

APPENDIX A: Gippsland stratification and survey intensity analysis - flora

STRATA WITH HIGH SAMPLING INTENSITY (>40 sites per 10,000ha)

Stratum No.	mean ann. precip.	min. temp. coldest month	max. temp. warmest month	lithology*	# spp	# sites	probability next species new (%)	forest area (ha)	% of forest in Gippsland	# polygons	site density (sites per 10,000 ha)	distribution (geographic units)
86	moderate	high	high	2	1149	366	3	47,506	3.01	345	77.04	Mullungdung Coastal, Wilsons Promontory, Latrobe Valley
18	high	low	low	8	894	365	2	38,123	2.41	294	95.74	Wellington Mountains, Upper Murray Mountains, Cobungra Mountains, Dargo Mountains
78	moderate	high	high	5	823	142	5	33,027	2.091	994	43	Mullungdung Coastal, Latrobe Foothills, Taylor Foothills, Strzelecki Foothills, Latrobe Valley
81	moderate	high	high	3	644	123	5	19,609	1.24	323	62.73	Mullungdung Coastal, Strzelecki Foothills, Taylor Foothills
95	high	high	high	6	606	58	13	10,103	0.64	40	57.41	Wilsons Promontory
99	high	high	moderate	6	456	47	17	9,360	0.59	92	50.21	Wilsons Promontory
82	moderate	high	high	4	463	58	10	7,558	0.48	783	76.74	Latrobe Valley, Strzelecki Foothills, West Gippsland Foothills, Mullungdung Coastal,
36	high	low	low	9	469	47	9	4,423	0.28	63	106.25	Dargo Mountains, Wellington Mountains, Cobungra Mountains
100	high	high	moderate	2	580	76	8	3,007	0.19	29	252.78	Wilsons Promontory
77	low	high	v.high	4	280	20	14	2,946	0.19	487	67.88	King Coastal Plains, Avon Foothills, Wellington Coastal Plains
72	moderate	high	high	6	399	33	22	2,800	0.18	117	117.87	Wilsons Promontory
79	low	high	v.high	2	223	29	23	2,323	0.15	120	124.84	Wellington Coastal Plains, King Coastal Plains
98	high	high	high	2	207	21	16	1,983	0.13	67	105.92	Wilsons Promontory, Fish Creek Coastal
96	moderate	high	moderate	6	130	10	59	1,699	0.11	77	58.86	Wilsons Promontory

97	moderate	high	moderate	2	199	9	58	726	0.05	21	124.05	Wilsons Promontory
Total								185,193	11.74			

NOTE: Asterisks in "probability next species new" column indicate too few samples (<6 survey sites) for accurate calculation.

* Key to lithology

1 = undescribed

2 = coarsely textured unconsolidated deposits: low fertility

3 = coarsely textured unconsolidated deposits/finely textured unconsolidated deposits: low fertility

4 = finely textured unconsolidated deposits: highest fertility

5 = finely textured unconsolidated deposits/coarsely textured unconsolidated deposits: moderate fertility

6 = granites and gneisses: moderate to low fertility

7 =limestone: ??? fertility, limestone/coarsely textured unconsolidated deposits: ??? fertility

8 = sedimentary rock: low fertility, sedimentary/granites and gneisses: low fertility, sedimentary/volcanic rock : low/moderate fertility, sedimentary/limestone rock-
??fertility, volcanic/sedimentary rock: high fertility

9 = ???volcanic rock: ??? fertility

STRATA WITH MODERATE SAMPLING INTENSITY (10 - 40 sites per 10,000 ha)

Stratum No.	mean ann. precip	min. temp. coldest month	max. temp warmest month	Lithology	# spp	# sites	probability next species new (%)	forest area (ha)	% of forest in North East	# polygons	site density (sites per 10,000 ha)	distribution (geographic units)
13	high	low	moderate	8	1033	298	3	123,946	7.85	434	24.04	Upper Murray Mountains, Wellington Mountains, Cobungra Mountains, Dargo Mountains, Macalister Mountains
62	high	high	high	8	621	160	6	96,305	6.10	1300	16.61	Strzelecki Foothills, Aberfeldy Foothills, West Gippsland Foothills, Fish Creek Coastal
17	high	low	moderate	6	733	93	8	53,737	3.40	136	17.31	Cobungra Mountains, Upper Murray Mountains, Nunniong Mountains, Haunted Mountains

16	moderate	low	high	8	765	131	4	53,446	3.38	578	24.51	Nunniiong Mountains, Upper Murray Mountains, Cobungra Mountains, Haunted Mountains, Dargo Mountains
8	high	low	high	8	720	111	4	46,118	2.92	179	24.07	Upper Murray Mountains, Cobungra Mountains
9	moderate	moderate	v.high	8	535	49	9	42,891	2.72	585	11.42	Dargo Mountains, Haunted Mountains, Nunniiong Mountains, Taylor Foothills, Upper Murray Mountains, Cobungra Mountains, Avon Foothills
60	low	high	v.high	8	485	37	19	36,194	2.29	157	10.22	Avon Foothills, Dargo Mountains
68	moderate	high	high	8	497	75	11	32,518	2.06	670	23.06	Strzelecki Foothills, Aberfeldy Foothills, Latrobe Foothills, Avon Foothills
87	low	high	high	2	522	53	10	31,818	2.01	418	16.66	Mullungdung Coastal, Wellington Coastal Plains, King Coastal Plains
41	moderate	low	moderate	8	405	31	12	27,041	1.71	240	11.46	Dargo Mountains, Haunted Mountains, Cobungra Mountains, Avon Foothills
76	low	high	v.high	3	326	21	21	15,430	0.98	300	13.61	Wellington Coastal Plains, Avon Foothills, King Coastal Plains, Taylor Foothills
19	high	low	low	6	355	22	21	14,191	0.90	132	15.5	Cobungra Mountains, Upper Murray Mountains, Nunniiong Mountains
2	moderate	moderate	v.high	6	389	24	17	13,974	0.88	173	17.18	Nunniiong Mountains, Cobungra Mountains, Upper Murray Mountains
7	high	low	high	6	369	17	20	12,829	0.81	107	13.25	Upper Murray Mountains, Cobungra Mountains
57	moderate	high	v.high	5	285	19	26	12,466	0.79	377	15.24	Taylor Foothills, Latrobe foothills, Aberfeldy Foothills
84	low	high	high	3	280	11	31	10,887	0.69	436	10.1	Mullungdung Coastal, Wellington Coastal Plains, King Coastal Plains
59	moderate	high	v.high	6	265	11	36	9,624	0.61	223	11.43	Taylor Foothills, Nunniiong Mountains, Avon Foothills
26	high	low	moderate	9	242	16	13	8,452	0.54	95	18.93	Wellington Mountains, Nunniiong Mountains, Dargo Mountains,

												Cobungra Mountains, Macalister Mountains, Upper Murray Mountains
63	moderate	high	v.high	9	251	13	28	8,059	0.51	85	16.13	Avon Foothills, Aberfeldy Foothills, Nunniong Mountains, Macalister Mountains
71	moderate	high	high	9	318	28	14	7,659	0.48	335	36.56	Strzelecki Foothills, Mullungdung Coastal, Avon Foothills, Latrobe Valley
25	moderate	moderate	high	9	255	16	18	7,071	0.45	81	22.63	Avon Foothills, Nunniong Mountains, Upper Murray Mountains
22	high	moderate	high	9	169	13	30	6,381	0.40	75	20.37	Wellington Mountains, Macalister Mountains, Matlock Mountains, Avon Foothills, Strzelecki Foothills
69	high	high	high	9	160	14	44	5,007	0.32	585	27.96	Strzelecki Foothills, West Gippsland Foothills, Macalister Mountains
28	moderate	low	high	9	239	14	18	4,890	0.31	20	28.63	Nunniong Mountains, Upper Murray Mountains
89	high	high	high	5	197	13	39	4,645	0.29	253	27.99	Fish Creek Coastal, Strzelecki Foothills, Latrobe Foothills
73	moderate	high	v.high	4	204	8	49	4,558	0.29	331	17.55	Taylor Foothills, Aberfeldy Foothills, Latrobe Valley
93	high	high	high	3	198	13	25	3,925	0.25	101	33.12	Strzelecki Foothills, West Gippsland Foothills
23	moderate	moderate	v.high	9	241	8	24	3,867	0.24	25	20.69	Nunniong Mountains, Upper Murray Mountains
92	high	high	high	4	70	3	*	1,135	0.07	159	26.43	Strzelecki Foothills, West Gippsland Foothills, Wilsons Promontory
Total								699,061	44.26			

STRATA WITH LOW SAMPLING INTENSITY (>0 - 10 sites per 10,000 ha)

Stratum No.	mean ann. precip	min. temp. coldest month	max. temp warmest month	Lithology	# spp	# sites	probability next species	forest area (ha)	% of forest in North East	# polygons	site density (sites per	distribution (geographic units)
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							new (%)				10,000 ha)	
56	moderate	high	v.high	8	983	221	2	279,557	17.70	604	7.91	Taylor Foothills, Avon Foothills, Aberfeldy Foothills, Nunniong Mountains, Dargo Mountains, Haunted Mountains
20	high	moderate	high	8	520	54	10	108,222	6.85	398	4.99	Macalister Mountains, Aberfeldy Foothills, Wellington Mountains, Matlock Mountains
27	moderate	moderate	high	8	684	71	8	90,873	5.75	372	7.81	Avon Foothills, Dargo Mountains, Wellington Mountains, Cobungra Mountains, Nunniong Mountains
37	low	moderate	high	8	275	15	19	31,222	1.98	211	4.8	Haunted Mountains, Dargo Mountains, Nunniong Mountains, Cobungra Mountains
14	moderate	low	high	6	392	18	19	27,609	1.75	214	6.52	Cobungra Mountains, Nunniong Mountains, Haunted Mountains, Upper Murray Mountains
40	low	moderate	v.high	8	268	9	43	21,922	1.39	223	4.11	Haunted Mountains, Dargo Mountains, Nunniong Mountains
55	high	high	v.high	8	228	11	31	21,479	1.36	164	5.12	Macalister Mountains, Matlock Mountains, Aberfeldy Foothills, Latrobe Foothills
53	high	moderate	moderate	8	186	8	43	17,762	1.12	444	4.5	Macalister Mountains, Matlock Mountains, Aberfeldy Foothills, Wellington Mountains
42	low	low	high	8	236	11	38	13,023	0.82	247	8.45	Haunted Mountains, Cobungra Mountains, Nunniong Mountains
35	moderate	low	moderate	6	252	12	20	12,039	0.76	137	9.97	Cobungra Mountains, Haunted Mountains, Nunniong Mountains
88	low	high	high	5	184	7	39	11,192	0.71	341	6.25	Mullungdung Coastal, Wellington Coastal Plains
39	low	moderate	v.high	6	144	4	*	10,165	0.64	196	3.94	Nunniong Mountains, Haunted Mountains
30	moderate	moderate	high	6	207	6	43	9,726	0.62	96	6.17	Cobungra Mountains, Nunniong Mountains, Avon Foothills
38	low	moderate	high	6	166	4	*	8,299	0.53	122	4.82	Haunted Mountains, Nunniong Mountains
43	low	low	high	6	47	1	*	5,761	0.36	142	1.74	Haunted Mountains, Nunniong Mountains, Cobungra Mountains

61	low	high	v.high	5	53	2	*	5,703	0.36	151	3.51	Avon Foothills, Taylor Foothills, King Coastal Plains
74	moderate	high	v.high	3	37	2	*	4,808	0.30	244	4.16	Taylor Foothills, King Coastal Plains, Aberfeldy Foothills, Avon Foothills
10	high	moderate	v.high	8	124	3	*	4,252	0.27	115	7.05	Upper Murray Mountains, Wellington Mountains, Cobungra Mountains
58	high	moderate	moderate	9	20	1	*	1,057	0.07	74	9.46	Wellington Mountains, Macalister Mountains, Avon Foothills, Matlock Mountains
Total								684,671	43.34			

STRATA (>500 HA) WITHOUT SAMPLE SITES

Stratum No.	mean ann. precip	min. temp. coldest month	max. temp warmest month	Lithology	# spp	# sites	Probability next species new (%)	forest area (ha)	% of forest in North East	# polygons	site density (sites per 10,000 ha)	distribution (geographic units)
85	low	high	high	4	0	0	100	2,345	0.15	314	0	Mullungdung Coastal, Latrobe Valley, Wellington Coastal Plains, King Coastal Plains
64	low	high	v.high	6	0	0	100	1,239	0.08	76	0	Dargo Mountains, Avon Foothills
24	high	low	high	9	0	0	100	1,072	0.07	13	0	Upper Murray Mountains
52	high	moderate	high	5	0	0	100	655	0.04	17	0	Wellington Mountains
								5,311	0.34			

STRATA OCCUPYING LESS THAN 500 HECTARES

Stratum No.	mean ann. precip	min. temp. coldest month	max. temp warmest month	Lithology	# spp	# sites	Probability next species new (%)	forest area (ha)	% of forest in North East	# polygons	site density (sites per 10,000 ha)	distribution (geographic units)
3	high	moderate	v.high	5	0	0	100	464	0.03	30	0	Wellington Mountains
29	high	moderate	high	6	0	0	100	428	0.03	18	0	Cobungra Mountains
31	moderate	low	high	4	127	3	*	426	0.027	27	70.47	Upper Murray Mountains, Cobungra Mountains

102	moderate	high	high	7	61	2	*	398	0.025	9	50.2	Wilsons Promontory
70	high	high	v.high	9	0	0	100	353	0.02	15	0	Macalister Mountains, Wellington Mountains
21	high	moderate	v.high	9	0	0	100	279	0.02	12	0	Upper Murray Mountains
1	moderate	moderate	v.high	5	0	0	100	260	0.02	24	0	Upper Murray Mountains, Nunniong Mountains
94	high	high	high	1	0	0	100	242	0.02	39	0	Fish Creek Coastal
44	low	moderate	v.high	5	0	0	100	225	0.01	14	0	Nunniong Mountains
46	moderate	low	moderate	9	0	0	100	181	0.01	10	0	Nunniong Mountains, Cobungra Mountains
15	moderate	low	v.high	8	0	0	100	178	0.01	15	0	Upper Murray Mountains
12	moderate	low	v.high	6	0	0	100	170	0.01	17	0	Upper Murray Mountains
101	high	high	high	7	36	1	*	147	0.01	4	67.77	Wilsons Promontory
83	moderate	high	v.high	1	0	0	100	135	0.01	38	0	Aberfeldy Foothills, Latrobe Valley
103	high	moderate	moderate	6	0	0	100	135	0.01	5	0	Wilsons Promontory
45	low	moderate	high	9	49	1	*	133	0.01	4	75.15	Nunniong Mountains
65	high	low	low	5	0	0	100	133	0.01	2	0	Wellington Mountains
54	high	high	v.high	5	25	1	*	128	0.01	14	77.83	Wellington Mountains
49	low	moderate	high	7	0	0	100	85	0.01	8	0	Nunniong Mountains
90	low	high	high	1	0	0	100	73	0.00	42	0	Wellington Coastal Plains
32	moderate	moderate	high	4	68	2	*	72	0.004	8	278.93	Upper Murray Mountains
66	high	low	moderate	5	0	0	100	71	0.00	1	0	Wellington Mountains
34	high	low	high	4	0	0	100	66	0.00	3	0	Upper Murray Mountains
5	high	moderate	v.high	6	0	0	100	63	0.00	7	0	Upper Murray Mountains
47	low	moderate	v.high	9	0	0	100	61	0.00	3	0	Nunniong Mountains
67	moderate	moderate	moderate	8	0	0	100	53	0.00	6	0	Avon Foothills, Wellington Mountains
48	low	moderate	v.high	7	0	0	100	48	0.00	12	0	Nunniong Mountains
11	high	low	v.high	8	0	0	100	45	0.00	7	0	Upper Murray Mountains
6	high	low	v.high	6	0	0	100	36	0.00	3	0	Upper Murray Mountains
104	high	high	moderate	5	0	0	100	35	0.00	2	0	Wilsons Promontory
75	low	high	v.high	9	0	0	100	26	0.00	1	0	Avon Foothills
105	moderate	high	moderate	5	0	0	100	26	0.00	3	0	Wilsons Promontory
50	moderate	low	high	7	0	0	100	19	0.00	4	0	Nunniong Mountains
4	high	low	v.high	5	0	0	100	9	0.00	1	0	Upper Murray Mountains
33	high	low	moderate	4	0	0	100	9	0.00	1	0	Upper Murray Mountains
51	low	low	high	9	0	0	100	9	0.00	1	0	Nunniong Mountains
80	moderate	high	v.high	2	0	0	100	6	0.00	10	0	Taylor Foothills

Total

5,227

0.31

Appendix B - Fauna Survey Intensity - Gippsland

Probability (%) of the next species recorded for a particular fauna group in a particular stratum being new (ie not previously recorded in surveys for that fauna group in that stratum). Also shown are the forested area of each stratum and the % of the total forested area of the Gippsland CRA Region. Strata are listed in order of size. Asterisks indicate too few samples (<6 survey sites) for accurate calculation and entries of 100% indicate either no sites surveyed or few species detected.

Strata No.	Area (ha)	% Forest Area	Arboreal Mammals	Large Mammals	Small Ground Mammals	Bats	Diurnal Birds	Nocturnal Birds	Large Forest Owls	Reptiles	Amphibians
1	260	0.02	100	100	100	100	100	100	100	100	100
2	13,974	0.88	5	20	0	8	10	0	100*	0	95
3	464	0.03	*	*	*	100	100	100	*	100	100
4	9	0.00	100	100	100	100	100	100	100	100	100
5	63	0.00	100	100	100	100	100	100	100	100	100
6	36	0.00	100	100	100	100	100	100	100	100	100
7	12,829	0.81	*	100	*	100	*	*	*	*	*
8	46,118	2.92	4	30	3	0	1	0	0	*	*
9	42,891	2.72	0	46	0	2	3	7	0	*	*
10	4252	0.27	*	*	*	*	30	*	*	100	100
11	45	0.00	100	100	100	100	100	100	100	100	100
12	170	0.01	100	100	100	100	100	100	100	100	100
13	123,946	7.85	1	4	0	0	3	0	15	11	79
14	27,609	1.75	7	28	*	*	100	32	0	100	100
15	178	0.01	100	100	100	100	100	100	100	100	100
16	53,446	3.38	0	15	8	10	13	9	0	39	100*
17	53,737	3.40	0	13	15	3	*	19	0	21	100*
18	38,123	2.41	21	23	0	1	6	98	100*	18	100*
19	14,191	0.90	*	*	*	100	100	100	100*	100	100
20	108,222	6.85	2	6	12	1	5	0	33	21	1
21	279	0.02	100	100	100	100	100	100	100	100	100
22	6,381	0.40	*	37	*	*	*	*	*	1	0.91195
23	3,867	0.24	*	*	*	100	16	*	95	100	100
24	1,072	0.07	100	100	100	*	100	100	100	100	100
25	7,071	0.45	*	34	*	*	18	*	*	19	100*
26	8,452	0.54	21	NaN	100	100	100	*	100*	100	100
27	90,873	5.75	2	14	18	33	4	0	17	0	100*
28	4,890	0.31	*	100	5	*	*	100	*	50	100*
29	428	0.03	100	100	100	100	100	100	100	100	100
30	9,726	0.62	9	91	*	*	*	*	86	*	26
31	426	0.03	100	100	100	*	100	100	100	100	100
32	72	0.00	100	100	100	100	100	100	100	100	100
33	9	0.00	100	100	100	100	100	100	100	100	100
34	66	0.00	100	100	100	100	100	100	100	100	100
35	12,034	0.76	*	*	*	*	*	*	*	100	100
36	4,423	0.28	*	0	25	100	*	*	*	*	*
37	31,222	1.98	15	100	*	*	*	37	0	34	*
38	8,299	0.53	*	*	100	100	*	*	100*	*	*
39	10,165	0.64	*	*	100	100	*	*	100*	100	100
40	21,922	1.39	23	100	100	13	35	*	100	39	*
41	27,041	1.71	4	100	*	*	27	100	100*	99	*
42	13,023	0.82	23	100	100	100	100	88	100*	100	100
43	5,761	0.36	*	*	100	*	35	*	0	14	100*
44	225	0.01	*	*	100	100	*	100	*	*	*

Strata No.	Area (ha)	% Forest Area	Arboreal Mammals	Large Mammals	Small Ground Mammals	Bats	Diurnal Birds	Nocturnal Birds	Large Forest Owls	Reptiles	Amphibians
45	133	0.01	100	100	100	100	100	100	100	100	100
46	181	0.01	100	100	100	100	100	100	100	100	100
47	61	0.00	100	100	100	100	100	100	100	100	100
48	48	0.00	100	100	100	100	100	100	100	100	100
49	85	0.01	100	100	100	100	100	100	100	100	100
50	19	0.00	100	100	100	100	100	100	100	100	100
51	9	0.00	100	100	100	100	100	100	100	100	100
52	655	0.04	0	100*	100	100	100	*	100	100	100
53	17,762	1.12	31	100*	*	23	*	100	84	100	100
54	128	0.01	100	100	100	100	100	100	100	100	100
55	21,479	1.36	10	100	*	100	*	0	100*	*	*
56	279,557	17.70	0	3	3	1	1	0	0	3	4
57	12,466	0.79	11	51	*	*	*	0	100	*	*
58	1,057	0.07	100	100	100	100	100	100	100	100	100
59	9,624	0.61	0	95	*	*	16	39	25	100	*
60	36,194	2.29	0	23	100	*	18	0	22	93	21
61	5,703	0.36	20	100	100	*	20	97	99	100*	100*
62	96,305	6.10	0	0	9	0	2	12	34	33	43
63	8,059	0.51	*	0	*	100	13	*	*	*	*
64	1,239	0.08	100	100	100	100	100	100	100	100	100
65	133	0.01	100	100	100	100	100	100	100	100	100
66	71	0.00	100	100	100	100	100	100	100	100	100
67	53	0.00	100	100	100	100	100	100	100	100	100
68	32,518	2.06	24	100*	45	17	12	36	100*	96	97
69	5,007	0.32	*	*	100	100	100	*	*	100	100
70	353	0.02	100	100	100	100	100	100	100	100	100
71	7,659	0.48	*	*	100	*	*	*	*	*	*
72	2,800	0.18	*	*	*	*	*	*	100	100	100
73	4,558	0.29	*	84	*	*	*	*	91	*	5
74	4,808	0.30	*	90	100*	*	*	*	100	*	*
75	26	0.00	100	100	100	100	100	100	100	100	100
76	15,430	0.98	*	31	0	*	100	*	*	*	*
77	2,946	0.19	*	*	*	100	100	*	*	*	*
78	33,027	2.09	4	5	20	18	6	100	0	33	42
79	2,323	0.15	0	19	0	*	100	25	*	100	100
80	6	0.00	100	100	100	100	100	100	100	100	100
81	19,609	1.24	8	21	18	0	53	0	0	100*	100*
82	7,558	0.48	100	100	*	100	*	100	100	100	100
83	135	0.01	100	100	100	100	100	100	100	100	100
84	10,887	0.69	*	*	0	1	100	*	100	50	20
85	2,345	0.15	100	100	100	100	100	100	100	100	100
86	47,506	3.01	12	15	1	*	3	0	100	15	12
87	31,818	2.01	*	17	0	31	*	*	*	99	100
88	11,192	0.71	*	*	*	*	*	*	*	*	*
89	4,645	0.29	*	*	*	*	*	*	*	*	0
90	73	0.00	100	100	100	100	100	100	100	100	100
92	1,135	0.07	100	100	*	100	100	100	100	100	100
93	3,925	0.25	8	15	7	*	100	100*	*	100	100
94	242	0.02	100	100	100	100	100	100	100	100	100
95	10,103	0.64	100	100	18	100	100	100	100	100	100
96	1,699	0.11	100	100	100	100	100	100	100	100	100
97	725	0.05	100	100	100	100	100	100	100	100	100
98	1,983	0.13	100	100	0	100	100	100	100	100	100
99	9,360	0.59	*	*	6	*	100	*	100	100	100
100	3,007	0.19	100	100	*	*	100	100	100	100	100
101	148	0.01	100	100	100	100	100	100	100	100	100
102	398	0.03	100	100	0	100	100	100	100	100	100

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

Notes:

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

EVC 1 Coastal Dune Scrub Mosaic

Coastal Dune Scrub Mosaic typically develops on the dunes and sand sheets behind the coastal beaches in South Gippsland. At Wilsons Promontory, it is extensively developed on a strip along the most exposed stretches of west-facing beaches north-west of Darby River where it merges with many of the sandblows that have moved inland from the coast. It occurs on both siliceous and calcareous sands that are subject to high levels of saltspray and continuous disturbance from onshore winds. Elevation is approximately 5-50 m above sea level and average annual rainfall varies from 700-1000mm.

Structurally, Coastal Dune Scrub Mosaic consists of wind-pruned scrub and heath, but may also include a band of grassland immediately behind the beach dominated by the introduced species Marram grass *Ammophila arenaria* as well as Hairy Spinifex *Spinifex sericeus* and Coast Fescue *Austrofestuca littoralis*. It includes the succulent species Sea Rocket *Cakile edentula*, Rough Sow-thistle *Sonchus aspera* s.l. and Karkalla *Carpobrotus rossii*. The weed, Sea Spurge *Euphorbia paralias*, is an invasive weed in these dunes.

Dominant shrubs include Coast Tea-tree *Leptospermum laevigatum*, Coast Wattle *Acacia longifolia* ssp. *sophorae*, Drooping Sheoke *Allocasuarina verticillata*, Sweet Bursaria *Bursaria spinosa*, Common Beard-heath *Leucopogon parviflorus*, Sea Box *Alyxia buxifolia* and Coast Everlasting *Ozothamnus turbinatus*. Common ground cover species in the hinterdunes and sand sheets include Long-hair Plume-grass *Dichelachne crinita*, Coast Sword-sedge *Lepidosperma gladiatum*, Honey-pots *Acrotriche serrulata*, Common Wheat-grass *Elymus scabrus*, Forest Clematis *Clematis microphylla*, Short-stem Sedge *Carex breviculmis*, Silky Guinea-flower *Hibbertia sericea* s.l. Cinquefoil Cranesbill *Geranium potentilloides*, Spiny-headed Mat-rush *Lomandra longifolia*, and Knobby Club-sedge *Isolepis nodosa*. Other herbs present are Shady Wood-sorrel *Oxalis exilis*, Common Lagenifera *Lagenifera stipitata*, Kidney-weed *Dichondra repens* and Variable Groundsel *Senecio pinnatifolius*.

EVC 2 Coast Banksia Woodland

Coast Banksia Woodland is restricted to near coastal localities in Central and South Gippsland. It occurs on calcareous sand on secondary or tertiary dunes behind Coastal Dune Scrub Mosaic. The upper levels of the soil profile show some evidence of iron and calcium leaching with the humus content being higher than for the soils of Coastal Dune Scrub Mosaic (Woodgate *et al.* 1994). Annual rainfall is 700-1000mm and elevation ranges from approximately 5 to 30m above sea level.

The dominant tree is Coast Banksia *Banksia integrifolia* with a tall shrub layer which may include Sallow Wattle *Acacia longifolia* var. *sophorae*, Swamp Paperbark *Melaleuca ericifolia*, Common Boobialla *Myoporum insulare* and Coast Tea-tree *Leptospermum laevigatum* of varying density. When Coast Tea-tree *Leptospermum laevigatum* is not predominating, shrubs such as White Elderberry *Sambucus gaudichaudiana* and the halophytes Seaberry Saltbush *Rhagodia candolleana* ssp. *candolleana* and Bower Spinach *Tetragonia implexicoma* are common. Coast Sword-sedge *Lepidosperma gladiatum* may be a prominent feature of the ground layer together with Kidney-weed *Dichondra repens*. Other plants which may be present include Sea Celery *Apium prostratum* ssp. *prostratum*, Branched Centaury *Centaureum tenuiflorum*, Ragwort *Senecio jacobaea*, Jagged Fireweed *S. biserratus*, Tangled Bedstraw *Galium australe*, Angled Lobelia *Lobelia alata*, Hairy Pennywort *Hydrocotyle hirta*, Common Lagenifera *Lagenifera stipitata*, Ivy-leaf Violet *Viola hederacea* s.l. and Knobby Club-sedge *Isolepis nodosa*.

EVC 3 Damp Sands Herb-rich Woodland

Floristic Community:

3-01 Gippsland Lakes Damp Sands Herb-rich Woodland

Gippsland Lakes Damp Sands Herb-rich Woodland typically occurs on Pleistocene aeolian and marine sands on the Gippsland plains and coastal areas inland from Coast Banksia Woodland. Soils are relatively fertile black to grey sands that remain damp through close association with the underlying water table. Average annual rainfall is 500-1000mm and elevation is approximately 5-100m above sea level.

The vegetation is mainly an open woodland with an understorey that includes both heathy and herbaceous species. It is commonly dominated by Coast Manna Gum *Eucalyptus viminalis* ssp. *pryoriana*, and Shining Peppermint *E. willisii* but Bangalay *E. botryoides* is found in the group on Raymond Island and elsewhere eastward through the Gippsland Lakes area. Narrow-leaf Peppermint *E. radiata*, Yellow Box *E. melliodora* and But But *E. angophoroides/bridgesiana* are also sometimes present.

