a ground-layer of halophytic herbs (conspicuously *Sacraria quinqueflora*, *Selliera radicans*, *Wilsonia rotundifolia*, *Apium annuum*).
Structure: Woodland 4–8 metres tall, in mosaic with low herbland to 0.3 m in height.
Habitat: Seasonally waterlogged heavy clay soils on saline flats and lake verges.
Nearest relative: Inland Salt Marsh, Saline Lake Verge.
Comments: Mapped as part of mosaic with Inland Saltmarsh.

EVC 677 Inland Salt Marsh
Typically species-poor samphire dominated shrubland, or locally variously herbland or grassland. Previously very rare and localised within the study area, further reduced by agricultural activity. Occurs in seasonally or intermittently waterlogged shallow depressions on salinised heavy soils. Recorded from one bioregion within study area.

***Wimmera* Inland Salt Marsh**
Floristics: Mostly dominated by *Halosarcia pergranulata* and/or *Sarcocornia quinqueflora*, with *Samolus repens*, *Selliera radicans*, *Distichlis distichophylla* and *Puccinellia stricta* var. *perlaxa* common conspicuous associates or locally dominant/co-dominant.
Structure: Low open-shrubland, herbland or grassland, mostly less than 0.5 m in height.
Habitat: Occurs on salinised heavy grey clay soils in seasonally or intermittently waterlogged shallow depressions.
Nearest relative: Saline Lake Verge Herbland/Sedgeland, Salt Paperbark Woodland.

EVC 679 Drainage Line Woodland
Eucalypt-dominated woodland, ground-layer presumed to have been primarily grassy-herbaceous. Associated with ephemeral streams in a low rainfall landscape of very low relief and poorly defined drainage, often running between freshwater lakes. Previously very rare and

localised within the study area, virtually totally cleared. Recorded from one bioregion within study area (Wimmera).

Drainage Line Woodland
Floristics: Dominated by *Eucalyptus camaldulensis*, ground-layer presumed to have been primarily grassy-herbaceous, and including a range of species tolerant of waterlogging, but now difficult to determine prior floristics through lack of remnant vegetation.
Structure: Woodland to 30 m.
Habitat: Ephemeral streams on alluvial soils within fertile plains areas.
Nearest relative: Uncertain—possibly Creekline Grassy Woodland.

EVC 680 Freshwater Meadow
Wetlands shallowly inundated for only a few months each year. While this hydrological regime delimits a range of possible wetland EVCs, only on a very local scale does it imply a particular EVC with any certainty. On the volcanics and more fertile Tertiary soils, Freshwater Meadow is usually indicative of Plains Grassy Wetland. In relevant sections of the Wimmera Plains, it is usually indicative of Red Gum Wetland on more fertile soils, or Seasonally Inundated Shrubby Woodland / Sedge-rich Woodland on shallow sand sheets, with Dune Soak Woodland of very restricted occurrence south of Goroke. In the Casterton area, it can indicate Damp Heath, Wet Heath and/or Sedge Wetland.

EVC 681 Deep Freshwater Marsh
Semi-permanent wetlands, where at least central areas are inundated for in excess of 6 months each year and soils remain virtually continuously wet. Centres of wetlands in this category of wetland typically support Aquatic Herbland. Fringes are variously dominated by sedges, reeds or rushes, or shrubs, varying according to habitat type in which wetland is occurring. Each wetland description refers to the deepest or wettest area of the respective wetland, hence Deep Freshwater Marsh typically represents mosaics of different vegetation types reflecting the inundation regime. The main EVCs occurring within Deep Freshwater Marsh are mosaics with Aquatic Herbland, variously including Red Gum Wetland, Plains Sedgy Wetland, Sedge Wetland, Swamp Scrub, Floodplain Riparian Woodland and rarely small areas of Brackish Wetland.

EVC 682 Permanent Open Freshwater
Permanent waterbodies often mapped as Freshwater Lake or Brackish Lake. Centres of this category of wetland can support Aquatic Herbland or open water apparently lacking macrophytic vegetation. A submerged herbland of *Vallisneria americana* is sometimes present. Character of verges varies with ecological position around respective waterbody. North to western sides can include a beach or steep bank associated with a levee, while on south to eastern banks, patches of sheltered shallows with Aquatic Herbland and sedges or reed beds can be present. An additional fringing community, usually with *Eucalyptus camaldulensis*, typically occurs in the zone between the shoreline and adjacent dryland vegetation types. Brackish lakes (i.e. slightly saline) can support a different flora, including a herbland of aquatics dominated by *Myriophyllum muelleri*, *M. verrucosum*, *Lepilaena* spp. and *Ruppia* spp. In sites considered 'saline', macrophyte diversity is greatly reduced, often to only a single species of *Lepilaena* or *Ruppia*. The verges of brackish lakes also floristically differ from those of freshwater lakes, including species indicative of some salinity, notably herbs (e.g. *Pratia irrigua*, *Wilsonia rotundifolia*, *Cressa cretica*, *Schoenus nitens*, *Sporobolus* spp.), often with *Cyperus gymnocaulos* and *Eragrostis infecunda*.

EVC 683 Semi-permanent Saline
Saline wetlands where inundation is prolonged, and soil mostly remains continually wet, at least in central portion. On lower rainfall volcanic plains and fertile Tertiary soils, these wetland types are typically fringed by saltmarsh vegetation dominated by either *Puccinellia stricta* var. *perlaxa* or *Sarcocornia quinqueflora*. Central wet areas usually support a herbland dominated by *Lepilaena* spp. (Aquatic Meadow). In a localised section of the Wimmera, Salt Paperbark Woodland and/or Inland Saltmarsh can occupy flats around saltmarsh fringed salt pans. This category has often been mapped as Saline Lake.

EVC 684 Permanent Saline
Description denotes saline waterbodies where inundation, at least in their central portion, is continual. Peripheral vegetation is typically similar to that of semi-permanent saline wetlands in same area. Permanent water areas support a species-poor herbland dominated by *Ruppia* spp. or *Lepilaena* spp. (Aquatic Meadow). Both semi-permanent saline and permanent saline wetlands have mostly been treated as the same EVC (Saline Lake) during mapping, except where it was reasonable to attempt to distinguish drier verges or more seasonal wetland communities such as Brackish Wetland, Inland Saltmarsh / Salt Paperbark Woodland or Lignum Swamp.

EVC 704 Lateritic Woodland
Low woodland with a diverse shrubby understorey and supporting a wide variety of grasses and herbs, making it particularly species-rich. Occurs on gently undulating to flat ground with well-drained lateritic soils. In many areas remnants occur in areas favoured for gravel extraction. Recorded from four bioregions within the study area (Dundas Tablelands, Goldfields, Grampians, Wimmera).

***Dundas Tablelands* Lateritic Woodland**
Floristics: Dominated by *Eucalyptus leucoxylon* with occasional *Eucalyptus goniocalyx* and *Eucalyptus melliodora* in some areas. Shrubs are usually low-growing and the ground-layer is usually dominated by annual herbs and graminoids.
Structure: Woodland to open-forest 12–15 m tall. Trees are typically straight and well-formed except where laterite is exposed.
Habitat: Shallow, lateritic soils associated with well-drained sites of poor fertility associated with aeolian sand deposits. A thin layer of sand (to a few cm) present in some areas.
Nearest relative: Shallow Sands Woodland.

***Goldfields* Lateritic Woodland**
Floristics: Dominated by *Eucalyptus viminalis* and *E. willisii* with an understorey dominated by *Xanthorrhoea australis*, *Leptospermum myrsinoides* and *Brachyloma daphnoides*. Species-rich ground-layer includes *Gahnia radula*, *Hypolaena fastigiata*, *Lepidobolus drapetocoleus*, *Lepidosperma* spp., *Schoenus apogon*.
Structure: Woodland 5–8 m tall.
Habitat: Lateritic soils on the plains.
Nearest relative: Heathy Woodland.

***Grampians* Lateritic Woodland**
Floristics: Dominated by *Eucalyptus leucoxylon* and *E. melliodora*. Shrub layer dominated by *Brachyloma daphnoides*, *Leptospermum myrsinoides*, *Acacia pycnantha*. Ground-layer is species-rich and dominated by *Lepidosperma carphoides*, *Schoenus breviculmis*, *Baumea acuta*.
Structure: Woodland 20–30 m tall.
Habitat: Plains to gently undulating topography adjacent to alluvial flats.
Nearest relative: Heathy Woodland.

***Wimmera* Lateritic Woodland**
Floristics: Dominated by *Eucalyptus leucoxylon* ± *E. melliodora* ± *E. microcarpa*. Sparse shrub layer includes *Acacia pycnantha*, *Leptospermum myrsinoides*, *Acacia genistifolia*, *Astroloma conostephioides*. Ground-layer rich in grasses and herbs.
Structure: Woodland 15–25 m tall.
Habitat: Low rises with lateritic soils.
Nearest relative: *Wimmera Low Rises* Grassy Woodland.

EVC 705 Basalt Creekline Shrubby Woodland
Shrub-dominated low woodland, with a range of grasses and herbs shared with Plains Grassy Wetland. On heavy soils along low-gradient boggy drainage lines on relatively high rainfall volcanic plains. Previously widespread in narrow bands within suitable habitat but now virtually totally cleared. Recorded from one bioregion within study area.