Tall shrubs or small trees of Black Wattle *Acacia mearnsii*, Coast Banksia *Banksia integrifolia* and Saw Banksia *Banksia serrata* are often found together with smaller shrubs including Prickly Tea-tree *Leptospermum continentale*, Coast Tea-tree *L. laevigatum*, Coast Wattle *Acacia longifolia* var. *sophorae*, Common Heath *Epacris impressa*, Honey-pots *Acrotriche serrulata* and Spike Wattle *Acacia oxycedrus*. The climbers, Common Apple-berry *Billardiera scandens* var. *scandens* and Small-leaved Clematis *Clematis microphylla* are also frequently present.

The herb-rich ground cover which reflects the relatively fertile sandy soils on which it grows includes Stinking Pennywort *Hydrocotyle laxiflora*, Creeping Wood-sorrel *Oxalis corniculata* spp. agg., Kidney-weed *Dichondra repens*, Common Lagenifera *Lagenifera stipitata*, Ivy-leaf Violet *Viola hederacea* s.l., Hairy Pennywort *Hydrocotyle hirta* and Knobby Club-sedge, *Isolepis nodosa*. Austral Bracken *Pteridium esculentum* is typically present with the tussock-forming grass *Poa labillardieri* and mats of the widespread palatable native Weeping Grass *Microlaena stipoides*. Spiny-headed Mat-rush *Lomandra longifolia* tussocks are also common. Blady Grass *Imperata cylindrica* is a good indicator of this group although it would probably be much more frequent with a higher fire frequency.

The group has close floristic and geographic affinities with Coast Banksia Woodland as halophytic species such as Bower Spinach *Tetragonia implexicoma* and Seaberry Saltbush *Rhagodia candolleana* ssp. *candolleana* appear in the understorey near the coast. Where copses of old-growth Saw Banksia *Banksia serrata* occur, a dense ground cover of leaf litter can develop which inhibits herb diversity due to low light levels and possibly chemical influences. This situation represents the most species depauperate form of the group and approaches closely to the floristic composition of old-growth Heathy Woodland.

EVC 5 Coastal Sand Heathland

Coastal Sand Heathland is only recorded from some of the most exposed coastal areas of South Gippsland, especially on headlands where wind-stripped patterns are typically evident such as at the lighthouse and Tongue Point, Wilsons Promontory. It occurs on skeletal gravelly soils derived from granite. Elevation is up to 40m above sea level and annual average rainfall is 900-1000mm.

The structure is mostly an open or closed heath often less than 1m in height. Common shrubs are Sea Box *Alyxia buxifolia*, Coast Ballart *Exocarpos syrticola*, White Correa *Correa alba*, Dusty Miller *Spyridium parvifolium*, White Kunzea *Kunzea ambigua*, Coast Tea-tree *Leptospermum laevigatum*, Common Correa *Correa reflexa*, Prickly Moses *Acacia verticillata*, the vulnerable epacrid, Crimson Berry *Cyathodes juniperina*, Paper-flower *Thomasia petalocalyx*, Hop Goodenia *Goodenia ovata*, and Large-leaf Bush-pea *Pultenaea daphnoides*. Herbs present include White Everlasting *Chrysocephalum baxteri* and Bristly Wallaby-grass *Austrodanthonia setacea*

Coastal Sand Heathland merges into Coastal Headland Scrub where exposure is less extreme.

EVC 6 Sand Heathland

Sand Heathland develops on deep, infertile, uniform textured sands, and is most extensive in the Loch Sport area and on the lower slopes and flats at the base of the main mountain ranges at Wilsons Promontory. The low height of less than 5m reflects the poor fertility and physical limitations such as drought susceptibility of the loose sandy substrate. It is found at an elevation of 20-80m above sea level and average annual rainfall ranges from 450-1000mm.

Sand Heathland is typically low in stature with emergent scattered tall shrubs of Saw Banksia *Banksia serrata* and stunted mallee-like eucalypts such as Coast Manna Gum *Eucalyptus pryoriana*, Shining Peppermint *E. willisii* and Messmate *E. obliqua* usually dominating the landscape. The heathy understorey is dominated by the shrubs, Heath Tea-tree *Leptospermum myrsinoides*, Prickly Tea-tree *L. continentale*, Green Sheoke *Allocasuarina paradoxa*, Bushy Needlewood *Hakea decurrens* and Silver Banksia *Banksia marginata*. It also includes Common Heath *Epacris impressa*, Variable Bossiaea *Bossiaea heterophylla*, Showy Bossiaea *B. cinerea*, Smooth Parrot-pea *Dillwynia glaberrima*, Showy Parrot-pea *D. sericea*, Spike Wattle *Acacia oxycedrus*, Prickly Broom-heath *Monotoca scoparia*, Broom Spurge *Amperea xiphoclada*, Sweet Wattle *Acacia suaveolens*, Common Beard-heath *Leucopogon virgatus*, Horny Cone-bush *Isopogon ceratophyllus*, Common Correa *Correa reflexa* and Common Wedge-pea *Gompholobium huegelii*. Austral Grass-tree *Xanthorrhoea australis*, Wattle Mat-rush *Lomandra filiformis* and Thick Twist-rush *Caustis pentandra* are also commonly present.

Herbs and grasses are notably absent. The ground cover is typically dominated by Tassel Rope-rush *Hypolaena fastigiata* and often includes Sand-hill Sword-sedge *Lepidosperma concavum*, Dwarf Wire-lily *Laxmannia orientalis*, Tall Sundew *Drosera peltata* ssp. *auriculata*, Hairy Pink-bells *Tetradlea pilosa*, Spreading Guinea-flower *Hibbertia procumbens*, Prickly Guinea-flower *H. acicularis*,

Milkmaids *Burchardia umbellata* and Honey-pots *Acrotriche serrulata*.

EVC 7 Clay Heathland

Clay Heathland occurs on sites with impeded drainage derived from Tertiary and Quaternary outwash alluviums. The soil profile is usually duplex with the upper horizon having a pale bone colour, being a silty or clayey sand which overlies mottled yellow clays. The soils have a water impeding layer which often leads to the soil profile being sodden during winter and spring. Topographically, this community mainly occupies broad slopes or ridges with gentle gradients or shallow basins (Woodgate *et al.* 1994). It occurs on the Gippsland plains near Longford and in the Mullungdung State Forest. The elevation is 40-140m above sea level and average annual rainfall is 550-700 mm.

Silver-leaf Stringybark *Eucalyptus cephalocarpa* is usually present as a sparse low woodland overstorey and intergrades with Swamp Stringybark *E. conspicua* to the east. The understorey is variably shrubby and includes Scrub Sheoke *Allocasuarina paludosa*, Prickly Tea-tree *Leptospermum continentale*, Heath Tea-tree *L. myrsinoides*, Rough Bush-pea *Pultenaea scabra*, Burgan *Kunzea ericoides*, Smooth Parrot-pea *Dillwynia glaberrima*, and Common Heath *Epacris impressa*.

Clay Heathland is notably richer in graminoids than other sandy heathland EVCs. These species include Hairy Rice-grass *Tetrarrhena distichophylla*, Upright Panic *Entolasia stricta*, Reed Bent-grass *Deyeuxia quadriseta*, Pale Twig-sedge *Baumea acuta* and Zig-zag Bog-sedge *Schoenus brevifolius*.

EVC 8 Wet Heathland

Wet Heathland develops on poor fertility sands subject to poor drainage where the water table is at or near the surface for most of the year. It is found extensively at Wilsons Promontory and also in the South Gippsland area near Tarwin and Port Welshpool. Soils are variable, ranging from deep uniform black sand to sandy peat on dark reddish-brown (ironstone) cemented hardpan through to duplex profiles with a sandy grey-brown topsoil over a sandy-clay subsoil. Drainage is also highly variable from impeded under wet conditions to extreme when the sandy profile dries out completely. Elevation is low at 20-40m above sea level and average annual rainfall is 800-1000mm.

Wet Heathland is typically low in stature with trees of Coast Manna Gum *Eucalyptus pryoriana* and Bog Gum *Eucalyptus kitsoniana* (South Gippsland) being scattered through this heath although they are more common on the periphery. Dominant shrubs are Prickly Tea-tree *Leptospermum continentale*, Scrub Sheoke *Allocasuarina paludosa*, Slender/Green Sheoke *A. misera/paradoxa*, Common Heath *Epacris impressa*, Blunt-leaf Heath *E. obtusifolia*, Scented Paperbark *Melaleuca squarrosa*, Pink Swamp-heath *Sprengelia incarnata*, Coral Heath

Epacris microphylla, Rigid Bush-pea *Pultenaea stricta* and Smooth Parrot-pea *Dillwynia glaberrima*.

The ground cover includes Long Purple-flag *Patersonia occidentalis*, Creeping Raspwort *Gonocarpus micranthus* and Screw Fern *Lindsaea linearis*. Swamp Selaginella *Selaginella uliginosa*, Spreading Rope-rush *Empodisma minus*, Tall Yellow-eye *Xyris operculata* and Button Grass *Gymnoschoenus sphaerocephalus* are all good indicator species for this poor drainage group. Other species commonly present are Slender Bog-sedge *Schoenus lepidosperma*, Common Rapier-sedge *Lepidosperma filiforme*, Slender Twine-rush *Leptocarpus tenax*, and Austral Grass-tree *Xanthorrhoea australis*.

EVC 9 Coastal Saltmarsh

Coastal Saltmarsh is restricted to the low energy coastal flats subject to tides and periodic inundation by saltwater but not exposure to excessive wave action. It is widespread in the Gippsland Lakes area and the inlets of the South Gippsland coastline where saline poor drainage conditions occur. As this community is tide affected, the elevation is to 1m above sea level. Average annual rainfall varies from 550-900 mm.

Coastal Saltmarsh comprises several zones. The lowest and most frequently inundated zones are dominated by Beaded Glasswort *Sarcocornia quinqueflora*. The next most landward zone is herbs represented by Salt-grass *Distichlis distichophylla*, Creeping Brookweed *Samolus repens*, Shiny Swamp-mat *Selliera radicans*, Rounded Noon-flower *Disphyma crassifolium*, Creeping Monkey Flower *Mimulus repens*, Sea Celery *Apium prostratum* and Streaked Arrow-grass *Triglochin striata*. The most landward zone is dominated by Sea Rush *Juncus kraussii* and Chaffy Saw-sedge *Gahnia filum*.

EVC 10 Estuarine Wetland

Estuarine Wetland is usually found growing on anaerobic peat-rich muds in areas of poor drainage with intermediate salinity conditions, inland from saltmarsh. It occupies the estuarine equivalent to Swamp Scrub and is widespread along the estuarine coastline of the Gippsland Lakes and South Gippsland area, occurring on the edges of estuarine waterbodies such as creeks, rivers and lagoons. Rainfall is generally between 600-900 mm per annum and elevation is 0-1m above sea level.

Swamp Paperbark *Melaleuca ericifolia* and Common Boobialla *Myoporum insulare* dominate the scrub overstorey and often form a fringe on the edges of estuarine waterbodies. Occasional emergent trees of Forest Red Gum *Eucalyptus tereticornis* may be present in the lower rainfall areas adjacent to the Gippsland Lakes. These areas are typically near occurrences of Gippsland Plains Grassy Woodland.

As conditions become progressively more waterlogged, localised patches of halophytic herbland and rushland can occur with species

present including Common Reed *Phragmites australis* and Cumbungi *Typha* spp.

The groundcover often includes salt-adapted, succulent species such as Karkalla *Carpobrotus rossii*, Shiny Swamp-mat *Selliera radicans*, Seaberry Saltbush *Rhagodia candolleana*, Creeping Brookweed *Samolus repens*, Water Buttons *Cotula coronopifolia*, Coast Saltbush *Atriplex cinerea*, Sea Celery *Apium prostratum*, Goosefoot *Chenopodium* spp. and Beaded Glasswort *Sarcocornia quinqueflora*. The grasses, Australian Salt-grass *Distichlis distichophylla*, Blue Tussock-grass *Poa poiformis* and Common Tussock-grass *Poa labillardieri*, may also be found.

EVC 11 Coastal Lagoon Wetland

Coastal Lagoon Wetland occupies the margins of coastal freshwater lagoons that have formed behind the coastal dune barrier. Soils are humus-rich sands and silts that remain inundated for most of the year, occasionally being exposed over summer (Woodgate *et al.* 1994). This EVC is uncommon and is restricted to Wilsons Promontory where it occurs behind the coast dune along Five Mile Beach. Rainfall is 900mm per annum with the elevation being at or around sea level.

Coastal Lagoon Wetland has several zones dependant upon water depth and persistence of inundation. Within the lagoon itself where exposure is rare, the dominant species are Tall Spike-sedge *Eleocharis sphacelata*, Water-ribbons *Triglochin procerum* spp. agg. and Soft Twig-rush *Baumea rubiginosa*. On the more frequently exposed lagoon margin the species diversity increases and may include such species as Jointed Twig-rush *Baumea articulata*, Leafy Twig-rush *Cladium procerum*, Running Marsh-flower *Villarsia reniformis*, Swamp Club-sedge *Isolepis inundata*, and Common Reed *Phragmites australis*. On the lagoon margin the vegetation begins to merge into Riparian Scrub as indicated by the presence of Swamp Paperbark *Melaleuca ericifolia*, Scented Paperbark *M. squarrosa*, Tall Saw-sedge *Gahnia clarkei* and Forest Bindweed *Calystegia marginata*. Scrambling Coral-fern *Gleichenia microphylla* often scrambles through this scrub (Woodgate *et al.* 1994).

EVC 12 Wet Swale Herbland

Wet Swale Herbland is restricted to seasonally inundated dune swales in the north-western area of Wilsons Promontory where it occurs on Quaternary peaty siliceous sands. Average annual rainfall is 900 mm and elevation is approximately 15-20m above sea level.

This EVC typically consists of a rushland dominated by *Juncus* spp. but also includes a suite of introduced herbaceous species perhaps reflecting the history of cattle grazing in these areas. Other species present are *Oxalis* spp, Angled Lobelia *Lobelia alata*, Kidney-weed *Dichondra repens*, Ribwort *Plantago lanceolata*, Clover *Trifolium* spp, Knobby Club-sedge *Isolepis nodosa*, Hairy Hawkbit *Leontodon taraxacoides*, Yorkshire

Fog *Holcus lanatus*, Bidgee-widgee *Acaena novae-zelandiae* and Self-heal *Prunella vulgaris*.

EVC 15 Limestone Box Forest

Floristic Community:

15-01 *Gippsland Lakes* Limestone Box Forest
Gippsland Lakes Limestone Box Forest occurs in the Gippsland Lakes area, including the Tambo Valley below Bruthen and the coastal area from Paynesville east to near Lakes Entrance. It often occurs on fertile soils derived from terra-rossa Tertiary limestone. It is found at elevations of around 170m above sea level and rainfall is approximately 700mm per annum. The fertile, yet relatively dry environment gives rise to a shrubby and herb-rich understorey. There are also unique species indicative of the limestone geology such as Limestone Pomaderris (Rr) *Pomaderris oraria* ssp. *calpicola* and Limestone Blue Wattle *A. caerulescens*.

The overstorey is dominated by Blue Box *Eucalyptus baueriana*, Coast Grey-box *E. bosistoana* and Gippsland Blue Gum *E. globulus* ssp. *pseudoglobulus*, with Forest Red Gum *E. tereticornis* dominating in the Paynesville area. Other occasional eucalypts include River Peppermint *E. elata* and Mountain Grey Gum *E. cypellocarpa*. Black Wattle *Acacia mearnsii* and Blackwood *A. melanoxylon* are small understorey trees.

The understorey carries a dense shrub layer, including Sweet Pittosporum *Pittosporum undulatum*, Drooping Sheoke *Allocasuarina verticillata*, Viscid Daisy-bush *Olearia viscosa*, Cherry Ballart *Exocarpos cupressiformis* Hop Goodenia *Goodenia ovata*, Sweet Bursaria *Bursaria spinosa*, Prickly Currant-bush *Coprosma quadrifida*, Common Correa *Correa reflexa*, Coast Beard-heath *Leucopogon parviflorus*, Bootlace Bush *Pimelea axiflora*. Halophytic species such as Bower Spinach *Tetragonia implexicoma*, Common Boobialla *Myoporum insulare*, and Seaberry Saltbush *Rhagodia candolleana* are also present in sites subject to occasional salt spray in coastal areas. In the driest sites such as west-facing gravelly clay banks on Tambo Bluff, the vegetation is dominated by Drooping Sheoke *Allocasuarina verticillata* rather than Coast Grey Box *Eucalyptus bosistoana*.

The ground layer is rich in forbs and grasses. Common forbs include Kidney-weed *Dichondra repens*, Spear Thistle *Cirsium vulgare*, Bidgee-widgee *Acaena novae-zelandiae*, Common Bitter-cress *Cardamine hirsuta*, Common Mouse-ear Chickweed *Cerastium glomeratum*, Wandering Bedstraw *Galium migrans*, Cat's Ear *Hypochoeris radicata*, Grassland Wood-sorrel *Oxalis perennans*, Variable Groundsel *Senecio pinnatifolius*, Common Sow-thistle *Sonchus oleraceus* and Trailing Speedwell *Veronica plebeia*. Common grasses include Common Wheat-grass *Elymus scabrus*, Yorkshire Fog *Holcus lanatus*, Weeping Grass *Microlaena stipoides*, Long-leaf Wallaby-grass *Notodanthonia longifolia*, Kangaroo Grass

Themeda triandra, Grey Tussock-grass *Poa sieberiana* and Common Tussock-grass *P. labillardierei*. Sickie Fern *Pellaea falcata* is the only common fern.

EVC 16 Lowland Forest

Lowland Forest is a very widespread and floristically diverse dry forest vegetation type that is found across the lowland plains from East Gippsland to the western edge of the study area. It typically develops on Tertiary and Quaternary deposits of clay, sand and gravel of moderate fertility. The understorey varies from shrubby to heathy to sedgy and may even be grassy as fertility increases and the group merges into Gippsland Plains Grassy Woodland. With decreasing fertility the group merges into Heathy Woodland through to Sand Heathland.

It occurs mostly in the low rainfall areas but is also found in areas of intermediate rainfall where it occupies the dry aspects and dry crests where incident radiation is greatest. In these areas Damp Forest develops immediately downslope where sufficient topographic protection is available.

The core type is associated with clay soils but an outlier of sandy surface deposits also occurs. To aid identification of this group a range of vegetation types need to be described, ranging from where the group floristically approaches Damp Forest (at the wettest end of the group) and Herbrich Foothill Forest through to the driest forms. A number of other types also need to be described through a drainage gradient ranging from sites with impeded drainage (on the margins of Wetland, Sedge Wetland, Swamp Scrub and Clay Heathland) through to well-drained sites associated with a well-drained, sandy soil form which has affinities with Heathy Woodland.

There are five floristic communities of Lowland Forest: *Strzeleckis* Lowland Forest, *Wilson's Promontory* Lowland Forest, *Depauperate* Lowland Forest, *Gippsland Plains* Lowland Forest and *Latrobe Valley* Lowland Forest.

Floristic Community:

16-03 *Strzeleckis* Lowland Forest

This floristic community occurs on the Tertiary deposits in the Mirboo North area of the *Strzeleckis*. Average annual rainfall is in the vicinity of 1000mm and elevation is 200-250m above sea level.

Strzeleckis Lowland Forest is commonly dominated by Messmate *Eucalyptus obliqua* and Mountain Grey Gum *E. cyphellocarpa*, but a range of other eucalypts may dominate or be present. This includes Yellow Stringybark *E. muelleriana*, Silver-top *E. sieberi*, Narrow-leaf Peppermint *E. radiata*, Yertchuck *E. considiana* and Swamp Gum *E. ovata* in poorer drained areas.

The understorey is typically dry in character and includes a range of shrubby wattle species such as Varnish Wattle *Acacia verniciflua*, Prickly Moses *A.*

verticillata, Hop Wattle *A. stricta* and Narrow-leaf Wattle *A. mucronata*. Other shrubs often present are Hop Goodenia *Goodenia ovata*, Snow Daisy Bush *Olearia lirata*, *Cassinia* sp., Bracken *Pteridium esculentum*, and the prickly-leaved shrubs such as Prickly Tea-tree *Leptospermum continentale*, Prickly Bush Pea *Pultenaea juniperina* and Common Heath *Epacris impressa*. Wire-grass *Tetrarrhena juncea* and tussocks of Tussock-grass *Poa* sp. are also present. Thatch Saw-sedge *Gahnia radula*, is also found and is sometimes locally dominant. Common groundcover species include Ivy-leaf violet *Viola hederacea*, Common Lagenifera *Lagenifera stipitata*, and Small St John's Wort *Hypericum gramineum*.

Two species with a high fidelity but low overall frequency to the group are Hairpin Banksia *Banksia spinulosa* var. *cunninghamii* and Bushy Hakea *Hakea decurrens* (sensu Willis 1972).

Floristic Community:

16-06 *Wilson's Promontory* Lowland Forest

Wilson's Promontory Lowland Forest is a dry forest vegetation type that typically develops on soils with moderate fertility derived from Devonian granite.

It occurs mostly in the low rainfall areas but also occurs in areas of intermediate rainfall, where it occupies the dry aspects and dry crests where incident radiation is greatest. In these areas Damp Forest develops immediately downslope where sufficient topographic protection is available.

The group is typically dominated by Messmate *Eucalyptus obliqua*, and includes a range of shrubs in the understorey including Silver Banksia *Banksia marginata*, Hairpin Banksia *Banksia spinulosa*, Bushy Needlewood *Hakea decurrens*, Prickly Moses *Acacia verticillata*, Rough Guinea-flower *Hibbertia aspera*, Common Heath *Epacris impressa*, White Kunzea *Kunzea ambigua*, and Hop Goodenia *Goodenia ovata*. Other species often present are Variable Sword-sedge *Lepidosperma laterale*, Common Apple-berry *Billardiera scandens*, Butterfly Flag *Diplarrena moraea*, Austral Bracken *Pteridium esculentum*, Shade Raspwort *Gonocarpus humilis*, Broom Spurge *Amperea xiphoclada*, Forest Wire Grass *Tetrarrhena juncea*, and Ivy-leaf Violet *Viola hederacea*.

Floristic Community:

16-12 *Depauperate* Lowland Forest

Depauperate Lowland Forest typically develops on infertile, deep, well-drained sands that have been subjected to a high fire frequency resulting in a dense but floristically depauperate Bracken *Pteridium esculentum* understorey. It is therefore closely related, floristically, to Heathy Woodland and may also have affinities with the heathy end of Lowland Forest.

It is recorded in low rainfall areas of less than 600mm per annum associated with Quaternary and Tertiary deposits of sand across the Gippsland Plains and South Gippsland. Many small areas are

found in and near the Providence Ponds Flora Reserve.

The group is typically dominated by White Stringybark *Eucalyptus globoidea*, Yertchuk *E. considiana* and Narrow-leaf Peppermint *E. radiata* or the closely-related Gippsland Peppermint *E. croajingolensis*. A tall, shrub stratum may be present that includes scattered individuals of Saw Banksia *Banksia serrata* and Black Wattle *Acacia mearnsii* but this may be eliminated by extreme fire frequencies. The understorey is dominated by Bracken *Pteridium esculentum*.

Floristic Community:

16-13 *Gippsland Plains Lowland Forest*
Gippsland Plains Lowland Forest is only recorded from the pre-1750 mapping project. It would have occurred on the Tertiary and early Pleistocene terraces of the Perry land system, often in a mosaic with Damp Sands Herb-rich Woodland on the plains south and west of Moormung State Forest. This depleted floristic community is only found today in a few road reserves in the area where it has been mapped as Depauperate Lowland Forest due to a high fire frequency over time resulting in a very species depauperate understorey. Soils consist of aeolian and marine sands of low dunes with a clay base which can be penetrated by shrub and tree roots. Elevation is in the range of 5 to 120m above sea level and annual average rainfall is approximately 550-700 mm.

This floristic community would have had an overstorey dominated by White Stringybark *Eucalyptus globoidea* and But But *E. bridgesiana* with a dense understorey of smaller trees and shrubs including Blackwood *Acacia melanoxylon*, Lightwood *A. implexa*, Silver Wattle *A. dealbata*, Spike Wattle *A. oxycedrus*, Shiny Cassinia *Cassinia longifolia*, Hop Bitter-pea *Daviesia latifolia*, Burgan *Kunzea ericoides*, Silver Banksia *Banksia marginata* (tree-form), Purple Coral-pea *Hardenbergia violacea* and Smooth Parrot-pea *Dillwynia glaberrima*. A dense ground cover of bracken, grasses and forbs would have included Austral Bracken *Pteridium esculentum*, Grey Tussock-grass *Poa sieberiana*, Kangaroo Grass *Themeda triandra*, Weeping Grass *Microlaena stipoides*, Common Raspwort *Gonocarpus tetragynus*, Germander Raspwort *G. teucroides*, Small Poranthera *Poranthera microphylla*, Common Lagenifera *Lagenifera stipitata* and *Glycine* spp. Thatch Saw-sedge *Gahnia radula*, Spiny-headed Mat-rush *Lomandra longifolia* and Wattle Mat-rush *L. filiformis* would also have been present.

Floristic Community:

16-15 *Latrobe Valley Lowland Forest*
Latrobe Valley Lowland Forest is found across the Gippsland plains but includes areas south of Traralgon at Gormandale. It grows on loose, light-grey to white sandy topsoil over a cemented gravel, clay or sand subsoil. The sandy topsoil promotes the occurrence of various heathy understorey species which reflects a floristic association with

Heathy Woodland. Average annual rainfall is 800-900 mm and elevation is 180-220m above sea level.

The overstorey is usually dominated by Yertchuk *E. considiana*, Narrow-leaf Peppermint *E. radiata* but *E. obliqua* and *E. viminalis* ssp. *pryoriana* may also be present.

Species in the shrub layer include Sunshine Wattle *Acacia terminalis*, Burgan *Kunzea ericoides*, Showy Bossiaea *Bossiaea cinerea*, Prickly Tea-tree *Leptospermum continentale*, Common Heath *Epacris impressa*, Snow Daisy-bush *Olearia lirata*, Broom Spurge *Amperea xiphoclada* and scattered Saw Banksia *Banksia serrata*.

The ground layer includes dense Austral Bracken *Pteridium esculentum* in addition to Common Raspwort, *Gonocarpus tetragynus*, Thatch Saw-sedge *Gahnia radula* and Tussock-grass *Poa* sp.

EVC 17 Riparian Scrub

Riparian Scrub typically occupies the poor drainage areas along creeks, small rivers and flats on shallow to deep acidic, peaty or sandy soils. It is widespread at Wilsons Promontory and in the lower rainfall areas of Gippsland such as Holey Plains State Park, Mullungdung and Won Wron State Forests. It is floristically close to Wet Heathland which tends to be lower in stature (less than 2m in height) and more diverse in composition. Average annual rainfall is in the vicinity of 600-900 mm and elevation ranges from sea level to 80m.

The scrub is dominated by Scented Paperbark *Melaleuca squarrosa* but Swamp Paperbark *Melaleuca ericifolia*, Prickly Moses *Acacia verticillata* and Woolly Tea-tree *Leptospermum lanigerum* are also locally dominant with thickets of Tall Sword-sedge *Gahnia clarkei*, Red-fruit Sword-sedge *G. sieberiana*, and Scrambling Coral-fern *Gleichenia microphylla*. Emergent trees of Swamp Gum *Eucalyptus ovata* may also be present.

Riparian Scrub often occurs on the margins of wetlands and Wet Heathland and therefore often includes a suite of wetland herb species such as Running Marsh-flower *Villarsia reniformis*, the sedges, Pithy Sword-sedge *Lepidosperma longitudinale* and Square Twig-sedge *Baumea tetragona*, and the Tassel Cord-rush *Restio tetraphyllus*. Patches of *Sphagnum* moss are also often found.

EVC 18 Riparian Forest

Riparian Forest is widespread but relatively uncommon in the study area. It is a tall forest which develops on Quaternary alluviums on river flats, alluvial terraces and on perennial streams along the major rivers within the study area and in association with other riparian EVCs such as Riparian Shrubland and Riverine Escarpment Scrub. Within the study area it occurs in moderate rainfall zones of 700-1000mm and across a broad altitudinal range from the Gippsland Plains to sub-montane levels.

The overstorey is dominated by Manna Gum *Eucalyptus viminalis* though a range of other eucalypts from adjacent vegetation may be present such as Messmate *E. obliqua*. In the Mt. Elizabeth area Mountain Grey Gum *E. cytellocarpa* and Gippsland Peppermint *E. croajingolensis* dominate in conjunction with Manna Gum and occasionally White Stringybark *E. globoidea*. Tree-form Silver Wattle *Acacia dealbata*, Blackwood *A. melanoxylon* and occasionally Blue Oliveberry *Elaeocarpus reticulatus* form a sparse sub-dominant stratum.