Basalt Creekline Shrubby Woodland
Floristics: Dominated by *Eucalyptus ovata*, with *Acacia melanoxylon* and a range of shrub species noted in degraded road verge remnants, including *Leptospermum continentale*, *Acacia verticillata*, *Coprosma quadrifida*, *Ozothamnus ferrugineus*. Low gradient drainage lines appear to have included a range of sedges, grasses and herbs, with a number of species shared with Plains Grassy Wetland.
Structure: Woodland, probably 6–15 m tall.
Habitat: Low gradient boggy drainage lines, with heavy clay soils of high fertility.
Nearest relative: Uncertain – perhaps Creekline Herb-rich Woodland, Creekline Grassy Woodland or Plains Swampy Woodland.

EVC 706 Limestone Rise Woodland
Shrubby woodland or open-forest on fertile flats with reddish, loamy soils and limestone relatively close to the surface, occasionally outcropping. Appears to be naturally rare within Victoria but may be more common in South Australia. All known remnants appear to be disturbed by past clearing and grazing. Recorded from one bioregion within study area.

***Glenelg Plain* Limestone Rise Woodland**
Floristics: Dominated by *Eucalyptus ovata* with scattered *E. baxteri* and *Acacia melanoxylon*. *Leucopogon lanceolatus* forms a prominent shrub layer over tussocks of *Lomandra longifolia*. Ground cover rich in geophytes and grasses when intact.
Structure: Woodland or open-forest 15–20 m tall. Trees are typically relatively young regrowth with a DBH of 1.2 m. A burnt out stump within the single quadrat taken for this EVC was estimated to be 3.6 m DBH suggesting the structure of this community was similar to mature Plains Grassy Woodland.
Habitat: Only known from areas of Quaternary aeolian dune fields where the underlying limestone is either exposed or only covered by a thin layer of sand. Soils supporting this woodland are typically reddish sandy loams (terra rossa soils).
Nearest relative: Herb-rich Foothill Forest.

EVC 707 Sedgy Swamp Woodland
Eucalypt dominated woodland with sedgy ground-layer and a range of herbs tolerant of seasonal waterlogging. Occurs on seasonally wet flats on Quaternary sandy soils over heavier subsoils. Formerly restricted and localised, now more rare. Recorded from one bioregion within study area (Glenelg Plain).

Sedgy Swamp Woodland
Floristics: Dominated by *Eucalyptus camaldulensis* ± *E. ovata*. Ground-layer typically dominated by *Lepidosperma longitudinale* with a range of herbs characteristic of seasonally wet sites.
Structure: Woodland 10–20 m.
Habitat: Poorly drained soils of relatively low fertility in low-lying areas.
Nearest relatives: Plains Swampy Woodland, Sedge Wetland.

EVC 708 Hypersaline Inland Saltmarsh
Low shrubland dominated by succulents (samphires), variously with a restricted range of salt-tolerant grasses and herbs locally prevalent. Occurs on seasonally wet salinised heavy soils in depressions on terrain of low relief. Previously very localised and restricted habitat within the study area, remnants largely modified by grazing and weed invasion. Recorded from one bioregion within study area.

***Wimmera* Hypersaline Inland Saltmarsh**
Floristics: Dominated by *Halosarcia pergranulata*, with *Distichlis distichophylla*, *Puccinellia stricta* and *Triglochin striatum* major associated species.
Structure: Low shrubland, mostly under 0.5 m tall, sometimes with patches of herbland, grassland or open salt pan.
Habitat: Heavy salinised grey-clay soils on depressions in low lying terrain of poorly defined drainage, typically fringing salt lakes or salt pans
Nearest relative: Inland Saltmarsh, Saline Lake Verge Herbland/Sedgeland.

EVC 709 Scree Slope Woodland/Grassland
Woodland dominated by an open to moderately dense cover of native cypress-pines with an open shrub layer over a grassy ground-layer with small sandstone boulders. Soils are generally shallow and the exposed rocky conditions result in relatively dry well-drained conditions. Recorded from the Mt Arapiles outlier of the Grampians bioregion.