A diversity of tall shrubs, also common to Wet or Damp Forest, form a major component in the understorey including Hazel Pomaderris *Pomaderris aspera*, Victorian Christmas-bush *Prostanthera lasianthos*, Elderberry *Panax Polyscias sambucifolia*, Burgan *Kunzea ericoides*, Bootlace Bush *Pimelea axiflora*, and Prickly Currant-bush *Coprosma quadrifida*. Rough Tree-fern *Cyathea australis* is also often present. More unusual species common to the Mt. Elizabeth area include Wallaby Bush *Beyeria lasiocarpa*, Silky Golden-tip *Goodia lotifolia* var. *pubescens* and Blue Howittia *Howittia trilocularis*.

The ground layer is generally diverse in both species and life forms. Due to the constant supply of water and, in many cases shade, ground ferns form a major component of Riparian Forest, often lining the stream-banks and are dispersed across the flats in moister sites. Common ferns include Fishbone Water-fern *Blechnum nudum*, Gristle Fern *B. cartilagineum*, Soft Water-fern *B. minus*, Common Rasp-fern *Doodia media*, Common Maidenhair *Adiantum aethiopicum*, Necklace Fern *Asplenium flabellifolium*, Mother Shield-fern *Polystichum proliferum* and Common Ground-fern *Calochlaena dubia*. Austral Bracken *Pteridium esculentum* is present in drier sites.

Sedges are also a distinctive feature of Riparian Forest, occupying the stream-bank and may be partially submerged. They include Short-stem Sedge *Carex breviculmis*, Swamp Club-sedge *Isolepis inundata*, Tall Sedge *Carex appressa*, Variable Sword-sedge *Lepidosperma laterale*, Common Bog-sedge *Schoenus apogon*, Mountain Club-sedge *Isolepis subtilissima*, Common Woodrush *Luzula meridionalis* and Leafy Bog-sedge *Schoenus maschalinus* is also commonly found along the stream banks.

Grasses are not prominent in terms of cover and include Common Tussock Grass *Poa labillardieri*, Weeping Grass *Microlaena stipoides*, Common Hedgehog-grass *Echinopogon ovatus* Sword Tussock-grass *P. ensiformis* and Forest Wire-grass *Tetrarrhena juncea*, which is generally uncommon in the Central Gippsland area. Forbs are particularly abundant and make up nearly half of the species diversity for this EVC. These include Cinquefoil Cranesbill *Geranium potentilloides*, Ivy-leaf Violet *Viola hederacea*, Bidgee-widgee *Acaena novae-zelandiae*, Kidney Weed *Dichondra repens*, Grassland Wood-sorrel *Oxalis perennans* and

Austral Brooklime *Gratiola peruviana*. Several herbaceous weeds are very common including Cat's Ear **Hypochoeris radicata*, Common Centaury **Centaureum erythraea*, Spear Thistle **Cirsium vulgare*, Self Heal **Prunella vulgaris*, Common Mouse-ear Chickweed **Cerastium glomeratum* and Common Sow-thistle **Sonchus oleraceus*.

In the Mt. Elizabeth area there is a high proportion of climbers and scramblers. Forest Clematis *Clematis aristata* and Blackberry *Rubus fruticosus* spp. agg. are the most common, although several others including Small-leaf Bramble *Rubus parvifolius*, Wombat Berry *Eustrephus latifolius* and Austral Sarsparilla *Smilax australis* are relatively abundant.

Riparian Forest has similarities with River Flat Dry Valley Forest, however the latter occurs in a much drier environment along perennial and ephemeral streams on alluvial terraces and lacks tree-ferns and moisture-requiring ferns common to Riparian Forest.

Riparian Forest is prone to weed invasion largely due to its fertile soils, abundant supply of water and the history of human and recurrent natural disturbance. Due to clearing for agriculture and the concentration or various forms of disturbance along rivers and creeks such as mining and grazing, very few undisturbed examples remain.

EVC 19 Riparian Shrubland

Floristic Community:

19-02 Gippsland Riparian Shrubland
Gippsland Riparian Shrubland is found growing on river beds of major flowing streams. It is subject to flooding disturbance, resulting in patches of open ground where many weed species thrive. Long periods without flooding results in a dense shrubland along the stream bank. Soils range from deep infertile coarse sands and gravels to skeletal soils developed on bedrock. It is confined to the major rivers and streams in Central Gippsland, ranging from foothill to montane elevations. Average annual rainfall also varies from 650mm to over 1000 mm.

Riparian Shrubland is treeless, with overhang from various eucalypts including Yellow Box *Eucalyptus melliodora* which is often present in the surrounding EVCs, River Peppermint *E. elata*, White Stringybark *E. globoidea*, Manna Gum *E. viminalis*, Black Wattle *Acacia mearnsii*, Blackwood *A. melanoxylon* and Silver Wattle *A. dealbata*.

Shrubs which can withstand frequent flooding or can regenerate rapidly after flooding are the dominant feature of Riparian Shrubland, often forming dense thickets along the stream's edge. The most common shrub is Burgan *Kunzea ericoides*, forming dense monocultural thickets in some instances and occurring with a variety of other shrubs. These include Woolly Tea-tree *Leptospermum lanigerum*, Slender Tea-tree *L. brevipes*, River Tea-tree *L. obovatum*, River Bottlebrush *Callistemon sieberi*, Swamp Paperbark

Melaleuca ericifolia, Prickly Moses *A. verticillata*, Snow Daisy-bush *Olearia lirata*, River Lomatia *Lomatia myricoides*, Large-leaf Hickory Wattle *Acacia falciformis*, White Sallow-wattle *A. floribunda*, Wallaby-bush r *Beyeria lasiocarpa*, Sweet Bursaria *Bursaria spinosa*, Common Fringe-myrtle *Calyx tetragona*, Shiny Cassinia *Cassinia longifolia*, Long-leaf Wax-flower *Eriostemon myoporoides* ssp. *myoporoides*, Wallaby-bush r *Beyeria lasiocarpa* and Hazel Pomaderris *Pomaderris aspera*. Basket Willow **Salix X rubens* and Blackberry **Rubus fruticosus* spp. agg. are also present.

Sedges and rushes common to riparian environments which are present include Spiny-headed Mat-rush *Lomandra longifolia*, Tall Sword-sedge *Lepidosperma elatius*, Variable Sword-sedge *L. laterale*, Tailed Rapier-sedge *L. urophorum*, Drain Flat-sedge **Cyperus eragrostis*, Common Reed *Phragmites australis* and Rushes *Juncus* spp.

An array of herbs and grasses including many ephemeral weed and native species survive on the bare sands or in rock crevices. Commonly found are White Willow **Salix alba*, Indian Weed **Sigesbeckia orientalis*, Club-sedges *Isolepis* spp., Self-heal *Prunella vulgaris*, Cat's Ear **Hypochoeris radicata*, Tall Fleabane **Conyza bonariensis*, Ribwort **Plantago lanceolata*, Sheep Sorrel *Acetosella vulgaris*, Pimpernel **Anagallis arvensis*, Slender Thistle **Carduus tenuiflorus*, Spear Thistle **Cirsium vulgare*, Cleavers **Galium aparine*, Curled Dock **Rumex crispus* and Blue Periwinkle **Vinca major*.

A few native herbs are present which include Golden Everlasting *Bracteantha bracteata*, Kidney-weed *Dichondra repens*, Hairy Pennywort *Hydrocotyle hirta*, Water Pimpernel r *Samolus valerandii*, Tussock Grass *Poa australis* spp. agg. and Trailing Speedwell *Veronica plebeia*. Green Rock Fern *Cheilanthes austrotenuifolia* and Water-ferns *Blechnum* spp. are the commonly occurring ferns.

EVC 20 Heathy Dry Forest

Heathy Dry Forest occurs north of the Great Dividing Range, with minimal occurrences to the south. It grows on exposed north and north-western slopes, at a range of elevations to sub-montane levels. Although it occurs in areas with rainfall ranging between 700-1300mm per annum, shallow, often rocky soils, on steep slopes and combined with exposed aspects result in a low effective rainfall. The understorey is dominated by a low, sparse to dense layer of ericoid-leaved shrubs including heaths and peas. The overstorey is often low in height, poor in form with an open crown cover and may be woodland-like in appearance. Heathy Dry Forest is sensitive to repeated fires at short intervals as seed from the proteaceous shrubs are not stored in the soil and many other species require longer fire intervals to successfully set seed, thus repeated burning

results in a loss of diversity of these species and an increase in opportunistic species that are favoured by frequent, repeated burning such as *Daviesia* spp.

There are three floristic communities of Heathy Dry Forest: *Gippsland 1* Heathy Dry Forest, *Exposed Slopes* Heathy Dry Forest and *Gippsland 2* Heathy Dry Forest.

Floristic Community:

20-01 *Gippsland 1* Heathy Dry Forest
Gippsland 1 Heathy Dry Forest occurs within an elevation range of 730-1100m above sea level. Although it grows in areas with high rainfall (ranging between 1000-1300mm.per annum), effective rainfall is low due to the drier exposed aspects and the relatively shallow soils it occurs on.

The overstorey is often dominated by Broad-leaved Peppermint *Eucalyptus dives* and Brittle Gum *E. mannifera*, whilst Narrow-leaved Peppermint *E. radiata* s.l., Red Stringybark *E. macrorhyncha* and Candlebark *E. rubida* may also be present. A diversity of other eucalypts may be present, probably overlapping from adjacent EVCs.

Silver Wattle *Acacia dealbata* is a common and usually dominant feature of the taller understorey shrub layer, other common shrubs including Gorse Bitter-pea *Daviesia ulicifolia*, Handsome Flat-pea *Platylobium formosum* and Prickly Bush-pea *Pultenaea forsythiana*. These overhang a lower shrub layer of Broom Heath *Monotoca scoparia*, Grey Guinea-flower *Hibbertia obtusifolia*, Cluster Geebung *Persoonia confertiflora*, Small-leaved Parrot-pea *Dillwynia phyllicoides* and Dwarf Geebung *Persoonia chamaepeuce*.

Graminoids are frequently present, but do not provide much cover. Spiny-headed Mat-rush *Lomandra longifolia* and Grass Trigger-plant *Stylidium graminifolium* are frequently found in the ground layer, in addition to the grasses Red-anther Wallaby-grass *Joycea pallida* and Grey Tussock-grass *Poa sieberiana*. Tasman Flax-lily *Dianella tasmanica* occurs in a majority of sites and is indicative of the high level of precipitation. Forbs are not commonly present, with the exception of Common Raspwort *Gonocarpus tetragynus*.

Floristic Community:

20-02 *Exposed Slopes* Heathy Dry Forest
Exposed Slopes Heathy Dry Forest occurs on exposed western and northern slopes, at altitudes ranging from 620-1100m above sea level. As with the previous group effective rainfall is low although annual rainfall ranges from 900-1300mm, due to its occurrence on exposed aspects, with shallow rocky soils. The low site quality associated with *Exposed Slopes* Heathy Dry Forest results in a low open forest to woodland structure.

The overstorey is dominated by Brittle Gum *Eucalyptus mannifera* and Red Stingybark *E. macrorhyncha* ssp. *macrorhyncha* forming an open

forest to woodland. Broad-leaved Peppermint *E. dives* and Long-leaved Box *E. goniocalyx/hortonii* are sub-dominant.

The shrub layer is often well developed and diverse. Tall shrubs such as Shiny Cassinia *Cassinia longifolia* and Pale-fruit Ballart *Exocarpos strictus* may be scattered above a dense, species rich layer of smaller shrubs. Peas and ericoid shrubs dominate, with Daphne Heath *Brachyloma daphnoides*, Pink Beard-heath *Leucopogon ericoides*, Handsome Flat-pea *Platylobium formosum*, Small-leaf Parrot-pea *Dillwynia phyllicoides*, Showy Parrot-pea *D. sericea*, Hop Bitter-pea *Daviesia latifolia* and Common Hovea *Hovea linearis* the most common. Other narrow leaved shrubs include Grey Guinea-flower *Hibbertia obtusifolia*, Slender Rice-flower *Pimelea linifolia*, Ploughshare Wattle *Acacia gunnii* and Cluster-flower Geebung *Persoonia confertiflora*.

The scattered and sparse ground layer comprises Black-anther Flax-lily *Dianella revoluta*, Spiny-headed Mat-rush *Lomandra longifolia*, Red-anther Wallaby-grass *Joycea pallida*, Wattle Mat-rush *Lomandra filiformis* and Grass Trigger-plant *Stylidium graminifolium*. Mesic forbs may be present but contribute little to the overall cover of the ground layer. No ferns have been recorded in Exposed Slopes Heathy Dry Forest.

Floristic Community:

20-10 Gippsland 2 Heathy Dry Forest

Gippsland 2 Heathy Dry Forest is undersampled, and more data is required to more adequately define species composition. Generally, it occurs within an elevation range of 400-900m above sea level and a medium to high rainfall range of 700-1300mm. This community occurs on deeper soils than the other Heathy Dry Forest communities, thus forming a taller forest, with the shrub and ground layers also reflecting the increased moisture and fertility. This floristic community has affinities with Lowland Forest.

The overstorey is dominated by Broad-leaved Peppermint *Eucalyptus dives*. Mountain Grey Gum *E. cypellocarpa*, Messmate *E. obliqua* and Narrow-leaved Peppermint *E. radiata* s.l. may form a mixed forest with *E. dives*.

Silver Wattle *Acacia dealbata* is also common and usually a dominant feature of the taller understorey shrub layer which includes a diverse array of species including Narrow-leaved Bitter-pea *Daviesia leptophylla*, Handsome Flat-pea *Platylobium formosum* and Common Cassinia *Cassinia aculeata* as the most common. A diverse smaller shrub layer includes Prickly Broom-heath *Monotoca scoparia*, Honey-pots *Acrotriche serrulata*, Common Heath *Epacris impressa* and Cluster-flowered Geebung *Persoonia confertiflora*.

Austral Bracken *Pteridium esculentum*, Spiny-headed Mat-rush *Lomandra longifolia*, Tussock Grass *Poa australis* spp. agg., Common Raspwort

Gonocarpus tetragynus, Black-anther Flax-lily *Dianella revoluta*, Tasman Flax-lily *D. tasmanica* and Ivy-leaf Violet *Viola hederacea* have been recorded in the ground layer.

EVC 21 Shrubby Dry Forest

Within the study area, Shrubby Dry Forest is widely distributed from north of Morwell to the eastern boundary, along the footslopes and extends to sub-montane levels. Although the elevation range is generally between 240-550m above sea level, it has been observed in the field up to 1000m on more exposed aspects. Rainfall ranges between 700-1000mm per annum, however the effective rainfall is much lower due to low environmental site quality as it occurs on shallow, rocky soils of Carboniferous or Ordovician marine sediments and on northern and western ridge tops. Low environmental site quality also results in low biomass.

As the understorey is dominated by an abundance of shrubs which are capable of regeneration after frequent burning Shrubby Dry Forest is considered to be relatively resilient to frequent burning, however species diversity will decrease with higher fire frequencies.

Shrubby Dry Forest is characterised by a diversity and variability in the overstorey eucalypts. The overstorey is similar to that of Lowland Forest although there is more emphasis on eucalypts of drier habitats. Red Stringybark *Eucalyptus macrorhyncha* occurs most frequently in addition to Silvertop Ash *E. sieberi* and White Stringybark *E. globoidea*. Slightly less frequent are Red Box *E. polyanthemos* var. *vestita*, Apple Box *E. bridgesiana* or *E. angophorooides* and Mountain Grey Gum *E. cypellocarpa*. Sites dominated by Red Stringybark and White Stringybark are low to moderate in height, whereas sites containing tall Silvertop Ash indicate a higher environmental site quality. Broad-leaved Peppermint *Eucalyptus dives* and Narrow-leaved Peppermint *E. radiata* may occasionally be present.

The shrub layer is particularly well-developed. The medium shrub layer carries few distinctive species. Shiny Cassinia *Cassinia longifolia*, Sunshine Wattle *Acacia terminalis* and Narrow-leaved Bitter-pea *Daviesia leptophylla* are most abundant and usually form a moderate to dense cover. The smaller shrub layer is more distinctive and usually well developed but may in some cases be depleted and sparse due to fire history. Grey-leaf Guinea-flower *Hibbertia obtusifolia* is the most frequent small shrub with other common species including White Marianth *Rhytidosporum procumbens*, Common Heath *Epacris impressa*, Broom Heath *Monotoca scoparia*, Daphne Heath *Brachyloma daphnoides* and Cluster Persoonia *Persoonia confertiflora*.

The ground layer, although sometimes sparse due to frequent fire or low environmental site quality, is usually well developed. Tussock-forming graminoids are the dominant life form in the ground

layer. The most conspicuous species are Wattle Mat-rush *Lomandra filiformis*, Spiny-headed Mat-rush *Lomandra longifolia*, Black-anther Flax-lily *Dianella revoluta*, Variable Sword-sedge *Lepidosperma laterale* and Nodding Blue Lily *Stypandra glauca*. Grey Tussock-grass *Poa sieberiana* and Red-anther Wallaby-grass *Joycea pallida* are variable in their occurrence, ranging from scattered, occasional tussocks to forming a complete ground cover. The rhizomatous Weeping Grass *Microlaena stipoides*, although abundant in some locations, usually only occurs as small isolated plants that are stunted, often only a few centimetres tall.

There is a paucity of dicotyledonous herbs. Common Raspwort *Gonocarpus tetragynus* is common but only occurs as scattered and usually stunted individuals. Other forbs occur throughout but rarely contribute significantly to the overall structure or biomass. These include Small Poranthera *Poranthera microphylla*, Ivy-leaved Violet *Viola herderacea*, Rough Bedstraw *Galium gaudichaudii*, Small St. John's Wort *Hypericum gramineum* and Cotton Groundsel *Senecio quadridentatus*.

EVC 22 Grassy Dry Forest

Floristic Community:

22-04 *Gippsland* Grassy Dry Forest
Gippsland Grassy Dry Forest occurs on fertile geologies, at low elevations and is often associated with rainshadow valleys. The annual rainfall range is 650–900 mm and elevation is 150–500m above sea level. It has been mapped in the valleys of the Tambo, Mitchell, Wentworth, Wonnangatta, Avon and Macallister Rivers. It is often found in association with grassy woodlands on the Wonnangatta and Tambo Rivers, occurring upslope on steeper terrain. Floristically it is characterised by a high cover of grasses and forbs with a suite of ferns, but lacks a diverse shrub layer.

Yellow Box *Eucalyptus melliodora* is the dominant overstorey tree, with Red Box *E. polyanthemos*, Red Stringybark *E. macrorrhyncha* and But But *E. bridgesiana* occurring as sub-dominants. Yellow Box is most common in the transition zone between Grassy Dry Forest and the Grassy Woodlands whilst Red Box and Red Stringybark tend to dominate further up-slope.

Below the eucalypt layer *Gippsland* Grassy Dry Forest is characterised by a layer of smaller trees including Black Wattle *Acacia mearnsii*, Silver Wattle *A. dealbata*, Large-leaf Hickory Wattle *A. falciformis* and Blackwood *A. melanoxylon*. These small trees are indicative of Grassy Dry Forest across Victoria.

The shrub layer is neither diverse nor dense, with Shiny Cassinia *Cassinia longifolia* the most common along with Burgan *Kunzea ericoides*, Austral Indigo *Indigofera australis* and the shorter Grey Guinea-flower *Hibbertia obtusifolia* also present.

Ferns are a notable inclusion in this floristic community of Grassy Dry Forest. The species present are indicative of drier environments and include Green Rock Fern *Cheilanthes austrotenuifolia*, Necklace Fern *Asplenium flabellifolium* and Sickle Fern *Pellea falcata* var. *falcata*. They are common but sparse within the ground layer. In contrast, *Pellea falcata* var. *falcata* may locally form dense mats. Bracken *Pteridium esculentum* is sometimes present and usually scattered but may form a complete layer, particularly on Carboniferous mudstones in the presence of disturbance, especially fire.

The ground layer carries a diversity of graminoids and herbs that thrive in open, well-drained and moist sites. Tussock Grasses *Poa* spp. are the most common taxa, Weeping Grass *Microlaena stipoides* occurs in inter-tussock spaces and Kangaroo Grass *Themeda triandra*, Plume-grass *Dichelachne* spp. and Bent-grass *Deyeuxia* spp. are commonly present. Spiny-headed Mat-rush *Lomandra longifolia* and Variable Sword-sedge *Lepidosperma laterale* are conspicuous, often forming an open sward. Nodding Blue-lily *Stypandra glauca* occurs at the drier, more rocky sites.

Dicotyledon forbs are abundant and fill the inter-tussock spaces including Hairy Pennywort *Hydrocotyle hirta*, Cinquefoil Cranesbill *Geranium potentilloides*, Cat's Ear *Hypochoeris radicata*, Austral Bear's-ears *Cymbonotus preissianus*, Kidney Weed *Dichondra repens*, Yellow Wood-sorrel *Oxalis corniculata* spp. agg. and Small St John's Wort *Hypericum gramineum*. Other forbs sometime act as scramblers through the tussocks such as Bidgee Widgee *Acaena nova-zealandiae* and Prickly Starwort *Stellaria pungens*.

The only true climber found consistently within this floristic community is Twining Glycine *Glycine clandestina*. It occurs as a small plant, scrambling over tussocks and fallen branches, rarely forming plants greater than 1.5m high when scrambling up shrubs.

Gippsland Grassy Dry Forest has floristic affinities with Dry Valley Forest, sharing many similar grasses and forbs but they differ environmentally. Dry Valley Forest has a higher effective rainfall and grows on the flatter terrain. In addition, it carries eucalypts, shrubs and ferns indicative of moister environments.

EVC 23 Herb-rich Foothill Forest

Herb-rich Foothill Forest is not as common to the south as it is to the north of the Great Dividing Range. South of the Great Dividing Range it occurs on the inland margins of stream valleys closer to the Great Dividing Range and in rainshadow valleys of the Wonnangatta, Dargo and the upper reaches of the Tambo Rivers. Within the study area, climatically it occurs in continental locations in rainshadows of the mountain ranges running coastward, where water is taken out of the atmosphere, leaving the valleys drier, in effect, therefore, growing in similar

climatic conditions to this EVC north of the Great Dividing Range where rainfall is low over summer.

Moderate to high soil fertility is reflected by the characteristically high diversity and cover of graminoid and herbaceous species in the ground layer of all floristic communities of this EVC. A small tree layer is nearly always present over a few scattered shrubs which form an open understorey.

There are five floristic communities of Herb-rich Foothill Forest: *Silurian Limestone* Herb-rich Foothill Forest, *Splitters Range* Herb-rich Foothill Forest, *Northern Fall* Herb-rich Foothill Forest, *Strzeleckis* Herb-rich Foothill Forest and *Tussocky* Herb-rich Foothill Forest.

Floristic Community:

23-03 *Silurian Limestone* Herb-rich Foothill Forest

Silurian Limestone Herb-rich Foothill Forest only occurs near Bindi Station at Marble Gully, on protected southern slopes of Silurian limestone. Rainfall is moderate, ranging between 700-800mm per annum and elevations range between 670-900m above sea level. Soils are fertile resulting in moderate to tall tree-form and a herb-rich ground layer.

Red Stringybark *Eucalyptus macrorhyncha* ssp. *macrorhyncha* and Silver Bundy *E. nortonii* are dominant in the overstorey.

The shrub layer is low in diversity and includes Shiny Cassinia *Cassinia longifolia*, Hairy Bursaria *Bursaria lasiophylla*, Sweet Bursaria *B. spinosa*, Prickly Currant-bush *Coprosma quadrifida*, Sticky Hop-bush *Dodonea viscosa* and Austral Indigo *Indigofera australis*. Scattered Large-leaf Hickory Wattle *Acacia falciformis* is also present.

The ground layer is species-rich and is dominated by graminoids such as Grey Tussock-grass *Poa sieberiana*, Red-anther Wallaby-grass *Joycea pallida*, Slender Mat-rush *Lomandra confertifolia* ssp. *leptostachya* and Wattle Mat-rush *L. filiformis*. Other grasses often present include Kangaroo Grass *Themeda triandra*, Common Wheat-grass *Elymus scabrus* and *Elymus scabrus* (glabrous form). Sedges are also present and include Variable Sword-sedge *Lepidosperma laterale* and Short-stem Sedge *Carex breviculmis*. Amongst the taller tussocks a variety of forbs develop and these comprise nearly half of the species recorded in this community. Those frequently recorded include Rough Bedstraw *Galium gaudichaudii*, Common Raspwort *Gonocarpus tetragynus*, Sieber Crassula *Crassula sieberiana*, Cat's Ear *Hypochoeris radicata*, Cotton Fireweed *Senecio quadridentatis* and Tall Bluebell *Wahlenbergia stricta* ssp. *stricta*.

Ground ferns indicative of the fertile, but relatively dry nature of this community include Green Rock Fern *Cheilanthes austrotenuifolia*, Bristly Cloak-fern *C. distans*, Blanket Fern *Pleurosaurus rutifolius* and Necklace Fern *Asplenium flabellifolium*. Only the

latter species is found in other communities of Herb-rich Foothill Forest.

Floristic Community:

23-04 *Strzeleckis* Herb-rich Foothill Forest
Strzeleckis Herb-rich Foothill Forest is mainly found in the lower rainfall areas of the Strzelecki ranges on slopes and in gullies. It can also occur on crests of Tertiary basalt-derived soils in the Boolarra and Thorpdale area. Geology mainly consists of very fertile well drained colluvial soils of Cretaceous origin. Elevation is in the range of 120-240 m above sea level and average annual rainfall is 800-1000 mm.

Strzeleckis Herb-rich Foothill Forest is typically dominated by Messmate *Eucalyptus obliqua*, Mountain Grey Gum *E. cypellocarpa* and Narrow-leaf Peppermint *E. radiata* but may also include Yellow Stringybark *E. muelleriana*, Gippsland Blue Gum *E. globulus* ssp. *pseudoglobulus*, and even Silver-top *E. sieberi* in extreme cases.

The understorey includes the shrubs Varnish Wattle *Acacia verniciflua*, Hop Goodenia *Goodenia ovata*, Prickly Currant-bush *Coprosma quadrifida*, Common Cassinia *Cassinia aculeata*, Snow Daisy-bush *Olearia lirata*, Tree Everlasting *Ozothamnus ferrugineus* and Common Raspwort *Gonocarpus tetragynus*. The climbers Mountain Clematis *Clematis aristata* and Wonga Vine *Pandorea pandorana* are often present whilst the ubiquitous Austral Bracken *Pteridium esculentum* is also frequent.

The herb-rich ground cover includes the grasses Common Tussock-grass *Poa labillardieri*, Short-hair Plume-grass *Dichelachne micrantha*, Weeping Grass *Microlaena stipoides*, Forest Wire-grass *Tetrarrhena juncea*, Common Hedgehog-grass *Echinopogon ovatus*, Stiped Wallaby-grass *Austroanthonia racemosa* var. *racemosa* and Reed Bent-grass *Deyeuxia quadriseta*. Common herbs are Ivy-leaf Violet *Viola hederacea*, Common Lagenifera *Lagenifera stipitata*, Hairy Speedwell *Veronica calycina*, Bidgee-widgee *Acaena novae-zelandiae*, Twining Glycine *Glycine clandestina*, Small St John's Wort *Hypericum gramineum*, Small Poranthera *Poranthera microphylla*, and Yellow Wood-sorrel *Oxalis corniculata* spp. agg.

Strzeleckis Herb-rich Foothill Forest is on the drier side of Damp Forest and *Tussocky* Herb-rich Foothill Forest and eventually merges into Lowland Forest as soil fertility decreases. A number of drier species found in this community which are not found in the damper, adjacent EVCs include Thatch Saw-sedge *Gahnia radula*, Common Heath *Epacris impressa*, Wattle Mat-rush *Lomandra filiformis*, Spiny-headed Mat-rush *Lomandra longifolia* and Hyacinth Orchid *Dipodium punctatum*.

The relatively dry nature of this EVC is reflected in the absence of 'wet' ground-ferns such as Common Ground-fern *Calochloena dubia* and Mother Shield-fern *Polystichum proliferum*. The group is also

closely related, at the drier end, to the dry forest EVCs of *South Gippsland Plains Grassy Forest* and *Lowland Forest*.

Floristic Community:

23-05 *Tussocky Herb-rich Foothill Forest*
Tussocky Herb-rich Foothill Forest typically occupies the grassy drier spurs and slopes upslope from *Damp Forest* on the margins of the *Strzelecki Ranges*. Soils are dark brown clay loams of Lower Cretaceous origin. Elevation is 200-500 m above sea level and average annual rainfall is 900-1000mm.

Gippsland Blue Gum Eucalyptus globulus ssp. *pseudoglobulus* dominates the overstorey but *Mountain Grey Gum E. cypellocarpa*, *Manna Gum E. viminalis*, *Messmate E. obliqua* or even *Mountain Ash E. regnans* which grows in associated *Damp* or *Wet Forest* can be present.

The understorey includes *Blackwood Acacia melanoxylon* and less frequently *Silver Wattle A. dealbata* over scattered shrubs and a herb-rich, grassy ground cover that is also often weedy. Common shrubs include *Tree Everlasting Ozothamnus ferrugineus*, *Prickly Currant-bush Coprosma quadrifida*, *Common Cassinia Cassinia aculeata*, and *Hazel Pomaderris Pomaderris aspera*.

A suite of herbs are present in the ground cover including *Fireweed Groundsel Senecio linearifolius*, *Bidgee-widgee Acaena novae-zelandiae*, *Cinquefoil Cranesbill Geranium potentilloides*, *Ivy-leaf Violet Viola hederacea*, *Common Cotula Cotula australis*, *Creeping Cudweed Euchiton gymnocephalus*, the weeds *Greater Plantain *Plantago major*, *Self-heal *Prunella vulgaris*, *Common Vetch *Vicia sativa* and numerous other ubiquitous species. Common grasses are *Common Hedgehog-grass Echinopogon ovatus*, *Common Tussock-grass Poa labillardieri*, and *Weeping Grass Microlaena stipoides*. Other species often present include *Austral Bracken Pteridium esculentum*, *Mother Shield-fern Polystichum proliferum* and the vine *Mountain Clematis Clematis aristata*.

Tussocky Herb-rich Foothill Forest develops on fertile soils and has therefore been extensively cleared for agriculture and plantations. Such areas may be recognised today where the native tussock grass still dominates open paddocks.

Floristic Community:

23-06 *Splitlers Range Herb-rich Foothill Forest*
Splitlers Range Herb-rich Foothill Forest occurs to the east of *Omeo* in the northern headwaters of the *Tambo River* within gullies and on protected south-facing slopes. It occurs at mid to high elevations between 750-950m above sea level and within moderate to high rainfall zones, ranging, between 750-950mm.

Splitlers Range Herb-rich Foothill Forest is of medium height. There has been some difficulties in the characterisation of the overstorey within this floristic community as a result of taxonomic

revisions and difficulties in identification of several of the key eucalypt species. Both *Narrow-leaved Peppermint Eucalyptus radiata* and *Broad-leaved Peppermint E. dives* are recorded but the 'broad-leaved Peppermint' is most likely to be *Gippsland Peppermint E. croajingolensis*. Similarly, records of *Candlebark E. rubida* are more likely to be *Mountain Gum E. dalrympleana*. Other important eucalypts include *Messmate E. obliqua* and *Manna Gum E. viminalis*.

The shrub layer is usually scattered but may form a moderately dense and continuous cover. Many of the common shrubs have fleshy fruits that are distributed by birds and other fruitivores such as *Prickly Currant-bush Coprosma quadrifida*, *Elderberry Panax Polyscias sambucifolius* and *Mountain Beard-heath Leucopogon hookeri*. Other shrubs include *Handsome Flat-pea Platylobium formosum*, *Grey Guinea-flower Hibbertia obtusifolia* and *Heath Pink-bells Tetratheca bauerifolia*.

The ground layer is characteristically diverse in grasses and herbs. Of the larger, tussock-forming grasses, *Grey Tussock-grass P. sieberiana* and *Sword Tussock-grass P. ensiformis* are most conspicuous though *Slender Tussock-grass Poa tenera* is also common and may become quite dense. *Weeping Grass Microlaena stipoides* has a creeping habit and is often abundant. *Sward-forming grasses* are less obvious as a result of their habit and therefore appear less abundant, however, they are often present, the most common being *Common Hedgehog-grass Echinopogon ovatus* and *Short-hair Plume-grass Dichelachne micrantha*. *Spiny-headed Mat-rush Lomandra longifolia* is often very conspicuous, sometimes providing a dense cover. *Tasman Flax-lily Dianella tasmanica*, *Pale Vanilla-lily Arthropodium milleflorum*, *Short-stem Sedge Carex breviculmis* and *Black-anther Flax-lily Dianella revoluta* are also common.

Forbs provide over half of the floristic diversity in the ground layer. Most of the species are common and widespread in other EVCs, but it is their abundance in this EVC that makes them noteworthy. *Prickly Starwort Stellaria pungens*, *Ivy-leaved Violet Viola hederacea*, *Small Poranthera Poranthera microphylla* and *Narrow-leaved Groundsel Senecio tenuiflorus* were recorded at almost every sample site and with relatively high cover/abundance rating. Many other herbs characteristic of open, moist, relatively fertile sites are found here including *Bidgee-widgee Acaena novae-zelandiae*, *Cat's Ear *Hypochoeris radicata*, *Grass-leaved Trigger-plant Styliidium graminifolium*, *Common Lagenifera Lagenifera stipitata*, *Prickly Woodruff Asperula scoparia*, *Forest/Sub-alpine Buttercup Ranunculus plebius/scapiger*, *Creeping Cudweed Euchiton gymnocephalus s.s.*, *Hairy Pennywort Hydrocotyle hirta*, and *Mountain Cotula Leptinella filicula*.

Ferns are present but not common. *Austral Bracken Pteridium esculentum* is frequently present whilst *Mother Shield-fern Polystichum proliferum* and

Necklace Fern *Asplenium flabellifolium* are often present in wetter sites.

Floristic Community:

23-07 Northern Fall Herb-rich Foothill Forest
This community is particularly interesting due to its limited distribution and species composition.

Northern Fall Herb-rich Foothill Forest occurs in the Mitta Mitta valley north of Omeo and in the Benambra area. It is restricted to gullies and protected southern slopes. Whilst average annual rainfall is only 800mm, effective rainfall is moderately high due to its occurrence on protected slopes and in gullies. The soils are fertile sandy clay loams over a clay layer which aids retention of soil moisture. Elevations vary between 660–960m above sea level. Northern Fall Herb-rich Foothill Forest is the most species-rich of all the Herb-rich Foothill Forest communities and is characteristically diverse in graminoids and forbs which comprise over two thirds of species recorded.

The overstorey is diverse and is rarely dominated by a single species. In the tallest stratum common eucalypts include Blue Gum *Eucalyptus globulus* ssp. *bicostata* and Monaro Peppermint *E. robertsonii* or Manna Gum *E. viminalis*, Candlebark *E. rubida* and Monaro Peppermint *E. robertsonii*. Both Silver Wattle *Acacia dealbata* and Blackwood *A. melanoxylon* are common in the understorey whilst scattered Mountain Swamp Gum *E. camphora* or Snow Gum *E. pauciflora* are occasionally present. Narrow-leaved Peppermint *E. radiata* s.l. recorded for this group is most certainly *E. robertsonii*, a segregate from the *E. radiata* species aggregate.

The shrub layer is usually very poorly developed and consists of widespread and common plants including Common Cassinia *Cassinia aculeata*, Shiny Cassinia *Cassinia longifolia* and Pale-fruit Ballart *Exocarpos strictus*. Handsome Flat-pea *Platylobium formosum* is typically present and may occur as scattered plants or as thick carpets as a result of fire history.

Ferns are common with Austral Bracken *Pteridium esculentum*, Necklace Fern *Asplenium flabellifolium* and Mother Shield-fern *Polystichum proliferum* frequently occurring as scattered clumps.

Graminoids dominate the ground stratum, giving it a grassy appearance in stark contrast to the size and density of the overstorey trees. Particularly common tussock-forming graminoids are Grey Tussock Grass *Poa sieberiana*, Short-stem Sedge *Carex breviculmis*, Spiny-headed Mat-rush *Lomandra longifolia* and Stiped Wallaby-grass *Austrodanthonia racemosa*. Rhizomatous and sward-forming grasses include Weeping Grass *Microlaena stipoides*, Common Wheat-grass *Elymus scabrus* and Short-hair Plume-grass *Dichelachne micrantha*.

The large diversity of forbs present include a suite of weed species common to grazed land. These are common on fertile, well-watered sites and their abundance and mixture with other herbaceous and woody species creates a unique combination. The most common forbs include Common Centaury **Centaureum erythraea*, Cat's Ear **Hypochoeris radicata*, Spear Thistle **Cirsium vulgare*, Creeping Cudweed *Euchiton gymnocephalus* s.s., Austral Bear's-ears *Cymbonotus preissianus*, Grassland Cranesbill *Geranium retrorsum* and Stinking Pennywort *Hydrocotyle laxiflora* in addition to species common and ubiquitous to all floristic communities of Herb-rich Foothill Forest.

EVC 27 Blackthorn Scrub

Floristic Community:

27-01 Gippsland 1 Blackthorn Scrub
Within the study area Gippsland 1 Blackthorn Scrub is restricted in habitat and geographic distribution. It occurs in the valleys of several major rivers within the study area including the Mitchell River south of Dargo, the Wentworth River south of Jenkins, the Tambo River, south of Tambo Crossing and along Wilkinson Creek. It grows at low elevations of 300 to 640m above sea level in areas of low site quality on shallow Ordovician sediments and on steep northern and western aspects. Rainfall is low, ranging between 700-850mm per annum, low site quality further reducing the effective rainfall due to the shallow soils and exposed aspects.

Trees are not a prominent feature of this EVC, often present only as emergents or forming a very open woodland. They may take on a mallee-form growth habit. Species present may include Red Ironbark *Eucalyptus tricarpa*, Red Box *E. polyanthemus*, White Stringybark *E. globoidea*, Gully Gum *E. smithii*, Gippsland Blue Gum *E. globulus* ssp. *pseudoglobulus* and River Peppermint *E. elata*.

The small tree or tall shrub layer is a dominant feature of Blackthorn Scrub, often forming even-aged stands of uniform height. In the east of the study area this stratum is dominated by Red Wattle *Acacia silvestris* which may form complete thickets, almost to the exclusion of many other species. Further west it is dominated by Black Wattle *A. mearnsii*. Other common species include Cherry Ballart *Exocarpos cupressiformis* which may form large stands and Rock Wax-flower *Eriostemon trachyphyllus*, occurring as an understorey shrub but may form the canopy in long-unburnt sites. Shiny Cassinia *Cassinia longifolia*, Bootlace Bush *Pimelea axiflora*, Ferny Panax *Polyscias sambucifolia* ssp. C, White Elderberry *Sambucus gaudichaudiana* and Saltbush *Einadia spp* also occur.

The ground layer is generally sparse and species-poor due to low site quality and the density of the shrub layer. This may increase when disturbance opens the canopy. Species present may include Variable Sword-sedge *Lepidosperma laterale*, Long-leaf Wallaby-grass *Notodanthonia longifolia* and Weeping Grass *Microlaena stipoides*.

Vines are conspicuous and include Wonga Vine *Pandorea pandorana*, Common Apple Berry *Billardiera scandens* and Coarse Dodder-laurel *Cassytha melantha*.

Ecologically, *Gippsland 1* Blackthorn Scrub has similarities to Rainforest as it has the ability to exclude fire, eucalypts are rarely present and shrubs form the emergent overstorey after long absence of fire.

EVC 28 Rocky Outcrop Shrubland

Rocky Outcrop Shrubland occurs in areas of low site quality on steep, exposed rocky outcrops where rock is a dominant landform feature, soils are shallow or virtually absent and effective rainfall is low. Scattered trees are occasionally present, although due to the harsh environment they are often stunted and may form part of the shrub layer. Shrubs dominate both floristically and structurally, though their density and diversity may vary. This EVC often forms a mosaic with Rocky Outcrop Hermland which grows on more shallow soils and in crevices within the same environment.

Two floristic communities of Rocky Outcrop Shrubland are mapped within the study area. These are *River Valley* Rocky Outcrop Shrubland and *Bowen Mountains* Rocky Outcrop Shrubland.

Floristic Community:

28-02 *River Valley* Rocky Outcrop Shrubland
River Valley Rocky Outcrop Shrubland is restricted to rocky outcrops along the Wellington River (on maroon shaly soils) and the Mitta Mitta River where it is extremely diverse.

Red Stringybark *Eucalyptus macrorhyncha* is the main overstorey tree, others including Red Box *E. polyanthemos* and Long-leaf Box *E. goniocalyx*, with occasional Red Ironbark *E. tricarpa* or Brittle Gum *E. mannifera*.

The shrub layer is the dominant lifeform in this EVC. It may be well-developed but when this EVC forms a mosaic with Rocky Outcrop Hermland then this layer may be sparse or patchy. Shiny Cassinia *Cassinia longifolia* usually forms a moderate to dense cover, although in the harshest sites, there may be very little cover of any of the species in this group and the Rocky Outcrop Hermland will dominate on boulders, amongst areas of bare rock. Few species are consistently present, however there are many that occur in various combinations at different sites. Cherry Ballart *Exocarpos cupressiformis*, Golden Wattle *Acacia pycnantha*, Common Correa *Correa reflexa*, Grey Guinea-flower *Hibbertia obtusifolia*, Common Fringe Myrtle *Calytrix tetragona* and Daphne Heath *Brachyloma daphnoides* are the most common components of the shrub layer. Grey Everlasting *Ozothamnus obcordatus* is a good indicator species, as it is represented in this EVC across Victoria.

The ground layer is usually very sparse and species-poor. Variable Sword-sedge *Lepidosperma laterale*, Black-anther Flax-lily *Dianella revoluta*, Wattle Mat-rush *Lomandra filiformis* and Cluster-headed Mat-rush *L. longifolia* ssp. *exilis* are the main graminoids present. The only grass observed is an occasional tuft of Silvertop Wallaby-grass *Joycea pallida*. Herbs rarely occur, these may include Pomax *Pomax umbellata*, Slender Fireweed *Senecio tenuiflorus* and Prickly Starwort *Stellaria pungens*. Purple Coral-pea *Hardenbergia violacea* forms a very light cover and is often heavily grazed.

Floristic Community:

28-03 *Bowen Mountains* Rocky Outcrop Shrubland

Bowen Mountains Rocky Outcrop Shrubland occurs on ridge-tops and on steep rocky outcrops in exposed aspects. It has been recorded at altitudes of around 800m, but most probably also occurs at lower elevations. At higher elevations, this EVC becomes Montane Rocky Shrubland, where species tolerant of high elevations and low temperatures are favoured. The average annual rainfall is high, however effective rainfall is low due to the harsh environment and low site quality.

Brittle Gum *Eucalyptus mannifera* and Red Stringybark *E. macrorhyncha* ssp. *macrorhyncha* are usual overstorey trees and are often stunted.

The shrub layer is characteristically the most prominent feature. It is characterised by Varnish Wattle *Acacia verniciflua*, Common Fringe-myrtle *Calytrix tetragona*, Shiny Cassinia *Cassinia longifolia* and Derwent Speedwell *Derwentia perfoliata*. Shorter shrubs are also frequent and include Violet Daisy-bush *Olearia iodochroa*, Juniper Wattle *Acacia ulicifolia*, Prickly Broom-heath *Monotoca scoparia*, Daphne Heath *Brachyloma daphnoides* and Grey Guinea-flower *Hibbertia obtusifolia*.

The ground layer, although sometimes diverse, is very open and sparse. Narrow Rock-fern *Cheilanthes sieberi* ssp. *sieberi* often grows in rock crevices or in sheltered pockets under overhanging rocks. The most common ground dwelling species include Black-anther Flax-lily *Dianella revoluta*, Short-hair Plume-grass *Dichelachne micrantha*, Annual Cudweed *Euchiton sphaericus*, Common Raspwort *Gonocarpus tetragynus*, Silver-top Wallaby-grass *Joycea pallida* and Fuzzy New Holland Daisy *Vittadinia cuneata* var. *cuneata*. Many other herbs are common which are often part of the separate EVC Rocky Outcrop Hermland which may form a mosaic with Rocky Outcrop Shrubland.

EVC 29 Damp Forest

Damp Forest is widespread in Gippsland in moderately fertile areas between Wet Forest, the drier end of Shrubby Foothill Forest and the driest forest types such as Lowland Forest, Herb-rich Foothill Forest, and Heathy Woodland. It develops

on the drier sites in Wet Forest or on the margins of Warm Temperate Rainforest. It also occurs on protected slopes associated with Tussocky Herb-rich Foothill Forest, Lowland Forest or even Heathy Woodland, provided topographic protection is sufficient.

In the lowlands and dissected country below 700m Damp Forest favours gullies or eastern and southern slopes. Above this elevation and in higher rainfall zones the effect of cloud cover at ground level and the subsequent fog drip permits this class to expand out of the gullies onto broad ridges and northern and western aspects. It occurs on a wide range of geologies and soils are usually colluvial, deep and well-structured with moderate to high levels of humus in the upper soil horizons (Woodgate *et al.* 1994). Rainfall is approximately 800-1600 mm per annum and elevation ranges from sea level in South Gippsland to up to 1000m in the montane areas where it merges into Montane Damp Forest.

The dominant eucalypts are commonly Messmate *Eucalyptus obliqua* and Mountain Grey Gum *E. cypellocarpa*. A range of other species may be present as well such as Yellow Stringybark *E. muelleriana* (in South Gippsland with Sticky Wattle *Acacia howittii* present in the understorey), Silvertop *E. sieberi*, Gippsland Blue Gum *E. globulus* ssp. *pseudoglobulus*, Narrow-leaf Peppermint *E. radiata*, Gippsland Peppermint *E. croajingolensis*, Brown Stringybark *E. baxteri* and Swamp Gum *E. ovata* in the vicinity of poorer drainage. Trees of Blackwood *Acacia melanoxylon* and Silver Wattle *Acacia dealbata* are often present.

The understorey typically includes moisture-dependent fern species such as Common Ground-fern *Calochlaena dubia*, Gristle Fern *Blechnum cartilagineum*, Mother Shield-fern *Polystichum proliferum* and Rough Tree-fern *Cyathea australis*, and the presence of broad-leaved species typical of wet forest mixed with elements from dry forest types such as Lowland Forest.

Broad-leaved species include Hazel Pomaderris *Pomaderris aspera*, Victorian Christmas-bush *Prostanthera lasianthos*, Snow Daisy-bush *Olearia lirata*, *Cassinia* spp, Hop Goodenia *Goodenia ovata*, Elderberry *Panax Polyscias sambucifolia* and White Elderberry *Sambucus gaudichaudiana*. Sweet Pittosporum *Pittosporum undulatum* is often present in South Gippsland. The wet forest shrub, Prickly Currant-bush *Coprosma quadrifida*, and Fireweed Groundsel *Senecio linearifolius* are also common. Drier shrubby elements include Prickly Moses *Acacia verticillata*, Prickly Bush Pea *Pultenaea juniperina*, Narrow-leaf Wattle *Acacia mucronata* and Varnish Wattle *Acacia verniciflua*. Other species commonly present are Austral Bracken *Pteridium esculentum* and Forest Wire-grass *Tetrarrhena juncea*, Broad-leaf Stinkweed *Opercularia ovata*, Tall Sword-sedge *Lepidosperma elatius*, Wonga Vine *Pandorea pandorana* and Mountain Clematis *Clematis aristata*.

At the drier end of Damp Forest a number of species start to appear such as Narrow-leaf Peppermint *Eucalyptus radiata*, Narrow-leaf Wattle *Acacia mucronata*, Cherry Ballart *Exocarpos cupressiformis*, Grey Tussock-grass *Poa sieberiana*, Prickly Tea-tree *Leptospermum continentale* and Thatch Saw-sedge *Gahnia radula*. At Wilsons Promontory, the shrub Blue Olive-berry *Elaeocarpus reticulatus* is a common species which indicates its close affinities with *Wilson's Promontory Overlap* Warm Temperate Rainforest.

Riparian habitats in Damp Forest contain indicator species of Riparian Forest such as Soft Water-fern *Blechnum minus*, Fishbone Water-fern *Blechnum nudum*, Austral King-fern *Todea barbara*, Scrambling Coral-fern *Gleichenia microphylla*, Tall Saw-sedge *Gahnia clarkei* and Tall Sedge *Carex appressa*.

Floristic Community:

29-01 *Vine-rich* Damp Forest

Vine-rich Damp Forest is scattered throughout the study area in areas with high effective rainfall. Although usually associated with lower slopes and gullies ranging between 400-600m in altitude, in protected environments (such as south-facing slopes) it may ascend to elevations in excess of 700m above sea level. The average annual rainfall of 750 mm per annum is relatively low, however the protected nature of the environment and the fertile soils help retain moisture and hence support a suite of ferns and broad leaf shrubs.

Vine-rich Damp Forest forms a moderate to tall open forest. The overstorey trees most commonly include Messmate *Eucalyptus obliqua* and Mountain Grey Gum *E. cypellocarpa*, but Gippsland Peppermint *E. croajingolensis* may co-dominate, especially in valley floors. White Stringybark *E. globoidea* is also a common co-dominant on middle to upper slopes and in more exposed situations. Silver Wattle *Acacia dealbata* is a common understorey tree, occurring as a moderately tall, slender tree or large shrub.

Large mesic shrubs are common but smaller-leaved shrubs, tolerant of lower humidity are most prominent. Prickly Currant-bush *Coprosma quadrifida*, Shiny Cassinia *Cassinia longifolia* and Bootlace Bush *Pimelea axiflora* occur most frequently. Broad leaf shrubs are structurally less important and include Blanket-leaf *Bedfordia arborescens*, Snowy Daisy-bush *Olearia lirata* and Hazel Pomaderris *Pomaderris aspera* with the occasional Musk Daisy-bush *Olearia argophylla*.

Rough Tree-fern *Cyathea australis*, the only tree fern recorded in this EVC, is often scattered amongst the shrub layer. Beneath this, ground ferns are prominent in cover and include the strongly rhizomatous Austral Bracken *Pteridium esculentum* and Common Ground-fern *Calochlaena dubia*. Mother Shield-fern *Polystichum proliferum* may dominate some sites.

A diverse array of forbs and graminoids are present but this stratum is not structurally dominant. Tasman Flax-lily *Dianella tasmanica*, Spiny-headed Mat-rush *Lomandra longifolia*, Weeping Grass *Microlaena stipoides*, Sword Tussock-grass *Poa ensiformis* and Ivy-leaf Violet *Viola hederacea* are the most common.

Vines are particularly rich in this community of Damp Forest. Mountain Clematis *Clematis aristata* is most common with Common Apple-berry *Billardiera scandens*, Love Creeper *Comesperma volubile*, Austral Sarsaparilla *Smilax australis*, Wombat Berry *Eustrephus latifolius* and Wonga Vine *Pandorea pandorana* often present. Climbers and scramblers are very prominent and the presence of Wombat Berry *Eustrephus latifolia* and Austral Sarsaparilla *Smilax australis* emphasises floristic links for Warm Temperate Rainforest.

EVC 30 Wet Forest

Wet Forest is predominantly a tall forest characterised by a layer of broad-leaf shrubs over a dense cover of tree-ferns and ground ferns. It occurs on relatively fertile soils such as deep organic loams and clay loams in the topographically protected high rainfall areas and headwaters of south flowing streams on the south side of the Great Dividing Range in the Avon Wilderness, around Mt Baldhead, Mt Elizabeth and on the southern fall of the Nuniong Plateau. It is also widespread in South and West Gippsland, particularly in the Strzelecki Ranges and at Wilsons Promontory.

This EVC includes a very wide range of structural variation ranging from tall old-growth forest up to 60m in height through to regrowth forest and scrub which has the potential to support tall forest. It also includes treeless areas dominated by wet scrub and even "oldfields" which were once cleared but are now dominated by native vegetation. These areas are typically dominated by broad-leaved shrubs such as Snow Daisy-bush *Olearia lirata*, Hazel Pomaderris *Pomaderris aspera*, and Three-nerved Cassinia *Cassinia trinerva*. The native fireweed, Fireweed Groundsel *Senecio linearifolius* is often present

Wet Forest is dominated by Mountain Ash *Eucalyptus regnans* but may be dominated locally by Blackwood *Acacia melanoxylon* or Silver Wattle *A. dealbata*. A range of other eucalypt species can be present but these tend to be on the periphery of extensive areas dominated by Mountain Ash *E. regnans*. These include Manna Gum *E. viminalis* (often occurring along major river flats and on associated slopes), Strzelecki Gum *Eucalyptus strzeleckii*, Gippsland Blue Gum *E. globulus* ssp. *pseudoglobulus*, Messmate *E. obliqua*, and Mountain Grey Gum *E. cypellocarpa* which occurs on the edges of Wet Forest stronghold areas immediately before Damp Forest becomes more developed. Tree-ferns are sometimes present, particularly Rough Tree-fern *Cyathea australis* on the slopes and Soft Tree-fern *Dicksonia antarctica*

along the creek lines as well as some of the "wet-ferns" such as Mother Shield-fern *Polystichum proliferum* and Hard Water-fern *Blechnum wattsii*.

Common understorey species are the broad-leaved shrubs such as Snow Daisy-bush *Olearia lirata*, Musk Daisy-bush *O. argophylla*, Blanket Leaf *Bedfordia arborescens*, Hazel Pomaderris *Pomaderris aspera*, *Cassinia* spp., Tree Lomatia *Lomatia fraseri* and Austral Mulberry *Hedycarya angustifolia*. The prickly shrub, Prickly Currant-bush *Coprosma quadrifida*, and the vines Mountain Clematis *Clematis aristata* and Wonga Vine *Pandorea pandorana* are also often present. Other shrubs sometimes include Sweet Pittosporum *Pittosporum undulatum*, Tree Lomatia *Lomatia fraseri* and Victorian Christmas-bush *Prostanthera lasianthos*. At the drier end of this group the understorey becomes very low in stature (less than 2m) and broad-leaved species other than Snow Daisy-bush *Olearia lirata* are notably absent. This variant tends to occur on the most exposed, drier northerly aspects.

Wet Forest develops extensively around the localised areas of Cool Temperate Rainforest in the study area. At the dry end of its range it changes to Damp Forest and Shrubby Foothill Forest, which tends to first appear on the drier, steeper aspects associated with Wet Forest in the more protected sites.

Areas of old-growth Wet Forest are very localised in the study area. Large patches were observed immediately west of Traralgon Creek Road in the most topographically protected sites.

There are two floristic communities of Wet Forest: *Gippsland 1* Wet Forest and *Gippsland 2* Wet Forest.

Floristic Community:

30-01 *Gippsland 1* Wet Forest

Gippsland 1 Wet Forest occurs across the study area along creeks and on south-facing slopes and gullies. It grows on a variety of geologies, which combine with high rainfall and moist loamy organic soils to provide a fertile environment for tall trees, broad-leaf shrubs and ferns. Average rainfall is high ranging from 700–1200mm, with high effective rainfall on protected southerly slopes. It grows at a range of altitudes from 500-1100m above sea level.

The overstorey may carry a range of eucalypts including Messmate Stringybark *Eucalyptus obliqua*, Gippsland Peppermint *Eucalyptus croajingolensis*, Narrow-leaf Peppermint *E. radiata* in the west of the study area and *E. croajingolensis* to the east of the study area. Manna Gum *Eucalyptus viminalis* and *E. obliqua* may co-dominant in some areas, such as the Nuniong Plateau and the Mount Baldhead areas.

Silver Wattle *Acacia dealbata* is the ubiquitous understorey tree in this EVC. A diversity of tall broad-leaved shrubs are prominent and often form a complete cover, although this may be broken by an

equally dense layer of tree ferns. The most common tall shrubs include Hazel Pomaderris *Pomaderris aspera*, Blanket Leaf *Bedfordia arborescens*, Musk Daisy-bush *Olearia argophylla*, and Rough Coprosma *Coprosma hirtella*. Common Cassinia *Cassinia aculeata*, Prickly Currant-bush *Coprosma quadrifida*, Elderberry Panax *Polyscias sambucifolia*, Snow Daisy-bush *Olearia lirata* and Dusty Daisy-bush *O. phlogopappa* form a shorter layer beneath the taller shrub layer.

Tree ferns are often present with Soft Tree-fern *Dicksonia antarctica* at the wettest sites and Rough Tree-fern *Cyathea australis* at lower elevations and on slightly drier sites. Ground ferns include Austral Bracken *Pteridium esculentum*, Mother Shield-fern *Polystichum proliferum* and Fishbone Water-fern *Blechnum nudum*.

The ground layer is equally rich in species, dominated by large moisture-loving herbs, and graminoids such as the large tussocks of Tasman Flax-lily *Dianella tasmanica*, Tussock-grasses *Poa* spp. and Tall-headed Mat-rush *Lomandra longifolia*. The diverse array of smaller forbs include Ivy-leaf Violet *Viola hederacea*, Soft Cranesbill *Geranium potentilloides*, Bidgee Widgee *Acaena novae-zelandiae*, Hairy Pennywort *Hydrocotyle hirta* and Common Lagenifera *Lagenifera stipitata*. Forbs indicative of Wet Forest include Mountain Cotula *Leptinella filicula*, Scrub Nettle *Urtica incisa* and Forest Starwort *Stellaria flaccida*.

The only climber common in this floristic community is Mountain Clematis *Clematis aristata*.

Floristic Community:

30-06 *Gippsland 2 Wet Forest*
Gippsland 2 Wet Forest grows in similar environments to *Gippsland 1 Wet Forest*. Rainfall is very high, ranging from 950–1350mm per annum and effective rainfall extremely high. It ranges in elevation from 700 to 1160m above sea level, thus reaching montane environments.

Gippsland 2 Wet Forest is the wettest of the eucalypt-dominated vegetation types. At higher elevations Alpine Ash *Eucalyptus delegatensis* dominates the overstorey whilst at lower elevations Mountain Ash *E. regnans* dominates wetter sites and Manna Gum *Eucalyptus viminalis* and species of the narrow-leaved peppermint group are prominent (for example, Narrow-leaved Peppermint *Eucalyptus radiata* s.s., Monaro Peppermint *Eucalyptus radiata* ssp. *robertsonii* and *Gippsland Peppermint Eucalyptus croajingolensis*). The understorey tree layer is well developed with Silver Wattle *Acacia dealbata* and Blackwood *A. melanoxylon* dominating.