Scree Slope Woodland/Grassland
Floristics: Dominated by *Callitris gracilis* and *C. glaucophylla*, with an open shrub cover of *Dodonaea viscosa* and wattles. The ground cover is dominated by *Themeda triandra* and is rich in grasses, annual herbs and geophytes.
Structure: Woodland to grassland.
Habitat: Scree slopes at the base of cliffs.
Nearest relative: Rocky Outcrop Shrubland.
Comments: While the present structure of much of this EVC is woodland, it is suspected the pre-1750 structure is more likely to have been grassland. It is possible that most of the area mapped as Scree Slope Woodland/Grassland was either a grassland or more open-woodland pre-1750. This EVC occurs adjacent to Plains Grassy Woodland which was presumably burnt on a regular basis (every 5–10 years or more) by Aborigines, and does appear to generate enough biomass to carry a fire. As the *Callitris* species are fire sensitive, and no large mature individuals were observed, it is suggested that their cover and abundance has increased since European settlement. As this location is surrounded by Plains Grassy Woodland, they were probably present in areas relatively sheltered from fire, or as larger individuals capable of reducing the ground fuel load in their immediate vicinity, and have increase in numbers as fire became less frequent.

EVC 710 Damp Heathland
Heathland, or scrub (>2 m tall) if long unburnt, developed on sites of intermittent waterlogging, typically wet in winter and dry in summer. Floristically and hydrologically intermediate between Sand Heathland on well-drained substrates and Wet Heathland on poorly drained substrates, but equally nutrient poor. Recorded from two bioregions (Glenelg Plain, Warrnambool Plain).

***Group 1* Damp Heathland**
Floristics: Dominated by *Leptospermum continentale* ± *Melaleuca squarrosa* ± *Allocasuarina paludosa* ± *Melaleuca gibbosa*. Other prominent species include *Banksia marginata*, *Hypolaena fastigiata*, *Xanthorrhoea caespitosa*, *Leptocarpus tenax*, *Calytrix tetragona*, *Patersonia fragilis*, *Lepyrodia muelleri*. Emergent *Eucalyptus ovata* may be present.
Structure: Closed-heath ± emergent eucalypts.
Habitat: Sites with intermittent waterlogging, typically wet in winter and dry in summer, and with low nutrient availability. An impeding subsoil layer is frequently present.
Nearest relative: Damp Heathy Woodland.
Comments: Boundaries between Damp Heathland and Wet Heathland are transitional; these cannot be represented in the mapping and arbitrary divisions have been necessary in places.

***Group 2* Damp Heathland**
Floristics: Poorly defined group of two quadrats with little similarity to other Damp Heathlands in this bioregion; separation is preliminary pending more quadrat data collection. One site is dominated by *Allocasuarina paludosa*, the other by *Leptospermum continentale*.
Structure: Closed-heathland.
Habitat: Sites with intermittent waterlogging, typically wet in winter and dry in summer, and with low nutrient availability. An impeding subsoil layer is frequently present.
Nearest relative: Damp Heathy Woodland.

EVC 717 Saline Lake Mosaic
Central deeper areas generally support species-poor Aquatic Meadow of *Lepilaena* spp. or *Ruppia* spp. when vegetated. Verges support a range of usually more species-rich herbland, grassland, shrubland or woodland communities, varying with the biogeographic context of the water body. The floristic composition of verges is also influenced by factors such exposure (to wind and wave action), aspect and steepness (see comments under Semi-permanent Saline and Permanent Saline). Only locally common but widespread over study area, in very restricted areas of suitable habitat. Current examples mostly modified by altered hydrology, grazing and weed invasion of verges. Examples occur at Stockdales Lane c. 4 km ESE of Mortlake, private land c. 3 km N of Woorndoo.

EVC 718 Freshwater Lake Mosaic
Central deeper area supports Aquatic Herbland or open water. The verges support a range of more species-rich herbland, sedgeland and rushland communities. These are fringed by a range of vegetation communities, varying with the biogeographic context of the water body. The floristic composition of the verge is also influenced by factors such exposure (to wind and wave action), aspect and steepness (see comments under Permanent Open Freshwater. Only locally common, but widespread over study area in restricted suitable habitat. Current examples mostly modified by altered hydrology, grazing and weed invasion of verges. Examples are found at Lake Bolac.

EVC 783 Grassy Dry Forest / Heathy Woodland Complex
Woodland with sparse dry open grassy-herbaceous understorey, with patchy heathy component including grass-trees and ericoid shrubs. Occurs on relatively infertile shallow sandy to clay-loamy soils. Confined to small geographic area, but not substantially reduced by clearing. Recorded from one bioregion within study area (Grampians).

***Grampians* Grassy Dry Forest / Heathy Woodland Complex**
Floristics: Dominated by *Eucalyptus obliqua*, sometimes with *E. melliodora*. Ground-layer sparse, often dominated by *Xanthorrhoea caespitosa* with sparse grasses (principally *Austrodanthonia* spp.) and herbs, to heathy (notably with patchy *Leptospermum myrsinoides*, *Astroloma* spp.).
Structure: Woodland 8–18 m tall.
Habitat: Shallow Quaternary aeolian deposits over Devonian granitics.
Nearest relative: Grassy Dry Forest, Heathy Woodland, Damp Sands Herb-rich Woodland.