The shrub layer is usually very dense and may form an almost impenetrable thicket, especially after disturbance. It is most often dominated by Soft Tree-fern *Dicksonia antarctica* and a mixture of large mesic shrubs including Banyalla *Pittosporum bicolor*, Mountain Tea-tree *Leptospermum*

grandifolium, Blanket-leaf *Bedfordia arborescens*, Victorian Christmas Bush *Prostanthera lasianthos*, Mountain Pepper *Tasmannia lanceolata*, Hazel Pomaderris *Pomaderris aspera* and Musk Daisy-bush *Olearia argophylla*. Several smaller shrubs are also common including Common Cassinia *Cassinia aculeata*, Elderberry Panax *Polyscias sambucifolia*, White Elderberry *Sambucus gaudichaudiana* and Dusty Daisy-bush *Olearia phlogopappa*.

The ground layer is also very dense and is dominated by ferns. Mother Shield-fern *Polystichum proliferum*, Fishbone Water-fern *Blechnum nudum*, Hard Water-fern *B. wattsi*, Ray Water-fern *B. fluviatile* and Austral Bracken *Pteridium esculentum* commonly form a complete cover.

Common herbs and graminoids including Tussock-grasses *Poa* spp, Scrub Nettle *Urtica incisa*, Shade Nettle *Australina pusilla* and Bidgee Widgee *Acaena novae-zelandiae* may reach high densities in open patches, often created by local disturbance, or where the substrate is rocky. Other herbs and graminoids include Tall Sedge *Carex appressa*, Tasman Flax-lily *Dianella tasmanica*, Small-leaf Bramble *Rubus parvifolius*, Hairy Pennywort *Hydrocotyle hirta*, Ivy-leaf Violet *Viola hederacea*, Mountain Cotula *Leptinella filicula*, Forest Mint *Mentha laxiflora* and Forest Starwort *Stellaria flaccida*. Forest Wire-grass *Tetrarrhena juncea* is also common.

Mountain Clematis *Clematis aristata* is the only commonly occurring climber.

EVC 31 Cool Temperate Rainforest

Floristic Community:

31-01 *Central Highlands Cool Temperate Rainforest*

Central Highlands Cool Temperate Rainforest is only found in the highest rainfall areas of Wet Forest associated with the most topographically protected sites in the Strzeleckis and Wilsons Promontory. There are also isolated occurrences in the foothills of the Great Dividing Range including the headwaters of Freestone Creek and Mount Useful Creek. It typically occupies protected south and south-easterly aspects and gullies of these sheltered streams. On some southern slopes that remain long-unburnt, the community can extend upslope beyond its usual gully refuge, even to minor saddles.

The climate is cool temperate with snowfalls a common event over most winters in the higher altitudes. Elevation varies from 500-1200m above sea level and average annual rainfall is 1000-1200 mm. Parent geologies range from granites, granodiorites and acid volcanics to marine sediments. The soils are formed through colluvial or alluvial processes and may be quite stony and are often red-brown, deep, well-structured krasnozems with an A horizon that is rich in humus (Peel 1999).

Central Highlands Cool Temperate Rainforest is characterised by a low diversity of trees, grasses, sedges, herbs and climbers and a high diversity of shrubs and ferns. The canopy is typically dominated by moss-covered Myrtle Beech *Nothofagus cunninghamii* and Southern Sassafras *Atherosperma moschatum* but localised adjoining areas can also be dominated by Blackwood *Acacia melanoxylon*. Scattered emergent Mountain Ash *Eucalyptus regnans* which is widespread in the surrounding Wet Forest may also be present.

The fern-dominated understorey is typically open in structure and may include stands of old-growth Soft Tree-fern *Dicksonia antarctica* with trunks covered with a characteristically high cover and diversity of delicate epiphytic filmy-ferns. These plants are only one cell thick and are extremely sensitive to drought stress. Species such as Austral Filmy Fern *Hymenophyllum australe*, Narrow Filmy Fern *H. rarum* and Shiny Filmy Fern *H. flabellatum* are good indicator species for the group whilst Common Filmy fern *H. cupressiforme* is also frequently present but less faithful to the group. Rough Tree-fern *Cyathea australis* often occurs upslope from watercourses, whilst the rare Slender Tree-fern *Cyathea cunninghamii* and Skirted Tree-fern *Cyathea x marcescens* are good indicator species for this group occurring closer to the gully floor and being more reliant on moisture.

A number of other epiphytic ferns are present on tree trunks such as Kangaroo Fern *Microsorium pustulatum*, Weeping Spleenwort *Asplenium flaccidum*, and Common Finger-fern *Grammitis billardieri* whilst the climber, Fieldia *Fieldia australis*, is also frequently present. Rare epiphytic primitive fern allies are sometimes present such as Long Fork-fern, *Tmesipteris obliqua*. The groundlayer includes a number of "wet fern" species such as Mother Shield-fern *Polystichum proliferum* as well as Leathery Shield-fern *Rumohra adiantiformis* and a diversity of *Blechnum* species including Hard Water-fern *B. watsii*, Lance water-fern *B. chambersii*, Strap Water-fern *B. pattersonii* and Ray Water-fern *B. fluviatile*.

Floristic Community:

31-05 *East Gippsland* Cool Temperate Rainforest

East Gippsland Cool Temperate Rainforest occurs primarily at montane elevations around 940m above sea level, but ranges from 800-1040m above sea level on the Errinundra Plateau and the Nunniong Plateau in East Gippsland. It grows in gullies, on escarpments, inter-montane basins and on montane plateaux that have various gradients from steep to almost flat. Mean annual rainfall is very high, ranging between 1341-1725mm (Peel 1999). It is also subjected to low cloud cover and thunderstorm activity in summer, resulting in heavy rainfall. The wet environment in which *East Gippsland* Cool Temperate Rainforest occurs protects it from the threat of wildfires.

East Gippsland Cool Temperate Rainforest in the Central Gippsland area, unlike in the Otways, Central Highlands and some parts of East Gippsland, is notable for its absence of Myrtle Beech *Nothofagus cunninghamii*. Silver Wattle *Acacia dealbata* and Blackwood *Acacia melanoxylon* are the most common overstorey trees. Occasionally, Manna Gum *Eucalyptus viminalis*, Alpine Ash *E. delegatensis* and Messmate Stringybark *E. obliqua* may occur as scattered individuals. Hazel Pomaderris *Pomaderris aspera*, Southern Sassafras *Atherosperma moschatum* and Banyalla *Pittosporum bicolor* are usually encountered as large shrubs and may reach tree proportions and form a complete canopy at some sites that remain long unburnt.

The mid-storey is dominated by large mesic shrubs. Musk Daisy-bush *Olearia argophylla*, Blanket-leaf *Bedfordia arborescens*, Austral Mulberry *Hedycarya angustifolia* and Victorian Christmas-bush *Prostanthera lasiantha* are the most common large shrubs. The recently described Gippsland Hemp-bush *Gynatrix macrophylla* and Common Cassinia *Cassinia aculeata*, may form dense thickets on the margins or on disturbed patches in the eastern area. Other common shrubs include Prickly Currant-bush *Coprosma quadrifida*, White Elderberry *Sambucus gaudichaudiana*, Snow Daisy-bush *Olearia lirata*, Tree Lomatia *Lomatia fraseri* and Elderberry *Panax Polyscias sambucifolia*.

Soft Tree-fern *Dicksonia antarctica* usually forms a complete layer. *East Gippsland* Cool Temperate Rainforest is commonly viewed as a 'fern gully' due to the lack of trees and the dominance of tree ferns and ground ferns. Characteristic ground ferns include Mother Shield-fern *Polystichum proliferum*, Ray Water-fern *Blechnum fluviatile*, Strap Water-fern *B. patersonii* ssp. *patersonii*, Bat's Wing Fern *Histiopteris incisa*, Veined Bristle-fern *Polyphlebium venosum* and Necklace fern *Asplenium flabellifolium*. Many of the tree-fern trunks and fallen logs are covered in mosses, lichens and epiphytic ferns such as Mother Spleenwort *Asplenium bulbiferum* ssp. *gracillimum*, Common Finger-fern *Grammitis billardieri* and Kangaroo Fern *Microsorium pustulatum*.

A few shade tolerant herbs occupy the ground layer including Forest Starwort *Stellaria flaccida*, Scrub Nettle *Urtica incisa*, Shade Nettle *Australina pusilla* ssp. *muelleri* and Hairy Pennywort *Hydrocotyle hirta*. Climbers and scramblers are only present on the edges of *East Gippsland* Cool Temperate Rainforest, which is in contrast to Warm Temperate Rainforest communities.

Floristic Community:

31-10 *Wilson's Promontory Overlap* Cool Temperate Rainforest

This rainforest group is restricted to a highly localised and protected area in the Paradise Valley catchment inland from Five Mile Beach at Wilsons

Promontory. It occurs where there is an overlap of *Central Highlands* Cool Temperate Rainforest with *Wilson's Promontory Overlap* Warm Temperate Rainforest inland from Freshwater Lake. It is therefore intermediate in floristic composition between these two groups. This floristic community of Cool Temperate Rainforest occurs as low as 10-15m above sea level but is mostly between 200-350m above sea level. Rainfall is approximately 900 mm per annum. Soils are of sedimentary origin and are brown sandy loams high in organic matter.

Wilson's Promontory Overlap Cool Temperate Rainforest is dominated by Lily Pilly *Acmena smithii*, Hazel Pomaderris *Pomaderris aspera*, Stinkwood *Zieria arborescens*, and also includes Myrtle Beech *Nothofagus cunninghamii*. Tall emergent trees of Blackwood *Acacia melanoxydon* are present. Other tall shrubs present include Musk Daisy-bush *Olearia argophylla*, Blanket-leaf *Bedfordia arborescens* and Austral Mulberry *Hedycarya angustifolia*.

Common understorey shrubs are White Elderberry *Sambucus gaudichaudiana*, Prickly Currant-bush *Coprosma quadrifida* and the VROT Cherry Rice-flower *Pimelea drupacea* which is a Tasmanian species having its northern limit of range at Wilson's Promontory. The tree-ferns, Soft tree-fern *Dicksonia antarctica*, Rough Tree-fern *Cyathea australis*, and Austral King-fern *Todea barbara* are also common with numerous ground ferns present such as Hard Water-fern *Blechnum watsii* and Mother Shield-fern *Polystichum proliferum*, as well as Tall Saw-sedge *Gahnia clarkii*.

EVC 32 Warm Temperate Rainforest

Warm Temperate Rainforest occurs in the foothills to 700m above sea level, with moderate to high rainfall ranging from 800-1200mm. It occurs on stream flats, drainage lines and gullies. Parent geologies are predominantly marine sandstones or alluviums, with occasional granites and limestones (Peel 1999). Eucalypts do not form a dominant overstorey, with only the occasional emergents present. Rather, other species of tall trees form the canopy, with a ground layer dominated by ferns.

There are five floristic communities of Warm Temperate Rainforest in the study area: *Alluvial Terraces* Warm Temperate Rainforest, *East Gippsland Coastal* Warm Temperate Rainforest, *East Gippsland Foothills* Warm Temperate Rainforest, *Strzeleckis* Warm Temperate Rainforest and *Wilson's Promontory Overlap* Warm Temperate Rainforest.

Floristic Community:

32-01 *Alluvial Terraces* Warm Temperate Rainforest

Alluvial Terraces Warm Temperate Rainforest occurs primarily on the Mitchell River in the Mitchell River National Park, north-west of Bairnsdale near Prospect Creek and around Mt Little Dick on both the Tambo River and Big Creek. It is restricted to the lowlands, around 110m above sea level, where it occurs on fertile alluvial flats of ephemeral creeks

and the floodplains of permanent streams. This habitat is regularly flooded, however it is not subject to the full forces of the flood and remains inundated for only a couple of days (Peel 1999). Rainfall ranges between 700-740mm per annum. *Alluvial Terraces* Warm Temperate Rainforest is the most species rich rainforest community in the state, with an average of 72 species per site (Peel 1999).

The canopy is dominated by Lily Pilly *Acmena smithii*, Hazel Pomaderris *Pomaderris aspera*, Muttonwood *Rapanea howittiana* and Sweet Pittosporum *Pittosporum undulatum*. Yellowwood r *Acronychia oblongifolia* is also a common canopy species, along with Blue Oliveberry *Elaeocarpus reticulatus* and Kanooka *Tristaniopsis laurina*. Blackwood *Acacia melanoxydon* is a common emergent species.

The shrub layer is well developed, with many broad-leaved shrubs present. Musk Daisy-bush *Olearia argophylla*, Snow Daisy-bush *O. lirata*, Blanket-leaf *Bedfordia arborescens* and Victorian Christmas-bush *Prostanthera lasiantha* overhang a layer of smaller, narrow-leaved shrubs such as Prickly Currant-bush *Coprosma quadrifida*, Three-nerved Cassinia *Cassinia trinerva*, Tree Violet *Hymenanthera dentata*, Bootlace Bush *Pimelea axiflora* and White Elderberry *Sambucus gaudichaudiana*.

Tree-ferns are common with Soft Tree-fern *Dicksonia antarctica* and Rough Tree-fern *Cyathea australis* forming a canopy above a ground rich fern layer. The moist and fertile nature of this environment creates suitable habitat for ground ferns such as Necklace Fern *Asplenium flabellifolium*, Tender Brake *Pteris tremula*, Common Rasp-fern *Doodia media* ssp. *australis*, Sickle Fern *Pellaea falcata*, Shiny Shield-fern *Lastreopsis acuminata*, Mother Shield-fern *Polystichum proliferum*, Austral Lady-fern *Allantodia australis*, Common Ground-fern *Calochlaena dubia*, Common Maidenhair *Adiantum aethiopicum*, Austral Bracken *Pteridium esculentum*, Gristle Fern *Blechnum cartilagineum*, Fishbone Water-fern *B. nudum* and Bat's-wing Fern *Histiopteris incisa*. Epiphytic ferns are also important indicators of rainforest and include Common Filmy Fern *Hymenophyllum cupressiforme*, Fragrant Fern *Microsorium scandens*, and Kangaroo Fern *M. pustulatum*.

Along the stream bank it is also common to find in spaces amongst the ferns, various graminoids and forbs. The most common graminoids include Black-fruit Saw-sedge *Gahnia melanocarpa*, Variable Sword-sedge *Lepidosperma laterale*, Bergalia Tussock *Carex longibrachiata* and Tall Sedge *C. appressa*. Many grasses are common, but not abundant. Species often present include Weeping Grass *Microlaena stipoides*, Basket-grass *Oplismenus hirtellus*, Common Hedgehog-grass *Echinopogon ovatus*, Common Tussock-grass *Poa labillardierei* and Forest Wire-grass *Tetrarrhena juncea*. The most common forbs include Scrub

Nettle *Urtica incisa*, Shrubby Fireweed *Senecio minimus*, Forest Starwort *Stellaria flaccida*, Northern Cranesbill *Geranium homeanum*, Indian Weed *Sigesbeckia orientalis*, Forest Hound's-tongue *Cynoglossum latifolium* and Kidney Weed *Dichondra repens*. Many other forbs are very common in this EVC but are too numerous to mention.

The other dominant feature of *Alluvial Terraces* Warm Temperate Rainforest is the variety of climbers, all of which frequently co-occur. These include Forest Clematis *Clematis glycinoides* var. *glycinoides*, Wonga Vine *Pandorea pandorana*, Wombat Berry *Eustrephus latifolius*, Scrambling Lily *Geitonoplesium cymosum*, Austral Sarsaparilla *Smilax australis*, Staff Climber *Celastrus australis*, Milk Vine *Marsdenia rostrata*, Jasmine Morinda *Morinda jasminoides*, Rock Felt-fern *Pyrrosia rupestris*, Twining Silkpod *Parsonsia brownii* and Forest Bindweed *Calystegia marginata*.

Floristic Community:

32-04 *East Gippsland Foothills* Warm Temperate Rainforest
East Gippsland Foothills Warm Temperate Rainforest grows in deeply cut south and south-east facing gullies at elevations around 450m above sea level, with the highest site at 680m above sea level. Rainfall ranges between 800-1200mm, with sites remaining quite moist year round due to the protected niches in which it occurs. The soils are fertile colluviums of clay or sandy clay loams, which can be quite stony due to landslips moving and mixing soil profiles (Peel 1999).

The canopy of *East Gippsland Foothills* Warm Temperate Rainforest contains gaps and is multi-aged due to landslips, eucalypt stag-fall from adjacent EVCs and from fire (Peel; in press). The canopy consists of Lilly Pilly *Acmena smithii*, Blue Oliveberry *Eleocarpus reticulatus* Hazel Pomaderris *Pomaderris aspera* and Sweet Pittosporum *Pittosporum undulatum*. Blackwood *Acacia melanoxylon* is the only dominant, scattered emergent tree. Eucalypts are only present on the fringes with surrounding EVCs.

Small understorey trees include Blanket-leaf *Bedfordia arborescens*, Musk Daisy-bush *Olearia argophylla* and Austral Mulberry *Hedycarya angustifolia*. Common small shrubs include Prickly Currant-bush *Coprosma quadrifida*, White Elderberry *Sambucus gaudichaudiana*, Three-nerved Cassinia *Cassinia trinerva* and Snow Daisy-bush *Olearia lirata*.

The fern layer is well developed, with both Rough Tree-fern *Cyathea australis* and Smooth Tree-fern *Dicksonia antarctica* always present. Ground ferns are diverse and dense and include Shiny Shield-fern *Lastreopsis acuminata*, Mother Shield-fern *Polystichum proliferum*, Gristle Fern *Blechnum cartilagineum*, Strap Water-fern *B. patersonii* ssp. *patersonii*, Necklace Fern *Asplenium flabellifolium*, Bat's Wing Fern *Histiopteris incisa*, Sickie Fern

Pellaea falcata and Veined Bristle-fern *Polyphlebium venosum*. Epiphytic ferns are also an important feature of *East Gippsland Foothills* Warm Temperate Rainforest. The common species include Mother Spleenwort *Asplenium bulbiferum* ssp. *gracillimum*, Common Filmy Fern *Hymenophyllum cupressiforme* and Kangaroo Fern *Microsorium pustulatum*.

Climber are another important feature of *East Gippsland Foothills* Warm Temperate Rainforest, although they are not as diverse as *Alluvial Terraces* Warm Temperate Rainforest. Austral Sarsaparilla *Smilax australis*, Milk-vine *Marsdenia rostrata*, Wombat Berry *Eustrephus latifolius*, Fieldia *Fieldia australis* and Twining Silkpod *Parsonsia brownii* are all common climbers.

Forbs and grasses are much less numerous than *Alluvial Terraces* Warm Temperate Rainforest. The few that are commonly found in canopy gaps include Shade Nettle *Australina pusilla* ssp. *muelleri*, Forest Starwort *Stellaria flaccida*, Scrub Nettle *Urtica incisa*, Northern Cranesbill *Geranium homeanum* and Weeping Grass *Microlaena stipoides* is the only common grass.

Floristic Community:

32-05 *East Gippsland Coastal* Warm Temperate Rainforest
East Gippsland Coastal Warm Temperate Rainforest is restricted to the eastern extremity of the study area near Lakes Entrance, associated with the more warm temperate climatic conditions. Soils are generally well drained, gradational sandy clay to clay loams, which are neutral to alkaline and may be quite stony. The elevation ranges from 1-40m above sea level and annual rainfall is in the vicinity of 700 mm.

It typically occupies the most protected gullies and slopes and consists of a dense cover of Lilly Pilly *Acmena smithii*, Sweet Pittosporum *Pittosporum undulatum*, Musk Daisy-bush *Olearia argophylla*, Hazel Pomaderris *Pomaderris aspera*, Muttonwood *Rapanea howittiana* and Yellowwood *Acronychia oblongifolia*. Blackwood *Acacia melanoxylon* is also often present.

East Gippsland Coastal Warm Temperate Rainforest is characterised by the presence of a number of indicative vines such as Bearded Tylophora *Tylophora barbata*, Austral Sarsaparilla *Smilax australis*, Staff Climber *Celastrus australis* and Milk-vine *Marsdenia rostrata*.

Floristic Community:

32-07 *Strzeleckis* Warm Temperate Rainforest
Strzeleckis Warm Temperate Rainforest is entirely restricted to the lowland valleys of the Strzelecki Ranges in South Gippsland. It is found at elevations between 80 and 240m above sea level where it grows on the slopes adjacent to streams and along minor gullies in the vicinity of Damp Forest and Wet Forest. Soils are deep grey to dark greyish-brown friable clay loams derived from Cretaceous

feldspathic mudstones and arkose sandstones (Peel 1999).

Structurally, these rainforest stands are low in stature and simple in floristic composition. The overstorey is dominated by Mountain Grey Gum *Eucalyptus cypellocarpa*, Gippsland Blue Gum *E. globulus* ssp. *pseudoglobulus*, Messmate *E. obliqua* and Yellow Stringybark *E. muelleriana*. Blackwood *Acacia melanoxylon* is a common emergent as many sites have been cleared and/or logged in the past. Other more common secondary species include Austral Mulberry *Hedycarya angustifolia* and Hazel Pomaderris *Pomaderris aspera* which often act as canopy trees. In less disturbed sites, Sweet Pittosporum *Pittosporum undulatum* and Muttonwood *Rapanea howittiana* are well represented as the primary canopy species (Peel 1999).

The canopy is covered with lianes including Forest Clematis *Clematis glycinoides*, Wonga Vine *Pandorea pandorana*, and to a lesser extent Twining Silkpod *Parsonsia brownii*. The understorey is characteristically open with only one shrub species, Prickly Currant-bush *Coprosma quadrifida* ever dominant. Other species recorded from gaps in the community include Musk Daisy-bush *Olearia argophylla*, Snowy Daisy Bush *O. lirata*, Elderberry *Panax polyscias sambucifolia*, Victorian Christmas Bush *Prostanthera lasianthos*, Forest Nightshade *Solanum prinophyllum*, Kangaroo Apple *S. aviculare* and Scrub Nettle *Urtica incisa*.

The ground cover is dominated by herbs where more light penetrates through the canopy, or it is sparse and litter-dominated in the shadier areas. Common herbs include Shade Plantain *Plantago debilis*, Weeping Grass *Microlaena stipoides*, Forest Starwort *Stellaria flaccida*, Forest Hound's-tongue *Austrocynoglossum latifolium* and Yellow Wood-sorrel *Oxalis corniculata* spp. agg. Other species present are the ferns Necklace Fern *Asplenium flabellifolium* (indicative of the drier understorey conditions), Sickle Fern *Pellaea falcata*, Tender Brake *Pteris tremula*, Mother Shield-fern *Polystichum proliferum*, Tall Sword-sedge *Lepidosperma elatius* and Tussock-grass *Poa* spp.

Floristic Community:

32-08 *Wilson's Promontory Overlap* Warm Temperate Rainforest

Wilson's Promontory Overlap Warm Temperate Rainforest is only found at Wilson's Promontory and is mostly recorded in topographically protected low altitude areas of the central and eastern parts of Wilson's Promontory associated with lowland valleys, gullies and major river flats. Soils are deep, dark brown sandy colluviums or silty alluviums derived from granitic geologies and contain high levels of organic matter in the A and B horizons. Wilson's Promontory represents the southern biogeographic limit of Warm Temperate Rainforest in Australia (Peel 1999). It grows at an altitude of up to about 400m above sea level and rainfall is in the vicinity of 900-1000 mm.

Stronghold areas are often free of eucalypts but sometimes include Messmate *Eucalyptus obliqua* and Blue Gum *E. globulus* and tend towards a park-like, open structure. A dense, tall shrub/small tree cover of Lilly Pilly *Acmena smithii* is typically present as well as Musk Daisy-bush *Olearia argophylla*, Blue Oliveberry *Elaeocarpus reticulatus*, Austral Mulberry *Hedycarya angustifolia*, and Hazel Pomaderris *Pomaderris aspera* with emergent Blackwood *Acacia melanoxylon* over a relatively open understorey that includes Prickly Currant-bush *Coprosma quadrifida*.

Wilson's Promontory Overlap Warm Temperate Rainforest includes a high diversity of tree-ferns, ground ferns and epiphytic ferns. These include Soft Tree-fern *Dicksonia antarctica*, Rough Tree-fern *Cyathea australis*, and the ground-ferns Mother Shield-fern *Polystichum proliferum*, Shiny Shield-fern *Lastreopsis acuminata*, Leathery Shield-fern *Rumohra adiantiformis*, Austral Bracken *Pteridium esculentum*, Hard Water-fern *Blechnum watsii*, Gristle Fern *B. cartilagineum* and Fishbone Water-fern *B. nudum*. The epiphytic dicotyledon, Fieldia *Fieldia australis*, is also common, as is Fragrant Fern *Microsorium scandens* and Kangaroo Fern *M. pustulatum*.

Impeded drainage is indicated by the presence of the sedges, Brickmakers' Saw-sedge *Gahnia grandis* and Tall Sedge *Carex appressa* as well as the tree-fern, Austral King-fern *Todea barbara*.

EVC 34 Dry Rainforest

Floristic Community:

34-02 *Gorges Dry Rainforest*

Within the study area *Gorges Dry Rainforest* is uncommon and has only been recorded in two areas in gorges on the Mitchell River including north of Billy Goat Bend. This is the western-most occurrence of this EVC within Victoria. *Gorges Dry Rainforest* grows on riverine cliffs and on colluvial rock screes which collect at the base of the cliffs (Peel, 1999). Soils are rocky and skeletal, though the parent geology is quite fertile, with moderate to high humus levels which often give rise to fertile soils (Peel, 1999). It grows on dry northern and western aspects, but is not fire-prone due to its position on rock outcrops and on rock screes along rivers. In addition, it borders fire retardant vegetation (i.e. *Alluvial Terraces* Warm Temperate Rainforest and *Gallery Rainforest*). It is restricted to low elevations ranging from 47-150m above sea level and to areas of low average annual rainfall of around 700mm.

The overstorey is characteristically composed of broad-leaved trees of varying density and cover, though mature examples of this floristic community carry an extremely dense cover. Species present are Kurrajong *Brachychiton populneus*, Sweet Pittosporum *Pittosporum undulatum*, Muttonwood *Rapanea howittiana* and Lilly-Pilly *Acmena smithii*. Occasional Yellow Box *Eucalyptus melliodora* and Red Box *E. polyanthemus* may be present though

these contribute little to the overall structure of the vegetation.

The shrub layer is poorly developed with Tree Violet *Hymenanthera dentata*, Black Wattle *Acacia mearnsii*, Lightwood *A. implexa* and Prickly Currant-bush *Coprosma quadrifida* present but rarely structurally prominent. Burgan *Kunzea ericoides* and Common Correa *Correa reflexa* may be present. Nodding Saltbush *Einadia nutans* and Saloop *E. hastata* are common prostrate shrubs.

The ground layer is diverse, containing a range of drought and shade tolerant species, however they are rarely abundant. Common forbs and graminoids include Long-leaf Wallaby Grass *Notodanthonia longifolia* and Basket-grass *Oplismenus hirtellus*. Kidney-weed *Dichondra repens* and Scrub Nettle *Urtica incisa* commonly form tangled mats over large areas. Other less abundant but commonly occurring forbs include Petty Spurge *Euphorbia peplus*, Slender Dock *Rumex brownii*, Southern Tick-trefoil *Desmodium gunnii* and Cockspear Flower *Plectranthus parviflorus*. Commonly occurring ferns are Sickie Fern *Pellaea falcata* var. *falcata* and Necklace Fern *Asplenium flabellifolium*.

The most diverse, distinctive and characteristic life form in Gorges Dry Rainforest is the vines and scramblers. With the exceptions of Forest Starwort *Stellaria flaccida* and Twining Glycine *Glycine clandestina*, all are large robust vines that form dense masses throughout the canopy and are particularly heavy on the margins of the Rainforest. Species include Cleavers **Galium aparine*, Scrambling Lily *Geitonoplesium cymosum*, Milk-vine *Marsdenia rostrata*, Staff Climber *Celastrus australis*, Wombat Berry *Eustrephus latifolius*, Forest Clematis *Clematis glycinoides*, Wonga Vine *Pandorea pandorana*, Austral Sarsaparilla *Smilax australis*, and Jasmine Morinda *Morinda jasminoides*. Blackberry **Rubus fruticosus* spp. agg. and Small-leaf Bramble *R. parvifolius* are also present.

EVC 35 Tableland Damp Forest

Floristic Community:

35-02 *Gippsland* Tableland Damp Forest
Gippsland Tableland Damp Forest occurs at montane elevations in high rainfall areas around Mt Baldhead and on the headwaters of the Avon River. It occurs around 1200m above sea level and receives an average annual rainfall of 1194mm. It grows on south-facing slopes and occasionally in gully heads on northern or western slopes. Most of the sites are topographically well protected from wind and from direct sunlight by frequent cloud cover at these elevations. Underlying soils are shallow to moderately deep, with a well-developed humus layer and abundant leaf litter. This EVC contains species characteristic of dry montane woodlands from higher elevations and of wetter forest communities downslope.

The overstorey is almost always dominated by Alpine Ash *Eucalyptus delegatensis*. *Gippsland*

Peppermint *E. croajingolensis* and Mountain Gum *E. dalrympleana* occur as subdominant trees. Silver Wattle *Acacia dealbata* is a common and often dominant feature of the understorey tree layer.

The shrub stratum is diverse and, depending on its disturbance history will vary in dominance, abundance and density. Rough *Coprosma* *Coprosma hirtella*, Dusty Daisy-bush *Olearia phlogopappa* and Elderberry *Panax Polyscias sambucifolia* are common and form the bulk of the shrub layer. Long-unburnt sites commonly carry Alpine Pepper *Tasmannia xerophila*, Drooping Beard-heath *Leucopogon gelidus* and Mountain Beard-heath *L. hookeri* as co-dominants. More recently burnt sites may have an almost complete layer of Hop Bitter-pea *Daviesia latifolia* (some tree-form) or Mountain Hickory Wattle *Acacia obliquinervia*. More open or exposed sites contain Alpine Podolobium *Podolobium alpestre*, Gorse Bitter-pea *Daviesia ulicifolia* and Cluster-flower Geebung *Persoonia confertiflora*. Many of the common shrubs are bird-dispersed.

The understorey carries a scattering of tree-ferns. In the wettest sites, there may be a total ground cover of Mother Shield-fern *Polystichum proliferum* intermingled with Forest Starwort *Stellaria flaccida* and few smaller shrubs.

Gippsland Tableland Damp Forest is diverse in forbs and graminoids. These include the 'broad-leaved' Tussock-grasses, notably Sword Tussock-grass *Poa ensiformis*, in addition to Tasman Flax-lily *Dianella tasmanica*, Derwent Speedwell *Derwentia derwentiana* and many shade-tolerant species such as Bidgee Widgee *Acaena novae-zelandiae*, Mountain Cotula *Leptinella filicula*, Common Lagenifera *Lagenifera stipitata* and Ivy-leaf Violet *Viola hederacea*.

EVC 36 Montane Dry Woodland

Montane Dry Woodland occurs on dry and exposed mid to upper slopes at montane elevations between 950-1200m above sea level. Rainfall varies between the floristic communities of Montane Dry Woodland, however effective rainfall may be enhanced by cold air drainage, low cloud cover and in some cases, persistent snow cover. Species present in this EVC are typical of dry, moist and cold environments. Structurally, this EVC varies from an open forest to an open woodland where the trees are woodland in form rather than cover, as the major crown-bearing units form low down on the trunk to produce a spreading habit.

There are two floristic communities of Montane Dry Woodland: *Gibbo River* Montane Dry Woodland and *Gippsland 1* Montane Dry Woodland.

Floristic Community:

36-01 *Gibbo River* Montane Dry Woodland
Gibbo River Montane Dry Woodland primarily occurs at montane elevations within the *Gibbo River* and occasionally in the *Tambo River* catchments. It occurs at elevations averaging 1100m above sea

level. Rainfall is very high, averaging 1200mm per annum making it one of the wettest EVCs in the study area. This floristic community is floristically more diverse than *Gippsland 1* Montane Dry Woodland.

Common species in the overstorey include Broad-leaved Peppermint *Eucalyptus dives*, Snow-gum *E. pauciflora*, Candlebark *E. rubida* and Mountain Gum *E. dalrympleana* ssp. *dalrympleana*. Brittle Gum *E. mannifera* and Narrow-leaf Peppermint *E. radiata* are common in drier sites. Silver Wattle *Acacia dealbata* is frequently found as an understorey tree.

Gibbo River Montane Dry Woodland has a characteristically diverse shrub layer which generally forms an even, fairly open layer. Species present include Prickly Bush-pea *Pultenaea forsythiana*, Moth Daisy-bush *Olearia erubescens*, Handsome Flat-pea *Platylobium formosum*, Gorse Bitter-pea *Daviesia ulicifolia*, Pale-fruit Ballart *Exocarpos strictus* and Dwarf Geebung *Persoonia chamaepeuce*. Shrub species indicative of moist environments include Common Cassinia *Cassinia aculeata*, Rough Coprosma *Coprosma hirtella*, Elderberry *Panax polyscias sambucifolia* and Mountain Hickory Wattle *Acacia obliquinervia*.

The ground layer lacks diversity compared to *Gippsland 1* Montane Dry Woodland which carries more species of grasses and forbs. This may be due to the more dense shrub layer in the former. Common graminoids include Grey Tussock-grass *Poa sieberiana*, Spiny-headed Mat-rush *Lomandra longifolia*, Grass Trigger-plant *Stylidium graminifolium* and Tasman Flax-lily *Dianella tasmanica*. The only common forbs include Common Raspwort *Gonocarpus tetragynus*, Slender Fireweed *Senecio tenuiflorus*, Prickly Starwort *Stellaria pungens* and Showy Violet *Viola betonicifolia* ssp. *betonicifolia*.

Clematis aristata is the only common climber in *Gibbo River* Montane Dry Woodland.

Floristic Community:

36-02 *Gippsland 1* Montane Dry Woodland
Gippsland 1 Montane Dry Woodland occurs at an average elevation of around 950m but has been recorded as high as 1200m above sea level. Average annual precipitation is relatively low at 900mm but this is supplemented by low cloud cover, cold air drainage and snow-fall. This is reflected in the floristic composition which carries species indicative of both moist and/or cold environments. *Gippsland 1* Montane Dry Woodland is widespread throughout the study area, occurring in the Bowen Mountains, around Mt Tambo and along Splinters Range Road east of Omeo, around Mt Nugong and near Mt Delusion.

The overstorey is dominated by Candlebark *Eucalyptus rubida* and Broad-leaved Peppermint *E. dives*. In more exposed situations, Snow Gum *E. pauciflora* may occur as the sole dominant or in a

mixture with either or both of these species. On more protected sites Narrow-leaf Peppermint *E. radiata* may be found in a mixture with *E. rubida* and *E. pauciflora*.

Several shrub species may be locally abundant, notably Common Cassinia *Cassinia aculeata*, Handsome Flat-pea *Platylobium formosum*, Grey Guinea-flower *Hibbertia obtusifolia*, Mountain Beard-heath *Leucopogon hookeri* and Honey-pots *Acrotriche serrulata*. Silver Wattle *Acacia dealbata* predominantly occurs in shrub form, rarely attaining a height greater than 2m. These shrubs are well adapted to relatively harsh environments of this EVC.

The ferns Austral Bracken *Pteridium esculentum* and Mother Shield-fern *Polystichum proliferum* may form particularly dense stands.

A characteristic feature of *Gippsland 1* Montane Dry Woodland is the diversity of the ground flora though it is structurally dominated by 'fine-leaved' Tussock Grasses *Poa* spp.. Other large graminoids include Spiny-headed Mat-rush *Lomandra longifolia* and Tasman Flax-lily *Dianella tasmanica*. Forbs are diverse in this floristic community and can cover much of the ground stratum in between tussock-forming graminoids. Dominant forbs include Bidgee Widgee *Acaena novae-zelandiae*, Prickly Woodruff *Asperula scoparia*, Common Raspwort *Gonocarpus tetragynus*, Hairy Pennywort *Hydrocotyle hirta*, Prickly Starwort *Stellaria pungens* and Cotton Fireweed *Senecio quadridentatus*.

Twining Glycine *Glycine clandestina* and Mountain Clematis *Clematis aristata* are the common climbers.

EVC 37 Montane Grassy Woodland

Floristic Community:

37-01 *Beloka 1* Montane Grassy Woodland

Beloka 1 Montane Grassy Woodland occurs at an average elevation of 910m above sea level, with an average annual rainfall of 950mm. Low cloud cover and occasional snow fall increase the effective rainfall. This floristic community is very diverse and fertile geology gives rise to high abundance and cover of grasses and forbs. Within the study area it occurs exclusively in the Beloka area, north east of Benambra.

The overstorey is dominated by Broad-leaved Peppermint *Eucalyptus dives*, Narrow-leaved Peppermint *E. radiata* s.l. and Candlebark *E. rubida* which form a woodland, with Silver Wattle *Acacia dealbata* in the understorey. Red Stringybark *E. macrorhyncha* ssp. *macrorhyncha* and Brittle Gum *E. mannifera* are less frequent.

The shrub layer is sparse and varies in height. Species present include Pale-fruit Ballart *Exocarpos strictus*, Handsome Flat-pea *Platylobium formosum*, Austral Indigo *Indigophera australis*, Hop Bitter-pea *Daviesia latifolia*, Shiny Cassinia *Cassinia*

longifolia, Common Cassinia *C. aculeata* and Mountain Mirbelia *Mirbelia oxylobioides*. Low prostrate shrubs are common and scattered. The most common are Daphne Heath *Brachyloma daphnoides*, Grey Guinea-flower *Hibbertia obtusifolia*, Honey-pots *Acrotriche serrulata*, Dwarf Boronia *Boronia. nana* var. *hyssopifolia* and Common Hovea *Hovea linearis*.

In addition to a diversity of other graminoids and forbs, the understorey is distinctively grassy. Larger graminoids include Wattle Mat-rush *Lomandra filiformis*, Common Woodrush *Luzula meridionalis* var. *flaccida* and *L. meridionalis* var. *densiflora*, Spiny-headed Mat-rush *Lomandra longifolia*, Common Bog-sedge *Schoenus apogon*, Grass Trigger-plant *Stylidium graminifolium* and Black-anther Flax-lily *Dianella revoluta*. Grasses include Grey Tussock-grass *Poa sieberiana* var. *sieberiana*, Kangaroo Grass *Themeda triandra*, Lesser Quaking-grass *Briza minor*, Silvery Hair-grass **Aira caryophylla*, Elegant Hair-grass **A. elegans*, Fox-tail Fescue **Vulpia myuros forma megalura*, Grey Tussock-grass *Poa sieberiana* var. *hirtella*, Misty Bent *Agrostis venusta*, Common Wheat-grass *Elymus scabrus* and Short-hair Plume-grass *Dichelachne micrantha*.

Common forbs include Common Centaury *Centaureum erythraea*, Common Raspwort *Gonocarpus tetragynus*, Small St. John's Wort *Hypericum gramineum*, Cat's-ear **Hypochoeris radicata*, Austral Cranesbill *Geranium solanderi*, Tall Bluebell *Wahlenbergia stricta* ssp. *stricta*, Tall Sundew *Drosera peltata* ssp. *auriculata*, Yam Daisy *Microseris scapigera* spp. agg., Small Poranthera *Poranthera microphylla* and Creamy Stackhousia *Stackhousia monogyna*. Orchids are also common and include Slender Sun-orchid *Thelymitra pauciflora* s.l., Green-comb Spider-orchid *Caladenia dilatata* spp. agg., Pink Fingers *C. carnea* spp. agg., Musky Caladenia *C. gracilis*, Leopard Orchid *Diuris pardina* and Common Bird Orchid *Chiloglottis valida*.

Twining Glycine *Glycine clandestina* and Purple Coral-pea *Hardenbergia violacea* are the only scramblers.

Floristic Community:

37-04 *Beloka 2* Montane Grassy Woodland *Beloka 2* Montane Grassy Woodland is very similar to *Beloka 1* Montane Grassy Woodland, but generally wetter as it receives higher annual rainfall of up to 1150mm. In addition, it occurs at higher elevations, generally exceeding 1000m above sea level. Many species present are common to wetter environments and there are fewer shrubs in this community than the former. The ground layer is similarly rich in forbs and grasses. *Beloka 2* Montane Grassy Woodland occurs on seyenite which is a feldspathic, iron-rich intrusive geology.

The higher elevation of this floristic community is reflected by the overstorey dominated by Snow Gum *Eucalyptus pauciflora* with Mountain Gum *E.*

dalrympleana ssp. *dalrympleana* also being present. These two species are absent from *Beloka 1* Montane Grassy Woodland. Narrow-leaf Peppermint *E. radiata* is common in both floristic communities. Silver Wattle *Acacia dealbata* and Blackwood *Acacia melanoxylo*n are common understorey trees.

Understorey shrubs include Handsome Flat-pea *Platylobium formosum* and Pale-fruit Ballart *Exocarpus strictus*. These species are common to both communities. Grey Guinea-flower *Hibbertia obtusifolia* and Honey-pots *Acrotriche serrulata* are the only two common low, prostrate woody shrubs in *Beloka 2* Montane Grassy Woodland.

The characteristic grassy understorey includes Grey Tussock-grass *Poa sieberiana* var. *sieberiana*, Grey Tussock-grass *Poa sieberiana* var. *hirtella*, Common Wheat-grass *Elymus scabrus*, Kangaroo Grass *Themeda triandra* and Short-hair Plume-grass *Dichelachne micrantha*. The high diversity of other graminoids and forbs include Common Woodrush *Luzula meridionalis* var. *flaccida*, Spiny-headed Mat-rush *Lomandra longifolia*, Tasman Flax-lily *Dianella tasmanica*, Grass Trigger-plant *Stylidium graminifolium*, Cats Ear **Hypochoeris radicata*, Small St John's Wort *Hypericum gramineum*, Prickly Woodruff *Asperula scoparia*, Common Centaury **Centaureum erythraea*, Prickly Starwort *Stellaria pungens*, Tall Bluebell *Wahlenbergia stricta* ssp. *stricta*, Showy Violet *Viola betonicifolia* ssp. *betonicifolia* and Austral Cranesbill *Geranium solanderi*.

Geophytes and orchids are less common in this floristic community and include Helmet Orchid *Corybas* spp., Common Bird Orchid *Chiloglottis gunnii* spp. agg, Pink Fingers *Caladenia carnea* spp. agg. and Pale Vanilla-lily *Arthropodium milleflorum*

Climbers include Twining Glycine *Glycine clandestina* and Mountain Clematis *Clematis aristata*.

Floristic Community:

37-05 *Gippsland 1* Montane Grassy Woodland

Gippsland 1 Montane Grassy Woodland once occurred widely in the Omeo and Benambra districts at an elevation ranging from 700-900m above sea level. The single quadrat that is used to describe this floristic community is from the Oriental Claims area west of Omeo. It forms an open grassy woodland, with the ground layer dominated by herbs and grasses. It is affected by cold air drainage, resulting in the presence of montane species including Snow Gum *Eucalyptus pauciflora*, Candlebark *Eucalyptus rubida* and Knawel *Scleranthus* sp.

Snow Gum *Eucalyptus pauciflora* is the common eucalypt with Candlebark *E. rubida* sometimes co-occurring. Trees are sparse and form less than five per cent of cover.

Below this the shrub layer is usually sparse and contains only a few species although these may become prominent depending on fire history. Handsome Flat-pea *Platylobium formosum*, Clustered Everlasting *Chrysocephalum semipapposum* and is most commonly present, whilst Pale-fruit Ballart *Exocarpos strictus*, Hop bitter-pea *Daviesia latifolia* and Common Everlasting *C. apiculatum* s.s may sub-dominate. Prostrate shrubs lack diversity but are scattered over the ground layer. Honey-pot Heath *Acrotriche serrulata*, Grey Guinea-flower *Hibbertia obtusifolia* and Common Hovea *Hovea linearis* are the most commonly present.

The dominant feature of *Gippsland 1* Montane Grassy Woodland is the grassy ground layer, dominated by Kangaroo Grass *Themeda triandra*. Common Wheat-grass *Elymus scabrus*, Bent-grass *Deyeuxia* spp, Velvet Wallaby-grass *Austrodanthonia pilosa*, Bristly Wallaby-grass *Austrodanthonia setacea* var. *setacea* and less commonly Weeping Grass *Microlaena stipoides* form a sward of grasses. Grey Tussock-grass *P. sieberiana* var. *sieberiana* forms small tussocks with Silvery Hair-grass **Aira caryophylla* amongst the other grasses.

The most common forbs include Austral Cranesbill *Geranium solanderi*, Cat's Ear **Hypochoeris radicata*, Common Woodruff *Asperula conferta*, Austral Carrot *Daucus glochidiatus*, Common Raspwort *Gonocarpus tetragynus*, Small St John's Wort *Hypericum gramineum*, Hairy Speedwell *Veronica calycina*, Twiggy Mullein **Verbascum virgatum*, Prickly Starwort *Stellaria pungens*, Common Centaury **Centaureum erythraea*, Spear Thistle **Cirsium vulgare*, Knawel *Scleranthus* sp., Variable Plantain *Plantago varia*, Cotton Fireweed *Senecio quadridentatus* and Prickly Starwort *Stellaria pungens*.

Other important graminoids include Short-stem Sedge *Carex breviculmis*, Common Bog-sedge *Schoenus apogon*, Black-anther Flax-lily *Dianella revoluta*, Common Woodrush *Luzula meridionalis* var. *flaccida* and Wattle Mat-rush *Lomandra filiformis*.

EVC 38 Montane Damp Forest

Montane Damp Forest occurs in gullies or on protected southern and eastern slopes. It grows as a tall forest, with a sparse shrub layer of narrow and broad leaf shrubs. The ground layer is dominated by a broad range of forbs and grasses that require year-round moisture and can tolerate substantial periods of snow fall. It is distributed widely across the study area at elevations greater than 900m above sea level.

There are four floristic communities of Montane Damp Forest: *Gippsland 1* Montane Damp Forest, *Sheltered Slopes* Montane Damp Forest, *Exposed Slopes* Montane Damp Forest and *Gippsland 2* Montane Damp Forest.

Floristic Community:

38-01 *Gippsland 1* Montane Damp Forest
Gippsland 1 Montane Damp Forest is widespread across the study occurring at elevations ranging from 900–1200m above sea level. Annual average rainfall is 1150mm, which is supplemented by low cloud cover and snow falls during winter. It predominantly occupies eastern slopes, but may occur on more protected southern slopes.

The overstorey is dominated by Candlebark *Eucalyptus rubida*. Co-dominants vary with the environment but may include Broad-leaved Peppermint *E. dives*, Snow Gum *E. pauciflora* in exposed situations and Alpine Ash *E. delegatensis* in more protected locations. Silver Wattle *Acacia dealbata* is predominantly a shrub in this community but may become a small tree when growing in association with Alpine Ash *E. delegatensis*.

Shrub diversity is high. This stratum commonly has two layers with Silver Wattle *Acacia dealbata* and Mountain Hickory Wattle *A. obliquinervia* commonly present in the taller layer in addition to Elderberry *Panax Polyscias sambucifolia* and Prickly Currant-bush *Coprosma hirtella* which are ubiquitous but are not abundant. The lower shrub layer is well-developed and often dense. Several of the smaller shrubs, notably, Moth Daisy-bush *Olearia erubescens*, Bitter-pea *Daviesia ulicifolia* and Handsome Flat-pea *Platylobium formosum* are strongly suckering. After fire these species may totally dominate the ground layer. Other shrubs include Common Cassinia *Cassinia aculeata*, Cluster-flower Geebung *Persoonia confertifolia* and Slender Rice-flower *Pimelea linifolia*.

Austral Bracken *Pteridium esculentum* and Mother Shield-fern *Polystichum proliferum* are often present.

Forbs and graminoids contribute significantly to the diversity of this vegetation though few are structurally dominant. The 'fine-leaved' Tussock-grasses *Poa* spp. coupled with Tasman Flax-lily *Dianella tasmanica* form the bulk of the herbaceous ground layer. Other graminoids include Grass Trigger-plant *Stylidium graminifolium*, Spiny-headed Mat-rush *Lomandra longifolia*, Pale Vanilla-lily *Arthropodium milleflorum* and Field Woodrush *Luzula campestris* spp. agg. Common forbs include Prickly Starwort *Stellaria pungens*, Common Raspwort *Gonocarpus tetragynus*, Ivy-leaf Violet *Viola hederacea*, Hairy Lagenifera *Lagenifera stipitata*, Bidgee Widgee *Acaena novae-zelandiae* and Prickly Woodruff *Asperula scoparia*.

Floristic Community:

38-02 *Sheltered Slopes* Montane Damp Forest
Sheltered Slopes Montane Damp Forest characteristically but not always occupies the riparian zones and sheltered plateau sites in higher rainfall and higher elevation areas. Altitude ranges between 800–1150m and average annual rainfall is high at 1100mm, which is supplemented by low

cloud cover and long-lying snow in protected niches.

Overstorey species vary with soil type. The most common species in the overstorey are Mountain Gum *Eucalyptus dalrympleana* and Monaro Peppermint *Eucalyptus radiata* ssp. *robertsonii*. Alpine Ash *Eucalyptus delegatensis* and Manna Gum *Eucalyptus viminalis* may form all or part of the overstorey but are more commonly found in association with the previous two species.

The sub-tree stratum is often well-developed and dominated by Silver Wattle *Acacia dealbata* which may grow in heavy densities in response to disturbance. Blackwood *Acacia melanoxydon* is also common.

The shrub layer is particularly well developed and diverse. More common shrubs include Common Cassinia *Cassinia aculeata*, Prickly Bush-pea *Pultenaea forsythiana*, Rough Coprosma *Coprosma hirtella*, Dusty Daisy-bush *Olearia phlogopappa*, River Lomatia *Lomatia myricoides*, Prickly Currant-bush *Coprosma quadrifida*, Elderberry Panax *Polyscias sambucifolia*, Mountain Pepper *Tasmannia lanceolata*, Pale-fruit Ballart *Exocarpos strictus* and Banyalla *Pittosporum bicolor*. A couple of other smaller shrubs, Moth Daisy-bush *Olearia erubescens* and Handsome Flat-pea *Platylobium formosum*, are common and the latter may dominate the ground layer particularly in response to disturbance.

The wet and protected nature of *Sheltered Slopes* Montane Damp Forest, provides suitable habitat for Soft Tree-fern *Dicksonia antarctica*. Ground ferns are also common and include Mother Shield-fern *Polystichum proliferum*, Austral Bracken *Pteridium esculentum* and Fishbone Water-fern *Blechnum nudum*.

The ground stratum carries a diversity of forbs and graminoids. Common grasses include Grey Tussock-grass *Poa sieberiana*, Grey Tussock-grass *P. sieberiana* var. *hirtella*, Sword Tussock-grass *P. ensiformis* and Common Wheat-grass *Elymus scabrus*. Most of the herbs are characteristic of higher rainfall such as Ivy-leaf Violet *Viola hederacea* ssp. *hederacea*, Cinquefoil Cranesbill *Geranium potentilloides*, Prickly Woodruff *Asperula scoparia*, Bidgee Widgee *Acaena novae-zelandiae*. Although none of these species are restricted to this vegetation type, the combination with other herbs and graminoids is distinctive. Some of the herbs such as Grass Trigger-plant *Stylidium graminifolium*, Prickly Starwort *Stellaria pungens* and Small St. John's Wort *Hypericum gramineum* are usually found in more exposed situations, while Tasman Flax-lily *Dianella tasmanica* and Tall Sedge *Carex appressa* are normally found in more protected wetter sites. The unique combination of high light levels, high rainfall, lower ambient temperatures and a diverse, rocky substrate encourages this diversity of species

Floristic Community:

38-03 *Exposed Slopes* Montane Damp Forest
Exposed Slopes Montane Damp Forest occurs on west-facing slopes where cold air drainage from Wilson Creek Valley is pushed past the western side of the Splitters Range and this coupled with rainwater run-off from rocky plutons upslope enables the establishment of this floristic community of an EVC that usually requires a degree of protection and adequate soil fertility and moisture.

It occurs at elevations above 1100m above sea level, with high annual rainfall averaging 1150mm. Cloud cover and snow deposition also contribute to the effective rainfall. Within the study area, *Exposed Slopes* Montane Damp Forest is recorded in the Beloka area and east of Omeo on the Splitters Range.

The overstorey is dominated by Alpine Ash *Eucalyptus delegatensis* with Candlebark *Eucalyptus rubida* also being present. Silver Wattle *Acacia dealbata* is usually present, but may only form a scattered understorey to two metres in height.

Shrubs are usually not prominent and those species that do occur are widespread and common with the exception of Mountain Beard-heath *Leucopogon hookeri*. Some of the more common species, also found in the other floristic communities of Montane Damp Forest include River Lomatia *Lomatia myricoides*, Moth Daisy-bush *Olearia erubescens*, Rough Coprosma *Coprosma hirtella*, Elderberry Panax *Polyscias sambucifolia*, Common Cassinia *Cassinia aculeata*, Bootlace Bush *Pimelea axiflora*, Handsome Flat-pea *Platylobium formosum* and Eastern Prickly Bush-pea *Pultenaea forsythiana*. All of these shrubs may dominate after disturbance.

A characteristic feature of this vegetation is the ground layer which is composed of a high diversity of ferns, graminoids and forbs. The ground ferns Austral Bracken *Pteridium esculentum* and Mother Shield-fern *Polystichum proliferum* are nearly always present. Tall graminoids scattered amongst the ferns include Tasman Flax-lily *Dianella tasmanica*, and Spiny-headed Mat-rush *Lomandra longifolia*. Grasses are common and contribute much to the high biomass of this community. Common species include Grey Tussock-grass *Poa sieberiana*, Horny Snow-grass *P. fawcettiae*, Sword Tussock-grass *P. ensiformis*, Short-hair Plume-grass *Dichelachne micrantha*, Weeping Grass *Microlaena stipoides* and Slender Tussock-grass *P. tenera*. Other graminoids include Pale Vanilla-lily *Arthropodium milleflorum* and Grass Trigger-plant *Stylidium graminifolium*. Forbs are diverse amongst the grasses, with Prickly Starwort *Stellaria pungens*, Hairy Lagenifera *Lagenifera stipitata*, Ivy-leaf Violet *Viola hederacea*, and Bidgee Widgee *Acaena novae-zelandiae* most often present. Specific montane forb species include Royal Bluebell *Wahlenbergia gloriosa*, Pale Everlasting *Helichrysum rutidolepis*, Mountain

Cotula *Leptinella filicula* and Australian Carroway *Oreomyrrhis eriopoda*.

Floristic Community:

38-04 *Gippsland 2* Montane Damp Forest
Gippsland 2 Montane Damp Forest predominantly occurs in the south-west of the study area. Sites include Blue Plain Spur, Macalister Spur, Little Tamboritha and north of Dargo near Mt Ewen. It also occurs in the north-east of the study area near Mt Pendergast and in the Beloka area. Elevation ranges between 800-1130m above sea level and average annual rainfall is high at 1000mm.

Gippsland 2 Montane Damp Forest occurs at generally lower rainfall than the other floristic communities of Montane Damp Forest and at lower elevations than *Gippsland 1* and *Exposed Slopes* Montane Damp Forest. It is floristically and structurally similar to *Gippsland 1* Montane Damp Forest but lacks Alpine Ash *E delegatens* in the overstorey and Blackwood *Acacia melanoxyton* replaces Mountain Hickory Wattle *A. obliquinervia* which is common to *Gippsland 1* Montane Damp Forest.

Broad-leaved Peppermint *E. dives* dominates the overstorey, with Candlebark *E. rubida*, Gippsland Peppermint *E. croajingolensis* or Monaro Peppermint *E. radiata* ssp. *robertsonii* in more protected areas. Brittle Gum *E. mannifera* and Snow Gum *E. pauciflora* occur in more exposed situations.

This vegetation although occurring at lower elevations, contains many of the shrubs found in *Gippsland 1* Montane Damp Forest at higher elevations. Silver Wattle *Acacia dealbata* is commonly found in shrub form, but may grow as a tree in more protected sites. The shrub layer is more diverse than *Gippsland 1* Montane Damp Forest containing many similar species in addition to Prickly Bush-pea *Pultenaea forsythiana*, Pale-fruit Ballart *Exocarpos strictus* and Shiny Cassinia *Cassinia longifolia*. Within the lower shrub layer, Silky Daisy-bush *Olearia myrsinoides*, Pink bells *Tetratheca ciliata* and Daphne Heath *Brachyloma daphnoides* are common and sometimes dominate. Handsome Flat-pea *Platylobium formosum* may dominate the shrubby ground layer particularly after fire. Several small heathy species are present in this community and not in the other three communities of Montane Damp Forest. These include Honey-pots *Acrotriche serrulata*, Grey Guinea-flower *Hibbertia obtusifolia* and Common Heath *Epacris impressa*.

Austral Bracken *Pteridium esculentum* and Mother Shield-fern *Polystichum proliferum* are the only ferns present and are low in cover.

The herbaceous ground layer is diverse however only Tussock-grass *Poa australis* spp. agg and Spiny-headed Mat-rush *Lomandra longifolia* provide much cover. The latter appears to fill the ecological niche that Tasman Flax-lily *Dianella tasmanica* fills in *Gippsland 1* Montane Damp Forest. Other

common graminoids and forbs include *Dianella tasmanica*, Black-anther Flax-lily *D. revoluta*, Common Raspwort *Gonocarpus tetragynus*, Bidgee *Widgee Acaena novae-zelandiae*, Small St John's Wort *Hypericum gramineum*, Cats Ear *Hypochoeris radicata*, Cotton Fireweed *Senecio quadridentatus* and Ivy-leaf Violet *Viola hederacea*.

EVC 39 Montane Wet Forest

Montane Wet Forest is restricted to small areas on granodiorite around Mt Baldhead. It occurs at elevations around 1,000m above sea level, on south-facing slopes and in protected gullies. Rainfall is high and the soils are deep, fertile and structureless, which, although well-drained, may remain saturated for long periods.