EVC 789 Hills Herb-rich Woodland/Grassy Dry Forest Complex
Eucalypt woodland with primarily grassy-herbaceous and grass-tree dominated ground-layer. Majority of understorey species with perennial rootstocks, and with a greater cover and diversity of perennial grasses than might otherwise be anticipated within Hills Herb-rich Woodland. Occurs on relatively infertile granitic soils on hill slopes of the Victoria Valley. Previously localised to a small geographic area, currently not substantially reduced by clearing and extending from private land into adjacent National Park. Recorded from one bioregion within study area (Grampians).

***Grampians* Hills Herb-rich Woodland / Grassy Dry Forest Complex**
Floristics: Dominated by *Eucalyptus obliqua*, *with Xanthorrhoea australis*, *Austrodanthonia* spp. and a wide range of associated grasses, herbs and semi-shrubs.
Structure: Woodland 8–15 m tall.
Habitat: Well-drained sites on relatively steep hill slopes and crests on Devonian granite.
Nearest relative: Hills Herb-rich Woodland, Grassy Dry Forest.

EVC 792 Stony Rises Woodland/Stony Knoll Shrubland Complex
Woodland or shrubland, sometimes extremely stony with Austral Bracken or sparse grasses and herbs. Occurs on mostly skeletal but very fertile loam soils, restricted to narrow tongues along valley-filling lava flows. Previously rare and localised, substantially further reduced, current remnants largely substantially modified. Recorded from one bioregion within study area (Victorian Volcanic Plain).

Stony rises Woodland/Stony Knoll Shrubland Complex
Floristics: Variously dominated by *Eucalyptus viminalis*, *Acacia melanoxylon*, *Acacia mearnsii*, *Hymenanthera* spp. and *Bursaria spinosa*, with Austral Bracken or grassy-herbaceous dominated ground-layer (main grass genera in remnants *Themeda* and *Austrodanthonia*), including minor unclassified vegetation types such as ephemeral ponds

with *Schoenus apogon* and *Oxalis* sp., and fern communities in collapsed lava tunnels.
Structure: Woodland 3–20 m tall, shrubland 1–3 m, or otherwise mostly less than 1 m in height.
Habitat: Extremely restricted geological type, forming a rocky plain mostly with free draining skeletal loams. Specialised habitats created by collapsed lava tunnels.
Nearest relatives: Stony rises Woodland, Stony Knoll Shrubland.

EVC 793 Damp Heathy Woodland
Woodland with heathy understorey which becomes scrub (>2 m tall) if long unburnt in high rainfall areas. Developed on sites of intermittent waterlogging, typically wet in winter due to impeding layer in soil and dry in summer. Slightly better drained and thus drier than Damp Heathland, but equally nutrient poor. Recorded from two bioregions within study area (Glenelg Plain, Warrnambool Plain).

***Glenelg Plain* Damp Heathy Woodland**
Floristics: Dominated by *Eucalyptus ovata* ± *E. baxteri* ± *E. viminalis*, *Leptospermum continentale* and *Banksia marginata* form a dense shrub layer. Dry elements include *Leptospermum myrsinoides*, *Hypolaena fastigiata*, *Isopogon ceratophyllus*, *Astroloma conostephioides*, *Austrodanthonia* spp.; wet elements include *Baumea juncea*, *Gahnia radula*, *Allocasuarina paludosa*, *Lepidosperma longitudinale*.
Structure: Woodland to open-woodland 10–15 m in height.
Habitat: Sites with intermittent waterlogging, typically wet in winter and dry in summer, and with low nutrient availability. An impeding subsoil layer is frequently present.
Nearest relative: Damp Heathland.

***Warrnambool Plain* Damp Heathy Woodland**
Floristics: Dominated by *Eucalyptus ovata* ± *E. viminalis* ± *E. willisii*, with *Leptospermum continentale, Acacia verticillata* and *Lepidosperma longitudinale* conspicuous understorey species, along with a wide range of grasses, herbs, small shrubs and tough-leaved monocots (e.g. *Patersonia fragilis*, *Lepyrodia muelleri*, *Lepidosperma filiforme*).
Structure: Woodland 10–20 m tall, sometimes only sparsely treed in wetter sites.
Habitat: Poorly drained sandy soils of moderate to low fertility, formerly in a fine scale mosaic with Damp Sands Herb-rich Woodland, Damp Heathland and wetlands.
Nearest relative: Damp Heathland, Damp Sands Herb-rich Woodland.

EVC 801 Basalt Shrubby Woodland/Plains Swampy Woodland Complex
Eucalypt dominated woodland with sedge-dominated grassy ground-layer. Occurs on heavy fertile seasonally wet basaltic soils, at least sometimes with loamy topsoils. Associated with the edges of wet flats and upper reaches of poorly defined gullies on terrain of very low relief. Previously localised to suitable habitat in higher rainfall volcanics but now almost entirely cleared. Low timber production value. Recorded from one bioregion within study area. Not mapped—below mapping threshold size.

Basalt Shrubby Woodland/Plains Swampy Woodland Complex
Floristics: Dominated by *Eucalyptus ovata* with *Acacia melanoxylon.* Understorey dominated by sedges and grasses, major species including *Lepidosperma elatius*, *Poa tenera*, *P. labillardierei*, *Notodanthonia semiannularis*, *Pratia pedunculata* s.l.
Structure: Woodland 10–20 m tall.
Habitat: Edges of wet flats and upper reaches of poorly defined gullies on terrain of very low relief.
Nearest relative: Basalt Shrubby Woodland, Plains Swampy Woodland, Riparian Sedgy Woodland.

EVC 803 Plains Woodland
Grassy or sedgy woodland with large inter-tussock spaces potentially supporting a range of annual or geophytic herbs adapted to low summer rainfall. Overall biomass is low in comparison to Plains Grassy Woodland. Occurs on fertile, sometimes seasonally waterlogged, mostly silty, loamy or clay topsoils, but occasionally sandy, with heavy subsoils. Mostly on fertile Quaternary soils on terrain of low relief. Previously widespread and extensive over a large proportion of the north of the study area but now reduced to narrow strips along roadsides and creeklines. Some higher quality areas still occur on private land. Recorded from one bioregion within study area (Wimmera).

Plains Woodland
Floristics: Dominated by *Eucalyptus microcarpa* and *Allocasuarina luehmannii* ± *Eucalyptus leucoxylon* ± *E. camaldulensis* ± *E. largiflorens*, rich in C3 grasses and annual and geophytic herbs when intact.
Structure: Open-woodland or woodland 12–20 m tall, trees are generally well-formed and straight-growing.
Habitat: Brown clay soils derived from former Quaternary swamp deposits in areas receiving <600 mm rainfall per annum.
Nearest relative: *Wimmera Low Rises* Grassy Woodland.

EVC 858 Calcarenite Dune Woodland
Woodland or scrub on stable, near-coastal calcareous dunefields. Much of the area originally occupied by this EVC appears to have been destabilised by European land use resulting in the development of extensive, un-vegetated shifting sand dunes and sheets and the eventual development of Coastal Dune Scrub on restabilised sands in many affected areas. Grant's description (in Gibbons and Downes 1964) of wooded hills rising gently from the shores of Discovery Bay and Bridgewater suggest that this EVC extended almost to the coast. Recorded from one bioregion within study area.

Calcarenite Dune Woodland
Floristics: Usually dominated by *Allocasuarina verticillata* and/or *Melaleuca lanceolata*. *Leucopogon parviflorus*, *Acacia longifolia* var. *sophorae* and *Lepidosperma gladiatum* are prominent in the understorey.
Structure: Open to closed scrub 8–15 m in height, depending on dominant species.
Habitat: Near-coastal, deep calcareous sand deposits, now stable but wind-blown in prehistoric times (aeolian deposits).
Nearest relative: Coastal Dune Scrub.
Comments: Further research is required to distinguish floristic communities within this unit although suitable remnants to facilitate this may no longer exist. There are indications that a woodland or scrub community with *Melaleuca lanceolata* over *Themeda triandra* may have occurred on the inland parts of this EVC but no intact remnants were located.

EVC 876 Spray-zone Coastal Shrubland
Stunted open-shrubland on extremely exposed tops of coastal cliffs. Recorded from Glenelg Plain bioregion but may also occur in Warrnambool Plain bioregion.

***Glenelg Plain* Spray-zone Coastal Shrubland**
Floristics: Dominated by *Leucophyta brownii*, composed of a small number of salt and wind tolerant species, with *Samolus repens* prominent.
Structure: Open-shrubland 30–40 cm high, vegetation cover is low (5–10%).
Habitat: Extremely exposed, wind-swept, rocky (calcarenite) sites subject to salt spray and run-off at crest of sea cliff. Soils are skeletal or virtually non-existent.
Comments: Distinctive community. Supports vulnerable *Ixodia achillaeoides* spp. *arenicola* at Cape Duquesne.