The overstorey forms a tall forest dominated by Alpine Ash *Eucalyptus delegatensis* over an understorey tree layer of Silver Wattle *Acacia dealbata* and Southern Sassafras *Atherosperma moschatum*. Occasional tall shrubs grow below this including Banyalla *Pittosporum bicolor* and Mountain Tea-tree *Leptospermum grandifolium* amongst a dense layer of Soft Tree-fern *Dicksonia antarctica*. These strata combine to provide shade and protection for a fern-rich ground layer which includes Hard Water-fern *Blechnum wattsii* and Lance Water-fern *B. chambersii*. Scattered herbs occur in gaps in the ground layer including Shade Nettle *Australina pusilla* and Delicate Hook-sedge *Uncinia tenella*.

EVC 40 Montane Riparian Woodland

Montane Riparian Woodland occurs on the flats of perennial streams within Montane Dry Woodland. It is characterised by a tall shrubby overstorey under a low open woodland. Ecologically it is the montane equivalent of Riparian Forest but is more open in structure and lower in height. It contains the ubiquitous forbs and sedges often associated with creeks or river margins and a range of riparian shrubs lining the creek bank. Average elevation is 800m but it has been recorded at above 1000m above sea level. Water is usually freely available as this EVC derives much of its moisture directly from the creek and its associated water table in addition to a high annual rainfall.

There are two floristic communities of Montane Riparian Woodland: *Gippsland 1* Montane Riparian Woodland and *Gippsland 2* Montane Riparian Woodland.

Floristic Community:

40-01 *Gippsland 1* Montane Riparian Woodland
Gippsland 1 Montane Riparian Woodland occurs around 800m above sea level but can be found above 1000m. It occurs on fertile stream flats drawing its moisture from the stream rather than relying on rainfall. *Gippsland 1* Montane Riparian Woodland is a depauperate community of Montane Riparian Woodland.

The dominant eucalypt is Mountain Swamp Gum *Eucalyptus camphora* ssp. *humeana* and Narrow-

leaf Peppermint *E. radiata* s.l. but Manna Gum *E. viminalis* may also be present. Silver Wattle *Acacia dealbata* and Blackwood *A. melanoxylon* are common understorey trees.

Shrubs are much fewer and more sparse in *Gippsland 1* Montane Riparian Woodland as compared to *Gippsland 2* Montane Riparian Woodland. Both communities contain Prickly Currant-bush *Coprosma quadrifida* and Mountain Tea-tree *Leptospermum grandifolium*, however Tree Violet *Hymenanthera dentata* is only common in *Gippsland 1* Montane Riparian Woodland.

Ferns are common in the ground layer, the same species occurring in both floristic communities of Montane Riparian Woodland. Soft Water-fern *Blechnum minus* is the most common, with Mother Shield-fern *Polystichum proliferum*, Austral Bracken *Pteridium esculentum* and Fishbone Water-fern *B. nudum* often present.

Rushes and sedges are common to this floristic community and include Tall Sedge *Carex appressa*, Leafy Flat-sedge *Cyperus lucidus*, Fen Sedge *Carex gaudichaudiana*, Club-sedge *Isolepis subtilissima*, Mountain Club-sedge *I. crassiuscula* and Pale Rush *Juncus pallidus*.

Grasses are much less conspicuous or abundant in the ground layer compared to *Gippsland 2* Montane Riparian Woodland. Yorkshire Fog **Holcus lanatus* and Tussock Grass *Poa australis* spp.agg. are the most common grasses, with occasional occurrences of Silvery Hair-grass **Aira caryophyllea* and Kangaroo Grass *Themeda triandra*.

Forbs are common and many are weed species. The most common forbs include Bidgee Widgee *Acaena novae-zealandiae*, Creeping Cudweed *Euchiton gymnocephalus* s.s., Self Heal **Prunella vulgaris*, White Clover **Trifolium repens* and Red-stem Goosefoot **Chenopodium macrospermum*. Austral Brooklime *Gratiola peruviana* is notably missing from this community.

Small-leaf Bramble *Rubus parvifolius* is often present in addition to the weedy Sweet Briar **Rosa rubiginosa* and Blackberry **Rubus fruticosus* spp.agg, taking advantage of the moist and fertile conditions.

Floristic Community:

40-02 *Gippsland 2* Montane Riparian Woodland
Gippsland 2 Montane Riparian Woodland is restricted to the north-east part of the study area in the Bowen Mountains and around Mt Hope and Mt Gibbo. It occupies fertile stream flats at mid-range to montane elevations ranging between 600-950m above sea level and obtains its moisture from the streams and the water tables with which it is associated. It is species rich for a riparian system.

Gippsland 2 Montane Riparian Woodland usually forms a low open woodland with scattered

eucalypts along the stream's edge and is species rich for a riparian system. The overstorey is dominated by Mountain Swamp Gum *Eucaalyptus camphora* ssp. *humeana*. Narrow-leaved Peppermint *E. radiata* s.l. and Manna Gum *E. viminalis* are common sub-dominants and are often stunted in form. Mountain Gum *E. dalrympleana*, Candlebark *E. rubida* and Black Sallee *E. stellulata* occur occasionally in cold air drainage lines and in narrow valleys. Blackwood *Acacia melanoxylon* and Silver Wattle *A. dealbata* are an important floristic and structural feature of *Gippsland 2* Montane Riparian Woodland.

The shrub layer varies in structural dominance depending on site characteristics. Often, shrubs occur as scattered clumps, with Mountain Tea-tree *Leptospermum grandifolium* the most common. Other shrubs include Common Cassinia *Cassinia aculeata*, Prickly Currant-bush *Coprosma quadrifida*, River Lomatia *Lomatia myricoides* and Hazel Pomaderris *Pomaderris aspera*.

Ferns, sedges and rushes are floristically characteristic of riparian ecosystems in dissected landforms. Many species present here are also common in Riparian Forest. Common ferns include Mother Shield-fern *Polystichum proliferum*, Soft Water-fern *Blechnum minus*, Fishbone Water-fern *B. nudum* and Austral Bracken *Pteridium esculentum*. A diversity of sedges and rushes occurs, including Tall Sedge *Carex appressa*, Fen Sedge *C. gaudichaudii*, Common Sedge *C. inversa*, Leafy Flat-sedge *Cyperus lucidus*, Club-sedge *Isolepis subtilissima*, Common Bog-sedge *Schoenus apogon*, Rush *Juncus sarophorus*, Green Rush *J. gregiflorus* and Jointed Rush **J. articulatus*.

Grasses are also a conspicuous component of the ground layer of this floristic community. The introduced Yorkshire Fog **Holcus lanatus* is most common in addition to the native tussock grasses including Common Tussock-grass *Poa labillardierei*, Grey Tussock-grass *P. sieberiana*, Tall Mountain Tussock-grass *P. helmsii* and Sword Tussock-grass *P. ensiformis*. Other grasses and graminoids present include Common Blown Grass *Agrostis avenacea*, Common Wheat Grass *Elymus scabrus*, Weeping Grass *Microlaena stipoides*, Pale Vanilla-lily *Arthropodium milleflorum* and Tasman Flax-lily *Dianella tasmanica*.

Forbs are structurally and visually important, comprising almost half of the species recorded. Several weeds are included in this number, notably **Trifolium* spp. (Clovers) and Cat's Ear **Hypochoeris radicata*, which are species normally associated with domestic stock grazing. Other common weeds include Musk Monkey-flower **Mimulus moschatus*, Spear Thistle **Cirsium vulgare*, Bird's-foot trefoil **Lotus corniculatus*, Curled Dock **Rumex crispus* and Sow-thistle **Sonchus oleraceus*. Common native forbs include Bidgee-Widgee *Acaena novae-zealandiae*, Robust Willow-herb *Epilobium billardierianum*, Austral Brooklime *Gratiola peruviana*, Hairy Pennywort

Hydrocotyle hirta and Prickly Starwort *Stellaria pungens*.

Small-leaf Bramble *Rubus parvifolius* and Blackberry **Rubus discolor* are also common in *Gippsland 2* Montane Riparian Woodland.

EVC 41 Montane Riparian Thicket

Montane Riparian Thicket occurs within Montane Damp Forest on wet sandy alluvial flats, along streams with gentle gradings and in soaks at the heads of gullies on south-facing aspects. It is closed in structure, often forming a narrow, linear strip. Sites that occur on soaks may form a broader patch of vegetation. It is restricted to montane elevations above 1000m and areas of high rainfall however this community derives much of its moisture from ground water.

The overstorey tree stratum is usually absent, usually only occurring as overhang from adjacent Montane Damp Forest. The most common of these eucalypts are Mountain Ash *Eucalyptus delegatensis*, Snow Gum *E. pauciflora* and Candlebark *E. rubida*. Silver Wattle *Acacia dealbata* and Blackwood *A. melanoxylon* may form a sparse understorey tree layer.

The tall shrub layer is visually most prominent, where Mountain Tea-tree *Leptospermum grandifolium* commonly forms an almost closed canopy three to four metres tall. A series of smaller shrubs are common components of this vegetation, most notably Moth Daisy-bush *Olearia erubescens*, Alpine Daisy-bush *O. alpicola*, Mountain Baeckea *Baeckea utilis* and Drumstick Heath *Epacris breviflora*. Eastern Prickly Bush-pea *Pultenaea forsythiana* and Mountain Pepper *Tasmannia lanceolata* also occur and are common to the surrounding Montane Damp Forest.

The ferns are a major component of the ground layer vegetation. Alpine Water-fern *Blechnum penna-marina* is consistently present and is restricted and specific in its habitat preferences. Several other ferns are common including Fishbone Water-fern *Blechnum nudum*, Mother shield-fern *Polystichum proliferum* and Hard Water-fern *Blechnum wattsi*.

Sedges, grasses and forbs form a sparse but diverse ground layer. Common graminoids include Tall Carex *Carex appressa*, Tasman Flax-lily *Dianella tasmanica*, Rush *Juncus sarophorus* and Club-sedge *Isolepis subtilissima* and the grasses Short Bent-grass *Deyeuxia brachyathera*, Bog Bent-grass *D. gunniana*, Tall Tussock-grass *Poa helmsii*, Fine-leaf Bent *Agrostis* sp. aff. *hiemalis*, Yorkshire Fog **Holcus lanatus*, Prickly Snow-grass *Poa costiniana*, Sword Tussock-grass *P. ensiformis*, Grey Tussock Grass *P. sieberi* and Slender Tussock-grass *P. tenera*. Forbs are common and include Bidgee-Widgee *Acaena novae-zelandiae*, Mountain Cotula *Leptinella filicula*, Cinquefoil Cranesbill *Geranium potentilloides*, Hairy Pennywort *Hydrocotyle hirta*, Prickly Woodruff

Asperula scoparia, Self-heal **Prunella vulgaris* and Forest/Subalpine Buttercup *Ranunculus plebius/scapiger*.

EVC 42 Sub-alpine Shrubland

Sub-alpine Shrubland occurs above 1400m where snow persists for long periods. Species diversity is relatively low as a result of harsh site quality (dominance of exposed rock, shallow and skeletal soils and long periods of low temperatures).

Structurally this EVC is dominated by a dense, though sometimes patchy shrub-layer under scattered Snow Gum *Eucalyptus pauciflora* growing where soils accumulate in rock crevices. Common species in the shrub layer include Mountain Plum Pine *Podocarpus lawrencei*, Alpine Orites *Orites lancifolia*, *Ozothamnus* spp., Alpine Podolobium *Podolobium alpestre*, Burgan *Kunzea ericoides* and Alpine Grevillea *Grevillea australis*.

In the ground stratum exposed rocks and shallow soils provide substrate for bryophytes and small annual herbs in addition to perennial species including occasional Snow Grasses *Poa* spp., Bidgee Widgee *Acaena novae-zelandiae* and, in sheltered rock boulder areas where small amounts of soil have accumulated, Mother Shield-fern *Polystichum proliferum* and Tasman Flax-lily *Dianella tasmanica*.

EVC 43 Sub-alpine Woodland

Sub-alpine Woodland occurs on a wide range of geologies on plateaux and occasionally on mountain-tops above 1200m. Soils are relatively shallow, well-drained and vary in fertility with a rich humus layer. The understorey varies floristically and structurally with soil fertility where herbs and grasses dominate the ground layer on more fertile soils and less fertile soils carry a mix of shrubs, grasses and herbs. Snow may persist for long periods over winter and rainfall is relatively high.

The overstorey is dominated by a woodland of Snow Gum *Eucalyptus pauciflora*. The shrub layer varies in density from a continuous layer to scattered individuals in more grassy sites. Species present include Alpine Podolobium *Podolobium alpestre*, Mountain Pepper *Tasmannia lanceolata* and Derwent Speedwell *Derwentia derwentiana*. At lower elevations, when frequently burnt, Hop Bitter-pea *Daviesia latifolia* can dominate the shrub layer. Small Epacridaceae spp. including *Astroloma* spp. and Honey-pots *Acrotriche serrulata* scattered above the herb-rich ground layer.

The ground carries a diversity of grasses and forbs due to the rich humus layer. Snow Grasses *Poa* spp., along with Wallaby Grasses *Austrodanthonia* spp. are characteristic, with a rich suite of forbs including Bidgee Widgee *Acaena novae-zelandiae*, Sheep Sorrel **Acetosella vulgaris*, Australian Carraway *Oreomyrrhis ereopoda*, Tasman Flax-lily *Dianella tasmanica*, Grass Trigger Plant *Stylidium graminifolium* and *Brachyscome* spp

EVC 44 Treeless Sub-alpine Mosaic

This mosaic is restricted to cold air drainage areas on plateaux at sub-alpine elevations greater than 1100m. The soils are often poorly-drained and snow persists for long periods over winter and into spring.

This mapping unit was used where discrete EVCs were unable to be distinguished in the mapping due to the scale used (i.e. 1:100 000) although these were identifiable on the ground. Within the study area the EVCs contained in this mosaic may include Sub-alpine Grassland, Sub-alpine Shrubland, Sub-alpine Wet Heathland, Sub-alpine Damp Heathland and Fen. In other study areas other EVCs may be present in this Mosaic.

EVC 45 Shrubby Foothill Forest

Shrubby Foothill Forest is restricted to moderate to high rainfall zones, receiving 700-1150mm per annum. It occurs on ridges and on southern and eastern slopes in association with Damp Forest or Wet Forest and is characterised by a distinctive overstorey middle strata dominated by a diversity of narrow-leaved shrubs and a paucity of ferns, graminoids and herbs in the ground stratum.

There are five floristic communities of Shrubby Foothill Forest: *Strzeleckis* Shrubby Foothill Forest, *Wilsons Promontory* Shrubby Foothill Forest, *Gippsland 1* Shrubby Foothill Forest, *Mt Elizabeth* Shrubby Foothill Forest and *Gippsland 2* Shrubby Foothill Forest.

Floristic Community:

45-04 *Strzeleckis* Shrubby Foothill Forest
Strzeleckis Shrubby Foothill Forest is found mainly on the northern and western aspects of the higher slopes of the Strzelecki Ranges. It occurs in habitats at the drier end of Damp Forest extending from Carrajung on the eastern flank of the Strzeleckis to Loch in the west. Soils are fertile, well-drained, grey-brown loams and clay loams of Cretaceous origin. This EVC has been even more extensively cleared than Wet Forest in the Strzeleckis with some of the few remaining intact remnant patches being found at the Karl Harmann Reserve north-east of Leongatha and at Dickies Hill near Mirboo North. It is floristically and geographically closely associated with Herb-rich Foothill Forest. Elevation ranges from 100-500m above sea level and average annual rainfall is 900-1100 mm.

The overstorey is dominated by Narrow-leaf Peppermint *Eucalyptus radiata*, Messmate *E. obliqua*, Mountain Grey Gum *E. cypellocarpa* and to a lesser extent Silver-top *E. sieberi*. A diverse, shrubby understorey characterises this EVC with a limited range of herbs and grasses in the ground layer.

Characteristic shrubs include Narrow-leaf Wattle *Acacia mucronata*, Dusty Miller *Spyridium parvifolium*, Prickly Currant-bush *Coprosma quadrifida*, Hazel Pomaderris *Pomaderris aspera*, Snow Daisy-bush *Olearia lirata*, Shiny Cassinia

Cassinia longifolia, Hop Goodenia *Goodenia ovata*, Handsome Flat-pea *Platylobium formosum* and Wiry Bauera *Bauera rubioides*.

The ground layer is very species poor and helps distinguish this EVC from Herb-rich Foothill Forest. It includes Ivy-leaf Violet *Viola hederacea*, Forest Wire-grass *Tetrarrhena juncea*, Austral Bracken *Pteridium esculentum* and Tall Sword-sedge *Lepidosperma elatius*.

Floristic Community:

45-05 *Wilsons Promontory* Shrubby Foothill Forest

Wilsons Promontory Shrubby Foothill Forest is found on the higher slopes in the central and southern areas of Wilsons Promontory at the drier end of Damp Forest but in moister habitats than Lowland Forest. Soils are fertile, well-drained, grey-brown loams and clay loams.

The overstorey is often dominated by Messmate *Eucalyptus obliqua* and to a lesser extent Brown Stringybark *E. baxteri*. A diverse, shrubby understorey characterises this EVC with a limited range of herbs and grasses in the ground layer. Common shrubs include Rough Guinea-flower *Hibbertia aspera*, Large-leaf Bush-pea *Pultenaea daphnoides*, Hairpin Banksia *Banksia spinulosa* var. *cunninghamii*, Silver Banksia *B. marginata*, Hop Goodenia *Goodenia ovata*, Prickly Moses *Acacia verticillata* and Bushy Needlewood *Hakea decurrens*.

The ground layer is very species poor and has a low cover of Ivy-leaf Violet *Viola hederacea* s.l., Forest Wire-grass *Tetrarrhena juncea*, Austral Bracken *Pteridium esculentum*, Tall Sword-sedge *Lepidosperma elatius* and Variable Sword-sedge *L. laterale*.

Floristic Community:

45-06 *Gippsland 1* Shrubby Foothill Forest
Gippsland 1 Shrubby Foothill Forest occurs at lower elevations and rainfall than *Gippsland 2* Shrubby Foothill Forest, averaging only 590m and ranging between 650-950mm per annum, respectively. This community grows in more exposed situations on ridge tops than *Gippsland 2* Shrubby Foothill Forest.

The overstorey is almost completely dominated by Silvertop Ash *Eucalyptus sieberi*, though Red Stringybark *E. macrorhyncha* or occasionally Broad-leaved Peppermint *E. dives* may be present.

Characteristically, shrubs are the dominant strata within this floristic community, both floristically and structurally. Environmentally this community is dry and experiences a relatively frequent fire regime and many of the shrub species present have developed strategies for dealing with these conditions. Members from the Fabaceae, Proteaceae and Epacridaceae families are common. Strategies include strong suckering (e.g. Eastern Prickly Bush-pea *Pultenaea forsythiana* and Gorse

Bitter-pea *Daviesia ulicifolia*), obligate seed regeneration after fire (e.g. Shiny Cassinia *Cassinia longifolia*, Small-leaf Parrot-pea *Dillwynia phyllicoides*, Spiny Bossiaea *Bossiaea obcordata*, Lance Beard-heath *Leucopogon lanceolatus* var. *lanceolatus*, Common Heath *Epacris impressa* and Hop Goodenia *Goodenia ovata*) and facultative root regeneration (e.g. Holly Lomatia *Lomatia ilicifolia*, Cluster-flower Geebung *Persoonia confertiflora* and Prickly Broom-heath *Monotoca scoparia*). Other shrubs include a large proportion of Sunshine Wattle *Acacia terminalis* in addition to Grey Guinea-flower *Hibbertia obtusifolia*, White Marianth *Rhytidosporum procumbens*, Blue Dampiera *Dampiera stricta* and Glandular Pink-bells *Tetratheca labillardierei*.

The ground stratum is species and structurally poor. Graminoids are the most common and include Spiny-headed Mat-rush *Lomandra longifolia*, Tasman Flax-lily *Dianella tasmanica*, Variable Sword-sedge *Lepidosperma laterale*, Black-anther Flax-lily *D. revoluta*, Nodding Blue-lily *Stypandra glauca*, Tussock-grasses *Poa* spp. and Forest Wire-grass *Tetrarrhena juncea* (which may form considerable cover in response to disturbance). Very occasionally Austral Grass-tree *Xanthorrhoea australis* forms a scattered to dense understorey at the driest sites and Slender Saw-sedge *Gahnia microstachya* may be prominent and form large stands in the Licola to Briagalong area. Austral Bracken *Pteridium esculentum* is often present. Forbs are few and include Germander Raspwort *Gonocarpus teucrioides*, Common Raspwort *G. tetragynus* and Ivy-leaf Violet *Viola hederacea*.

Love Creeper *Comesperma volubile* and Common Apple-berry *Billardiera scandens* are common climbers through the shrub layer.

Floristic Community:

45-07 *Mount Elizabeth* Shrubby Foothill Forest
Mount Elizabeth Shrubby Foothill Forest occurs predominantly in the vicinity of Mt Elizabeth, with three isolated occurrences near Mt Birregun and in the Mitchell River National Park. It grows at low elevations ranging from 270-620m above sea level. Annual rainfall is also relatively low, averaging 800mm.

This is the only community of Shrubby Foothill Forest not dominated by Silvertop Ash *Eucalyptus sieberi*. No single species is dominant in the overstorey which may include Red Stringybark *Eucalyptus macrorhynca* ssp. *macrorhynca*, Red Ironbark *E. tricarpa*, Silvertop Ash *E. sieberi*, White Stringybark *E. globoidea* and Red Box *E. polyanthemus* ssp. *vestita*.

Once again, shrubs are abundant, however they are much drier species than the other two communities of Shrubby Foothill Forest. Pale Hickory Wattle *Acacia falciformis* is dominant. Tall shrubs include Shiny Cassinia *Cassinia longifolia*, Cherry Ballart *Exocarpos cupressiformis*, Sunshine Wattle *Acacia terminalis*, Common Correa *Correa*

reflexa, Tree Hakea *Hakea eriantha* and Eastern Prickly Bush-pea *Pultenaea forsythiana*. Beneath these smaller shrubs include Pomax *Pomax umbellata*, Grey Guinea-flower *Hibbertia obtusifolia*, Cluster-flower Geebung *Persoonia confertiflora*, Hop Goodenia *Goodenia ovata* and Curved/Silky Rice-flower *Pimelea curviflora/micrantha*.

Common graminoids include Nodding Blue-lily *Stypandra glauca*, Variable Sword-sedge *Lepidosperma laterale*, Spiny-headed Mat-rush *Lomandra longifolia*, Black-anther Flax-lily *Dianella revoluta* and Tasman Flax-lily *D. tasmanica*. Grasses contribute little structurally and floristically, with only two grasses Grey Tussock-grass *Poa sieberiana* and Weeping Grass *Microlaena stipoides* present. *Mount Elizabeth* Shrubby Foothill Forest has the most forbs present of the three communities of Shrubby Foothill Forest and these include Common Raspwort *Gonocarpus tetragynus*, Rough Bedstraw *Galium gaudichaudii*, Germander Raspwort *Gonocarpus teucrioides*, Small Poranthera *Poranthera microphylla*, Ivy-leaf Violet *Viola hederacea* and Cat's Ear *Hypochoeris radicata*.

Vines and climbers are most abundant in this community of Shrubby Foothill Forest and are represented by Common Apple-berry *Billardiera scandens*, Love Creeper *Comesperma volubile*, Purple Coral-pea *Hardenbergia violacea* and Wonga Vine *Pandorea pandorana*.

Floristic Community:

45-08 *Gippsland 2* Shrubby Foothill Forest
Gippsland 2 Shrubby Foothill Forest occurs at an average elevation of 860m above sea level. Average annual rainfall is quite high, ranging between 700-1150mm. It is the wettest of the three floristic communities of Shrubby Foothill Forest in the study area and occurs on ridges and protected upper slopes on southern and eastern aspects.

Gippsland 2 Shrubby Foothill Forest is dominated in the overstorey by Silvertop Ash *Eucalyptus sieberi*. The high moisture levels of this floristic community influence the secondary eucalypts which include White Stringybark *Eucalyptus globoidea*, Mountain Grey-gum *E. cypellocarpa*, Messmate Stringybark *E. obliqua* and Broad-leaved Peppermint *E. dives*.

Shrubs are the dominant component of *Gippsland 2* Shrubby Foothill Forest. The high elevation and rainfall give rise to species not found in the other two floristic communities. Silver Wattle *A. dealbata* and Mountain Hickory Wattle *A. obliquinervia* occur as tall shrubs. Species unique to this floristic community from wetter environments include Prickly Currant-bush *Coprosma quadrifida* and Snowy Daisy-bush *Olearia lirata*. Species unique to this community from drier environments include Box-leaf Bitter-pea *Daviesia buxifolia*, Honey-pots *Acrotriche serrulata* and Common Oxylobium *Oxylobium ellipticum*. Other common shrubs shared between the three floristic communities

include Gorse Bitter-pea *Daviesia ulicifolia*, Shiny Cassinia *Cassinia longifolia*, Sunshine Wattle *Acacia terminalis*, Eastern Prickly Bush-pea *Pultenaea forsythiana*, Cherry Ballart *Exocarpos cupressiformis*, Prickly Broom-heath *Monotoca scoparia*, Cluster-flower Geebung *Persoonia confertifolia*, Grey Guinea-flower *Hibbertia obtusifolia* and Glandular Pink-bells *Tetradlea labillardierei*.

The ground layer is sparse and includes Grass Trigger-plant *Stylidium gramineum*, Tasman Flax-lily *Dianella tasmanica*, Black-anther Flax-lily *D. revoluta*, Spiny-headed Mat-rush *Lomandra longifolia*, Austral Bracken *Pteridium esculentum*, Common Raspwort *Gonocarpus tetragynus* and Nodding Blue-lily *Stypantha glauca* in drier sites. Silvertop Wallaby-grass *Joycea pallida* may be prominent after frequent fire. Common Apple-berry *Billardiera scandens* is the only common climber.

EVC 47 Valley Grassy Forest

Valley Grassy Forest occurs under moderate rainfall regimes of 700-800 mm per annum on fertile colluvial or alluvial soils on lower slopes and gully floors that have well-drained clay loam soils. It has a floristic composition midway between Herb-rich Foothill Forest on the damper sites and Grassy Woodland on the drier sites.

Floristic Community:

47-07 *Mt Elizabeth Valley Grassy Forest*
Mt Elizabeth Valley Grassy Forest is found in the valleys and foothills surrounding Mt Elizabeth to the north, west and south-west. It ranges in altitude from 200-710m, with moderate rainfall and occurs on fertile, sandy clay loam soils which support a species-rich herbaceous ground layer.

Mt Elizabeth Valley Grassy Forest prefers drier habitats than the Herb-rich Foothill Forest communities and this is reflected in the overstorey species. It grows as a moderate to tall open forest, dominated by White Stringybark *Eucalyptus globoidea*, often in association with dry forest or woodland eucalypts such as Red Stringybark *E. macrorhyncha* or Red Box *E. polyanthemos*. In wetter sites Mountain Grey Gum *E. cypellocarpa* is common. Black Wattle *Acacia mearnsii* forms an understorey tree or tall shrub layer, and Silver Wattle *A. dealbata* is sometimes present.

The shrub layer is species-poor and sparse, with only a few medium-height shrubs including Shiny Cassinia *Cassinia longifolia*, Austral Indigo *Indigofera australis*, Common Cassinia *Cassinia aculeata*, Prickly Currant-bush *Coprosma quadrifida* and Golden-tip *Goodia lotifolia*. Small shrubs are almost absent, although Grey Guinea-flower *Hibbertia obtusifolia* is commonly present.

The ground layer is rich in graminoids. Grasses form a dense field layer the most common including Grey Tussock-grass *Poa sieberiana*, Weeping Grass *Microlaena stipoides*, Common Hedgehog-grass *Echinopogon ovatus*, Short-hair Plume-grass

Dichelachne micrantha, Stiped Wallaby-grass *Austrodanthonia racemosa* var. *racemosa*, Common Wheat-grass *Elymus scabrus* and Common Tussock-grass *P. labillardierei*. Other graminoids include Tasman Flax-lily *Dianella tasmanica*, Variable Sword-sedge *Lepidosperma laterale*, Wattle Mat-rush *Lomandra filiformis*, Spiny-headed Mat-rush *L. longifolia*, Common Woodrush *Luzula meridionalis* var. *flaccida* and Short-stem Sedge *Carex breviculmis*.

Forbs are also abundant and contribute significantly to the ground cover. Most commonly present include Spear Thistle *Cirsium vulgare*, Cat's Ears *Hypochoeris radicata*, Small Poranthera *Poranthera microphylla*, Hairy Speedwell *Veronica calycina*, Ivy-leaf Violet *Viola hederacea*, Bidgee-widgee *Acaena novae-zelandiae*, Austral Bugle *Ajuga australis*, Common Centaury *Centaureum erythraea*, Austral Bear's-ears *Cymbonotus preissianus*, Kidney-weed *Dichondra repens*, Cinquefoil Cranesbill *Geranium potentilloides*, Stinking Pennywort *Hydrocotyle laxiflora*, Small St John's Wort *Hypericum gramineum*, Prickly Starwort *Stellaria pungens* and Tall Bluebell *Wahlenbergia stricta* s.l.

Austral Bracken *Pteridium esculentum* is often present at varying densities. Other ferns include Necklace Fern *Asplenium flabellifolium*, Common Maidenhair *Adiantum aethiopicum* and Green Rock Fern *Cheilanthes austrotenuifolia*.