EVC 882 Shallow Sands Woodland
Woodland or open-forest on shallow sands which overlay drainage-impeding clays. Typically it occurs between the plains proper (which support Plains Grassy Woodland) and Quaternary aeolian dunefields (dominated by Heathy Woodland) which overlay these plains. Also occurs on broader areas of plains covered by shallow fluvial or aeolian sands. A sparse shrub layer of heathy, ericoid shrubs is generally present and relatively intact versions support a species-rich ground cover dominated by grasses, annuals and geophytes. The ground cover is often visually dominated by *Lepidosperma congestum*. Extensively cleared for agriculture and remnants have been subject to timber production and grazing. Recorded from five bioregions within study area (Dundas Tablelands, Goldfields, Grampians, Wimmera, Glenelg Plain).

***Dundas Tablelands* Shallow Sands Woodland**
Floristics: Dominated by *Eucalyptus melliodora* ± *Acacia mearnsii*, understorey dominated by low-growing shrubs and numerous grasses, graminoids and other herbs.
Structure: Woodland to open-forest 15–18 m tall. Trees are straight-growing and well-formed.
Habitat: Relatively well-drained sites of moderate fertility associated with metamorphic schists, gneiss and calc-silicate rocks.
Nearest relative: Plains Grassy Woodland.

***Glenelg Plain* Shallow Sands Woodland**
Floristics: Dominated by *Eucalyptus ovata* and *Eucalyptus leucoxylon,* rich in low shrubs, sedges, grasses, geophytes and annuals.
Structure: Woodland 10–15 m tall. Trees are typically straight-growing and well-formed.
Habitat: Moderately well-drained sites on sandy soils derived from Tertiary marl and limestone; lower lying areas on shallow soils within aeolian sand deposits.
Nearest relative: Damp Sands Herb-rich Woodland.

***Goldfields* Shallow Sands Woodland**
Floristics: Dominated by *Eucalyptus leucoxylon* ± *E. melliodora* ± *E. camaldulensis*. *Allocasuarina verticillata* may form an open secondary tree layer. A sparse cover of *Astroloma conostephioides* is present over a rich suite of ground flora dominated by *Lepidosperma congestum* or *L. laterale*.
Structure: Open-woodland to open-forest.
Habitat: Restricted to sand sheets associated with Grampians outwash.
Nearest relative: Plains Grassy Woodland, Low Rises Grassy Woodland, Alluvial Terraces Herb-rich Woodland.

***Grampians* Shallow Sands Woodland**
Floristics: Dominated by *Eucalyptus leucoxylon* ± *Eucalyptus melliodora* ± *Allocasuarina verticillata,* rich in geophytes, sedges and grasses.
Structure: Woodland 10–15 m tall. Trees are typically straight-growing and well-formed.
Habitat: Moderately well-drained sites (some sites remaining wet for longer periods) on sandy soils up to 30 cm deep, overlying heavier soils of underlying Tertiary or Quaternary geology.
Nearest relative: Plains Sedgy Woodland.

***Wimmera* Shallow Sands Woodland**
Floristics: Dominated by *Eucalyptus leucoxylon* ± *Allocasuarina luehmannii* ± *Eucalyptus melliodora,* rich in geophytes, sedges, grasses and a number of low shrubs.
Structure: Woodland 10–15 m tall. Trees are typically straight-growing and well-formed.
Habitat: Moderately well-drained and fertile sites (some sites remaining wet for longer periods) on sandy soils up to 30 cm deep, overlying heavier soils of underlying Tertiary or Quaternary geology.
Nearest relative: *Wimmera Low Rises* Grassy Woodland.

EVC 885 Damp Sands Herb-rich Woodland/Plains Grassy Woodland Complex
Woodland with primarily grassy-herbaceous ground-layer, variously with Austral Bracken or hard-leaved monocots and small shrubs. Occurs on relatively fertile sedimentary soils, often with buckshot. Formerly locally extensive, particularly west of Coleraine, but now almost entirely cleared. Recorded from three bioregions within study area (Glenelg, Dundas, Warrnambool). Inadequately known.

Damp Sands Herb-rich Woodland/Plains Grassy Woodland Complex
Floristics: Dominated by *Eucalyptus camaldulensis* ± *E. viminalis* ssp. *cygnetensis* ± *E. ovata* ± *Allocasuarina verticillata* and a range of *Acacia* spp., predominantly grassy understorey, usually dominated by *Themeda triandra* and/or *Austrostipa pubinodis* on roadside remnants, sometimes with *Gahnia radula* and *Xanthorrhoea minor* or small ericoid shrubs locally common in small roadside remnants. A wide range of geophytes and perennial herbs is present in more diverse remnants, with strong floristic affinities with the flora of Plains Grassy Woodland.
Structure: Woodland to 12–20 m tall.
Habitat: Relatively fertile well-drained loamy to sandy or gravelly sedimentary soils, often with buckshot.
Nearest relative: Plains Grassy Woodland, Damp Sands Herb-rich Woodland, Grassy Woodland.

EVC 894 Scoria Cone Woodland
Typically woodland or open-shrubland, grassy to Austral Bracken-dominated, with a range of herbs conspicuous. Occurred on the slopes of freely-draining scoria cones, but confined to spatter areas of more course boulder-forming flow sources, where it is otherwise replaced by Stony Rises Woodland. Soils can be skeletal but are very fertile. Previously localised and restricted habitat, now almost entirely cleared. Recorded from one bioregion within study area (Victorian Volcanic Plain).

Scoria Cone Woodland
Floristics: Often uncertain due to previous modification. Probably dominated by various associations of *Eucalyptus viminalis*, *Acacia melanoxylon*, *Allocasuarina verticillata*, *Bursaria spinosa*, *Poa labillardierei*, *Pteridium esculentum.* The vegetation appears to have been at least moderately herb-rich.
Structure: Grassland, shrubland or woodland (presumed to 15 m, mostly considerably less), reflecting local site conditions. Trees and larger shrubs were probably frequently stunted by harsh conditions and high water stress.
Habitat: Free-draining stony soils of scoria cones, especially spatter zones or more consolidated finer particles on cone slopes.
Nearest relative: Stony Rises Woodland, Cinder Cone Woodland.

EVC 895 Escarpment Shrubland
Shrubland or scrub ± stunted emergent trees on rocky escarpments in steep valleys or gorges. Sites have moderate to high fertility, are well-drained but subject to regular summer drought due to shallow soils. Lichen-covered rock outcrops are common. Associated with limestone or basalt. Naturally rare and restricted in distribution. Little remains due to clearing and grazing except in Lower Glenelg National Park. Occurs in three bioregions within study area (Dundas Tablelands, Glenelg Plain, Victorian Volcanic Plain). Occurrences on Dundas Tablelands were not sampled.

***Glenelg Plain* Escarpment Shrubland**
Floristics: Dominated by range of shrubs including *Dodonaea viscosa*, *Leucopogon lanceolatus*, *Melaleuca lanceolata*, *Pomaderris halmaturina*. The rare small shrub *Logania ovata* is characteristic of this community. Stunted emergent trees may be present, especially *Allocasuarina verticillata*. An unusual stunted form of *Eucalyptus obliqua* occurs near the South Australian border (quadrat D38027).
Structure: Shrubland or scrub to 4 m tall ± emergent trees to 5 m tall.
Habitat: Rocky limestone escarpments in valleys or gorges.
Nearest relative: Limestone Pomaderris Shrubland (characterised by abundant *Pomaderris halmaturina*).
Comments: Variable unit in need of further survey to determine floristic composition and relationships. Tentatively separated from Limestone Pomaderris Shrubland.

***Victorian Volcanic Plain* Escarpment Shrubland**
Floristics: Dominated by shrubs including *Bursaria spinosa*, *Hymenanthera dentata*, *Notelaea ligustrina*, *Rubus parvifolius* ± emergent *Acacia melanoxylon*. Understorey includes *Dianella callicarpa*, *Bulbine bulbosa*, *Lomandra longifolia*, *Senecio glomeratus*.
Structure: Shrubland/scrub to 3 m tall.
Habitat: Rocky basalt escarpments in valleys or gorges.
Nearest relative: Stony Knoll Shrubland.

EVC 897 Plains Grassland/Plains Grassy Woodland Complex
Open woodland, shrubland or tussock grassland, dominated by perennial grasses with a wide range of inter-tussock herbs and geophytes. On mainly heavy fertile basalt-derived soils. Previously locally extensive within drier parts of the volcanic plain, but now virtually totally cleared and mostly confined to modified roadside remnants. Recorded from one bioregion within study area.

***Victorian Volcanic Plain* Plains Grassland/Plains Grassy Woodland Complex**
Floristics: Formerly variously with *Acacia melanoxylon*, *A. implexa*, *A. mearnsii*, *Allocasuarina verticillata*, *Banksia marginata* (tree form) and sparse *E. camaldulensis* and/or *E. ovata*, ground-layer dominated by tussock grasses (*Themeda*, *Austrodanthonia*, *Austrostipa*, *Poa*), with a diverse range of geophytes and dicot herbs in inter-tussock spaces.
Structure: Variously open-woodland 3–12 m high, shrubland 1–3 m high, or tussock grassland generally less than 0.8 metres high.
Habitat: Mostly on heavy loam to clay loam/clay soils on lower rainfall areas of basalt plain, sometimes seasonally waterlogged or retaining water in small shallow gilgai depressions.
Nearest relative: Plains Grassland, Plains Grassy Woodland, Stony Knoll Shrubland.

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