Mountain Clematis *Clematis aristata* may occur in moister sites, whilst Twining Glycine *Glycine clandestina* is always present.

EVC 48 Heathy Woodland

Heathy Woodland is mainly confined to the Gippsland plains, South Gippsland and the northern part of Wilsons Promontory. Geology consists of Tertiary and Quaternary sands. This EVC develops on the most infertile deep uniform sands with the topsoil being a light grey, loose sand, grading into a bleached greyish-white to yellow-brown sand (sometimes gravelly) subsoil. Sometimes a gravelly sand surface over a cemented yellow-brown gravelly hardpan is present. Elevation is from near sea level to 350m at Toms Cap and rainfall varies from 1000 mm at Wilsons Promontory to less than 500 mm per annum in the Sale area.

Heathy Woodland merges into Sand Heathland where sites become extremely well-drained, infertile and drought-stressed. As conditions become more poorly drained, the group merges into Sand Heathland/Wet Heathland Mosaic through to Wet Heathland and Riparian Scrub. Floristically, the EVC is closely related to Damp Sands Herb-rich Woodland which occurs on more fertile sands and is characterised by a more diverse herbaceous ground cover of forbs and grasses as well as a complement of heathy shrubs indicative of araneous soils.

The canopy consists of low scattered trees of Messmate *Eucalyptus obliqua*, Narrow-leaf Peppermint *E. radiata* and Shining Peppermint *E. willisii* as well as Yertchuk *E. consideriana*. Messmate *E. obliqua* is only ever found in this EVC in exposed near coastal situations in a stunted form. The shrub-dominated heathy understorey lacks grasses and herbs and is characterised by prickly-leaved shrubs of the Myrtaceae, Epacridaceae, Dilleniaceae, Fabaceae and Mimosaceae families. Banksias (Proteaceae family) are also common with Saw Banksia *Banksia serrata* often being a conspicuous species. The most frequent shrubs found in the understorey include Heath Tea-tree *Leptospermum myrsinoides*, Prickly Tea-tree *L. continentale*, Common Heath *Epacris impressa*, Showy Bossiaea *Bossiaea cinerea* and Prickly Broom-heath *Monotoca scoparia*.

Other shrubs present are Sweet Wattle *Acacia suaveolens*, Broom Spurge *Amperea xiphoclada*, Smooth Parrot-pea *Dillwynia glaberrima*, Silver Banksia *Banksia marginata*, Saw Banksia *B. serrata*, Common Beard-heath *Leucopogon virgatus*, Common Correa *Correa reflexa*, Common Wedge-pea *Gompholobium huegelii*, Common Aotus *Aotus ericoides*, Prickly Broom-heath *Monotoca scoparia*, Hairy Pink-bells *Tetratheca pilosa*, Horny Cone-bush *Iso Pogon ceratophyllus*, Common Flat-pea *Platylobium obtusangulum*, Honey-pots *Acrotriche serrulata* Wedding Bush *Ricinocarpos pinifolius* and Spike Wattle *Acacia oxycedrus*. The Guinea-flowers *Hibbertia* spp. are notably diverse in this group.

Other common species present are Austral Bracken *Pteridium esculentum*, Thatch Saw-sedge *Gahnia radula*, Spiny-headed Mat-rush *Lomandra longifolia*, and Small Grass-tree *Xanthorrhoea minor* ssp. *lutea*, Austral Grass-tree *Xanthorrhoea australis*, Blue Dampiera *Dampiera stricta*, Tassel Rope-rush *Hypolaena fastigiata*, Sand-hill Sword-sedge *Lepidosperma concavum*, and Slender Dodder-laurel *Cassytha glabella*.

Bracken dominated understoreys can develop in this group probably as a result of a high fire frequency or unsuitable burning regime, leading to the elimination of heathy shrubs and *Banksia serrata* from the understorey.

Floristic Community:

48-14 *Coastal Barrier* Heathy Woodland
Coastal Barrier Heathy Woodland occurs on the shores of Corner and Shallow Inlets, Snake, Sunday and Little Snake Islands in Shallow Inlet, South Gippsland and also on the Boole Poole Peninsula in the Gippsland Lakes. The geology consists of Quaternary barrier deposits of aeolian sand sheets. Rainfall is in the vicinity of 650-750 mm per annum and elevation is up to 10m above sea-level.

This community of Heathy Woodland is notable for the paucity of the usual prickly, narrow-leaved species found in Heathy Woodland elsewhere. In addition, it has a denser, taller shrub stratum

including dense thickets of Tree Broom-heath *Monotoca elliptica* and Saw Banksia *Banksia serrata*. Both these species are sensitive to high fire frequencies and their structural dominance may reflect a lower fire regime.

Apart from the above two dominant species, emergent Manna Gum *Eucalyptus viminalis* is often present over an understorey of shrubs including Prickly Tea-tree *Leptospermum continentale*, Sallow Wattle *Acacia longifolia*, Common Heath *Epacris impressa* and Honey-pots *Acrotriche serrulata*. Austral Bracken *Pteridium esculentum* is present in all sites sampled and common ground cover species include Common Lagenifera *Lagenifera stipitata*, Austral Grass-tree *Xanthorrhoea australis*, Sand-hill Sword-sedge *Lepidosperma concavum*, Spiny-headed Mat-rush *Lomandra longifolia* and Knobby Club-sedge *Isolepis nodosa*.

Coastal Barrier Heathy Woodland may be just a coastal old-growth form of Heathy Woodland.

EVC 53 Swamp Scrub

Swamp Scrub occurs on the plains of South Gippsland, at Wilsons Promontory, on the Gippsland Plains and would have been extensive in the Lake Wellington area before agricultural clearing and the opening of the Gippsland Lakes to the sea at Lakes Entrance. It develops mainly on poorly drained sites and on the margins of freshwater wetlands on organic soils. Swamp Scrub also occurs on some lower slope mineral soils prone to periodic seepage, particularly where a topsoil, such as a grey-brown sand, has a shallow hardpan in the subsoil. Elevation is low, ranging from near sea level to 60m in height above sea level and average annual rainfall is 500-1000 mm.

It is typically dominated by Swamp Paperbark *Melaleuca ericifolia* with an understorey that varies from quite depauperate to herbaceous depending on the density of the canopy. Species present often include Kidney-weed *Dichondra repens*, Bidgeewidgee *Acaena novae-zelandiae*, *Poa* spp. and *Geranium* spp.

Swamp Scrub is characterised by dense stems of Swamp Paperbark *Melaleuca ericifolia* and a moss/lichen/liverwort herbaceous ground cover where light penetrates to groundlevel. In these circumstances, species often present are Spiny-headed Mat-rush *Lomandra longifolia*, Slender Bog-sedge *Schoenus lepidosperma*, *Hydrocotyle* spp., Common Scale-rush *Lepyrodia muelleri* and Ivy-leaf Violet *Viola hederacea* but may include wetland elements such as Centella *Centella cordifolia*, Swamp Club-sedge *Isolepis inundata*, *Ranunculus* spp., Water-ribbons *Triglochin procerum* and Common Reed *Phragmites australis*. It may be depauperate where deep litter covers the ground and little light penetrates the canopy.

Groups adjacent to Swamp Scrub where better drainage conditions prevail include Lowland Forest,

Gippsland Plains Grassy Forest, South Gippsland Grassy Forest or Heathy Woodland.

Floristic Community:

53-01 *Calcareous* Swamp Scrub

Calcareous Swamp Scrub is restricted to the alkaline poor drainage areas of Wilsons Promontory. It is recorded only from the isthmus in the north but may also be present behind Oberon Bay. Soils are typically a black organic loam to peat. Elevation is low, at 1-20m above sea level and average annual rainfall is 900-950 mm.

Calcareous Swamp Scrub varies in structure and includes both scrub dominated and herbland forms. The scrub is characterised by thickets of Woolly Tea-tree *Leptospermum lanigerum* and a lush, herb-rich ground cover is present, which is prone to weed invasion due to the fertility and alkalinity of the soil. Common herbs are Water Parsnip *Berula ? erecta*, Slender Mint *Mentha diemenica*, Slender Knotweed *Persicaria decipiens*, Golden Dodder *Cuscuta tasmanica*, Hairy Hawkbit *Leontodon taraxacoides*, Scrub Nettle *Urtica incisa*, Sea Celery *Apium prostratum*, Kidney-weed *Dichondra repens*, Groundsel *Senecio* sp, Angled Lobelia *Lobelia alata*, Bidgee-widgee *Acaena novae-zelandiae* and Shining Pennywort *Hydrocotyle sibthorpioides*.

A number of species merge into this group as the poor drainage influences approach Riparian Scrub. The tall sedge, Leafy Twig-sedge *Cladium procerum*, which dominates in Blocked Coastal Stream Swamp is sometimes present. The herbland form typically attracts high densities of browsing marsupials. It is closely related to Wet Swale Herbland and may represent a degraded form of this group. The group merges upslope into Coastal Dune Scrub Mosaic adjacent to the coast, or Calcarenite Dune Woodland or Coast Banksia Woodland further inland.

EVC 55 Plains Grassy Woodland

Floristic Community:

55-03 *Gippsland* Plains Grassy Woodland

Gippsland Plains Grassy Woodland, also known as Forest Red Gum Woodland, is recorded on fertile soils across the low rainfall Gippsland plains from areas north of the Princes Highway such as Lake Glenmaggie and Briagolong to areas south of the highway, for example, Meerlieu and Moormung State Forest south-west of Bairnsdale with localised patches on Raymond Island. Elevation ranges from approximately 5-80 m above sea level and average annual rainfall is 500-900 mm. It merges into Damp Sands Herb-rich Woodland as soil profiles become more sandy and probably slightly less fertile and seems to have its main distribution inland from the Gippsland Lakes. The well-developed duplex soils consist of Lower Pleistocene gravels, sands, silts and clays with minor Tertiary alluvium. This EVC would have been extensive in the past which is reflected in the large numbers of relict trees of Forest Red Gum *Eucalyptus tereticornis* across the plains with an

introduced grassy or weedy understorey but today it is restricted to a few small remnant patches.

Gippsland Plains Grassy Woodland is typically dominated by Forest Red Gum *Eucalyptus tereticornis*. The understorey may include shrubs of Lightwood *Acacia implexa* and is usually grassy and herbaceous with sedges and lilies also present. Frequent grasses are Kangaroo Grass *Themeda triandra*, Weeping Grass *Microlaena stipoides*, Stiped Wallaby-grass *Austrodanthonia racemosa*, Knead Wallaby-grass *Austrodanthonia geniculata*, *Poa* spp, and Veined Spear-grass *Austrostipa rudis*. The Common Bog-sedge, *Schoenus apogon*, is often present together with lilies such as Yellow Rush-lily *Tricoryne elatior*, and Vanilla-lilies *Arthropodium* spp. Other species often present are Creeping Bossiaea *Bossiaea prostrata*, Cranberry Heath *Astroloma humifusum* and the herbs Kidney-weed *Dichondra repens*, Star Cudweed *Euchiton involucreatus*, Small Poranthera *Poranthera microphylla* and Trailing Speedwell *Veronica plebeia*.

EVC 56 Floodplain Riparian Woodland

Due to the lack of intact native remnants of Floodplain Riparian Woodland in the study area, the basis for this EVC description is from the Central Highlands study (VicRFASC 1997).

This low rainfall community is found on the banks and floodplains of the larger rivers of the Gippsland Plains including the LaTrobe, Thomson and Macalister Rivers. Floodplain Riparian Woodland has been extensively cleared for agriculture, and as a result of this clearing and periodical flooding disturbance, the EVC contains a large component of weeds, including Willows *Salix* spp. Soils are Quaternary stream alluviums and low level terrace deposits of sand, silt, clay and gravel. Elevation is low, averaging 20-30m above sea level and average annual rainfall is 550-800 mm.

Forest Red Gum *Eucalyptus tereticornis* or the closely related River Red Gum *E. camaldulensis* is the dominant overstorey tree over a medium shrub layer of Silver Wattle *Acacia dealbata* and Tree Violet *Hymenanthera dentata*. The groundlayer features Common Tussock-grass *Poa labillardieri* on the drier elevated banks, with Club-sedges *Isolepis* spp., Rushes *Juncus* spp., Common Reed *Phragmites australis* and Water-ribbons *Triglochin procerum* occupying the saturated or inundated soils at the water's edge.

EVC 61 Box Ironbark Forest

Floristic Community:

61-01 *Gippsland* Plains Box Ironbark Forest

Gippsland Plains Box Ironbark Forest is a dry forest type restricted to a stronghold area to the immediate south and south-west of Lake Glenmaggie near Heyfield. It occurs on a peneplain consisting of Tertiary fan deposits of sedimentary origin. The A horizon soils are often light grey, gritty clay loams of moderate to low fertility with the B horizon consisting of pale yellow to orange clays.

Elevation is in the range of 60-120m above sea level and average annual rainfall is 650-700 mm.

Gippsland Plains Box Ironbark Forest is a fairly distinctive vegetation grouping, almost always with Red Ironbark *Eucalyptus tricarpa* and Red Box *Eucalyptus polyanthemos* ssp. *vestita* as the common overstorey trees. Other eucalypts sometimes present include White Stringybark *Eucalyptus globoidea*, Yellow box *E. melliodora* and Apple-topped Box/But But *Eucalyptus angophoroides/bridgesiana*.

The mid storey is fairly consistent with Golden Wattle *Acacia pycnantha* forming a dense to open small tree layer. The shrub layer consists of Shiny Cassinia *Cassinia longifolia* and the ubiquitous shrub, Burgan *Kunzea ericoides* forming moderate to dense thickets.

The understorey is typically open in nature with a distinct array of small shrubs, herbs and grasses. Common shrubs are the prostrate Peach Heath *Lissanthe strigosa*, Pomax *Pomax umbellata*, White Marianth *Rhytidosporum procumbens*, the prostrate Honey-pots *Acrotriche serrulata*, Gold-dust Wattle *Acacia acinacea*, Rough-barked Honey-myrtle *Melaleuca parvistaminea*, Thyme Spurge *Phyllanthus hirtellus* and Juniper Wattle *Acacia ulicifolia*. Three *Pultenaea* species characterise the group, namely Alpine Bush-pea *P. fasciculata*, Loose-flower Bush-Pea *P. laxiflora* and Matted Bush-pea *P. pedunculata*.

Herbs present include Hill Saltbush *Einadia trigonis*, and the Coast Daisy *Brachyscome parvula*. Grasses such as *Poa* spp., Weeping Grass *Microlaena stipoides*, Veined Spear-grass *Austrostipa rudis* ssp. *nervosa*, Silvertop Wallaby-grass *Joycea pallida* and Purplish Wallaby-grass *Austrodanthonia tenuior* are common. Thatch Saw-sedge *Gahnia radula* is common and abundant in this vegetation and may become the dominant species in the understorey after fire.

The group is closely related to *Gippsland Plains* Grassy Woodland and Lowland Forest and probably exploits soils intermediate in fertility between the latter. *Gippsland Plains* Box Ironbark Forest also has some affinities with Shrubby Dry Forest which occupies the foothill country immediately inland from this EVC.

EVC 72 Granitic Hills Woodland

Floristic Community:

72-02 *Wilson's Promontory* Granitic Hills Woodland

Wilson's Promontory Granitic Hills Woodland is common on the exposed drier, north-east to north-west facing rocky slopes at *Wilson's Promontory* associated with gravelly, granite-derived, yellow brown sands, loams and clay loams. It is closely related, floristically, to the heathy end of Lowland Forest and merges into *Granitic Coastal Headland Scrub* with increased exposure to salt-laden winds. As soils become deeper, less fertile and more

sandy, this EVC tends towards Heathy Woodland and Sand Heathland. It varies in altitude from 40m above sea level in the north to over 300m in the vicinity of Mt Norgate and average annual rainfall is 900-1000mm.

The dominant trees are often stunted Brown Stringybark *Eucalyptus baxteri*, Shining Peppermint *E. willisii* and Messmate *E. obliqua* over a shrub-dominated heathy understorey of White Kunzea *Kunzea ambigua*, Prickly Tea-tree *Leptospermum continentale*, Silver Banksia *Banksia marginata*, Hairpin Banksia *B. spinulosa* and Bushy Needlewood *Hakea decurrens*. Also present are Honey-pots *Acrotriche serrulata*, Large-leaf Bush-pea *Pultenaea daphnoides*, Common Heath *Epacris impressa*, Dusty Miller *Spyridium parvifolium*, Cranberry Heath *Astroloma humifusum*, Common Correa *Correa reflexa*, Broom Spurge *Amperea xiphoclada*, Drooping Sheoke *Allocasuarina verticillata*, Grass-tree *Xanthorrhoea* spp., Butterfly Flag *Diplarrena moraea* and Sand-hill Sword-sedge *Lepidosperma concavum*.

EVC 73 Rocky Outcrop Shrubland/Herbland Mosaic

Floristic Community:

73-03 *Wilson's Promontory* Rocky Outcrop Shrubland/Herbland Mosaic

Wilson's Promontory Rocky Outcrop Shrubland/Herbland Mosaic is confined to *Wilson's Promontory* and includes the scrub and shrubland growing on major granite outcrops in the Park. It is well-developed on rocky crests where the skeletal gravelly sands accumulate in crevices. The group merges into *Wilson's Promontory* Granitic Hills Woodland with increased soil depth and merges into *Granitic Coastal Headland Scrub* on equivalent exposed rocky areas along the coast. Elevation is in the range of 200-500m above sea level and average annual rainfall is 900-1000mm.

The vegetation is typically dominated by White Kunzea *Kunzea ambigua* but also includes Lemon Bottlebrush *Callistemon pallidus*, Dusty Miller *Spyridium parvifolium*, Satin Everlasting *Helichrysum leucopsidum*, Large-leaf Bush-pea *Pultenaea daphnoides*, Common Heath *Epacris impressa*, Common Correa *Correa reflexa*, Silver Banksia *Banksia marginata* and Prickly Tea-tree *Leptospermum continentale*. Necklace fern *Asplenium flabellifolium* is a good indicator of the sheltered crannies in the rocky substrate.

Floristic Community:

73-04 *South Gippsland* Rocky Outcrop Shrubland/Herbland Mosaic

South Gippsland Rocky Outcrop Shrubland/Herbland Mosaic is restricted in *South Gippsland* to a small area on the Foster-Mt Best Rd. north-east of Foster. This EVC consists of scrub developed on extremely shallow soils on a north-facing rock outcrop. It occurs in a relatively high rainfall area of greater than 1100 mm and at an elevation of 220m above sea level.

The dominant shrub is Burgan, *Kunzea ericoides* but low shrubs of Hazel Pomaderris *Pomaderris aspera*, Silver Wattle *Acacia dealbata* and Blackwood *A. melanoxylon* are also present. The ground cover includes a number of herbs such as the grasses Stiped Wallaby-grass *Austrodanthonia racemosa* and Grey Tussock-grass *Poa sieberiana* as well as Variable Groundsel *Senecio pinnatifolius*, Short-stem Sedge *Carex breviculmis* and Green Rock Fern *Cheilanthes austrotenuifolia*.

EVC 74 Wetland Formation

Wetland Formation is a broad undersampled group occurring across the Gippsland plains, particularly in the Sale area. It was used for mapping the extant vegetation and includes generally herbaceous wetland vegetation in ephemeral water bodies associated with peat soils. For the pre-1750's mapping, Wetland Formation was broken down into a number of wetland EVCs such as Aquatic Herbland/Plains Sedgy Wetland Mosaic, Deep Freshwater Marsh, Plains Grassy Wetland, Floodplain Reedbed and Billabong Wetland. It is closely related to Sedge Wetland which dominates similar waterlogged areas. These wetland groups eventually merge into Riparian Scrub and Wet Heathland as the period of waterlogging becomes relatively less.

Common species in Wetland Formation include Water-ribbons *Triglochin procerum* spp. agg, Amphibious Milfoil *Myriophyllum simulans*, Running Marsh-flower *Villarsia reniformis*, Yellow Bladderwort *Utricularia australis*, Common Duckweed *Lemna disperma* and Tall Spike-sedge *Eleocharis sphacelata*.

EVC 82 Riverine Escarpment Scrub

Floristic Community:

82-01 *Eastern Victoria* Riverine Escarpment Scrub

Eastern Victoria Riverine Escarpment Scrub occurs along major rivers including the Tambo, Timbarra, Wentworth and Dargo Rivers. It characteristically occurs above flood level on southern and eastern aspects, on the steep, undercut slopes associated with rivers. Soils are colluvial and shallow, often with outcropping rock. Average precipitation is 800mm per annum and this is supplemented by the moist protected aspects and fog which is channeled down the river. *Eastern Victoria* Riverine Escarpment Scrub is characterised by dense shrubs over a rich herbaceous ground layer.

The sparse overstorey is not a prominent feature of this EVC. It is structurally variable, but usually at least one eucalypt species is present. Most commonly this is Manna Gum *E. viminalis*, but Mountain Swamp Gum *E. camphora*, Gippsland Peppermint *E. croajingalensis*, Apple Box *E. angophoroides*, Yellow Box *E. melliodora* and Common Peppermint *E. radiata* may also be present. Trees that normally occupy the understorey of forested vegetation often form the canopy including Silver Wattle *Acacia dealbata*, Blackwood *A. melanoxylon* or Black Wattle *A. mearnsii*.

Shrubs are structurally most dominant. There is a diversity of common and widespread species that often form an impenetrable thicket along the water's-edge. Burgan *Kunzea ericoides* is most common. Other common species include Prickly Currant-bush *Coprosma quadrifida*, Hazel Pomaderris *Pomaderris aspera*, River Lomatia *Lomatia myricoides*, Snow Daisy-bush *Olearia lirata*, Common Cassinia *Cassinia aculeata*, Tree Violet *Hymenanthera dentata*, Sweet Bursaria *Bursaria spinosa*, Shiny Cassinia *Cassinia longifolia*, Bootlace Bush *Pimelea axiflora* and Victorian Christmas-bush *Prostanthera lasianthos*.

Ferns are a major component of the ground stratum and are represented by common and widespread species including Common Maidenhair *Adiantum aethiopicum*, Austral Bracken *Pteridium esculentum*, Mother Shield-fern *Polystichum proliferum*, Green Rock Fern *Cheilanthes austrotenuifolia* and Sickle Fern *Pellaea falcata*. Closer to the water's-edge Fishbone Water-fern *Blechnum nudum* and Soft Water-fern *B. minus* are more abundant.

The ground layer is also rich, with a variety of graminoids, grasses and forbs. Larger tussock-forming graminoids include Short-stem Sedge *Carex breviculmis*, Tasman Flax-lily *Dianella tasmanica*, Variable Sword-sedge *Lepidosperma laterale*, Spiny-headed Mat-rush *Lomandra longifolia* and Tall Sedge *Carex appressa*. Grey Tussock-grass *Poa sieberiana*, although not usually associated with riparian situations, is a common component of the ground layer. The sward-forming Weeping Grass *Microlaena stipoides* is by far the most common grass.

In common with other riparian vegetation, forbs are floristically and structurally important and include a diversity of common and widespread species of moist, relatively fertile environments. These include Bidgee Widgee *Acaena novae-zelandiae*, Kidney Weed *Dichondra repens*, Cat's Ear **Hypochoeris radicata*, Small St John's Wort *Hypericum gramineum* and Common Lagenifera *Lagenifera stipitata*. Austral Brooklime *Gratiola peruviana* is also common at the water's-edge.

Associated with many riparian systems, Blackberry **Rubus fruticosus* spp. agg. is present and may pose a threat to this community if not controlled. Small-leaf Bramble *Rubus parvifolius* is also commonly present.

Twining Glycine *Glycine clandestina* is the only common climber.

EVC 83 Swampy Riparian Woodland

Due to lack of sampling in the study area, Swampy Riparian Woodland was amalgamated with Swampy Riparian Complex for the extant mapping in South and West Gippsland. For the pre-1750's mapping, the floristic description from the Central Highlands

study (VicRFASC 1997) was used as a basis for mapping this EVC.

Once a common vegetation type, Swampy Riparian Woodland has been largely altered particularly by clearance for agriculture and resultant altered drainage patterns. It occurs on broad drainage lines with slight gradients, on lower slopes near streams or large rivers and less commonly in gentle basins on valley slopes in association with permanent soaks or springs, not necessarily associated with permanent streams. It was mapped in riparian situations such as on the Tarwin River in the Leongatha South-Koonwarra area, Morwell River south of Morwell, Flynn's Creek and Traralgon Creek.

Soils are mostly silt-rich river sands and gravels, although sites with heavier clay soils may also support Swampy Riparian Woodland. The soils are generally Quaternary alluviums in stream environments derived from a broad range of parent geologies. Average annual rainfall is in the range of 650-1000mm per annum and the elevation varies between 20-160m above sea level.

The overstorey has a woodland structure which often forms mosaics with wetter treeless areas dominated by sedges, rushes and many other plants associated with riparian environments. Swamp Gum *Eucalyptus ovata* is the dominant overstorey species but a wide range of other eucalypts can be present.

The understorey shrubs consist of Blackwood *Acacia melanoxylon* (as it rarely reaches tree-form in this community), Swamp Paperbark *Melaleuca ericifolia*, Prickly Currant-bush *Coprosma quadrifida*, Hemp Bush *Gynatrix pulchella*, Tree Violet *Hymenathera dentata*, Hop Goodenia *Goodenia ovata*, Black Wattle *Acacia mearnsii* and Snow Daisy Bush *Olearia lirata*, especially on levees.

The ground stratum is the most characteristic feature of Swampy Riparian Woodland and is normally dense with graminoids including Leafy Flat-sedge *Cyperus lucidus*, Tall Sedge *Carex appressa*, Common Reed *Phragmites australis* and Common Tussock Grass *Poa labillardieri*. These species compete with ferns.

EVC 107 Lake Bed Herbland

Floristic Community:

107-02 *Montane* Lakebed Herbland

Montane Lakebed Herbland is a highly rare and restricted community in the study area, occurring only at Lake Omeo, west of Benambra. It occurs at montane elevations, tolerating cold frosty temperatures and occasional snow fall. *Montane* Lakebed Herbland has a bimodal development, with a dry lakebed in the summer months, adapting to a wetland during times of inundation. The lake bed is heavily grazed. *Montane* Lakebed Herbland requires further investigation.

There are no eucalypts present in *Montane* Lakebed Herbland. Shrubs are also poorly represented, with a few low, semi-woody shrubs found on the lake margins. These include Curved/Silky Rice-flower *Pimelea curviflora/micrantha*, Woolly New Holland Daisy *Vittadinia gracilis* and Hairy Anchor Plant *Rv Discaria pubescens*.

The herbaceous ground layer is distinctive in *Montane* Lakebed Herbland. The ground is covered in a variety of grasses and forbs. The most common grasses are Silvery Hair-grass *Aira caryophyllea*, Soft Brome *Bromus hordeaceus* ssp. *hordeaceus*, Smooth Wallaby-grass *Austrodanthonia laevis*, Perennial Rye-grass *Lolium perenne*, Kangaroo Grass *Themeda triandra*, Squirrel-tail Fescue *Vulpia bromoides*, Grey Tussock-grass *Poa sieberiana*, Rough Spear-grass *Austrostipa scabra* ssp. *scabra* and Common Wheat-grass *Elymus scabrus*. Other graminoids include Yellow Bulbine-lily *Bulbine bulbosa* and Pale Flax-lily *Dianella longifolia*. Common Sedge *Carex inversa* is often present, indicative of the seasonally wet conditions.

Common forbs include Hairy Sheep's Burr *Acaena agnipila*, Cut-leaf Goodenia *Goodenia pinnatifida*, Common Everlasting *Chrysocephalum apiculatum* s.l., Scaly Buttons *Leptorhynchus squamatus*, Ribwort *Plantago lanceolata*, Wiry Dock *Rumex dumosus*, Narrow-leaf Clover *Trifolium angustifolium*, Hare's Foot Clover *T. arvense* and Fuzzy New Holland Daisy *Vittadinia cuneata* var. *cuneata*. Many more forbs are present but are too numerous to mention.

EVC 125 Plains Grassy Wetland

Plains Grassy Wetland forms in shallow depressions within Gippsland Plains Grassy Woodland where drainage is poor and run-off water accumulates, especially between Sale and Rosedale. The relatively young Upper Pleistocene alluvial soils have clay loam to silty clay loam topsoils which gradually merge into clay with depth. Elevation is low, ranging from 20-40m above sea level and average annual rainfall is 500-800 mm.

The characteristic groundcover of this EVC consists of grasses and sedges dominated by Rushes *Juncus* spp., Tall Sedge *Carex appressa*, Swamp Wallaby-grasses *Amphibromus* spp., Mat Grass *Hemarthria uncinata*, Pratia *Pratia* spp., Blown/Bent Grass *Agrostis* spp., Love-grass *Eragrostis* spp., Common Tussock-grass *Poa labillardieri* as well as the herbs River Buttercup *Ranunculus inundatus* and Milfoil *Myriophyllum* spp. The margins of these wetlands are fringed with Swamp Scrub and include such species as Prickly Tea-tree *Leptospermum continentale*, Rough-barked Honey-myrtle *Melaleuca parvistaminea* and Woolly Tea-tree *Leptospermum lanigerum*.

EVC 126 Swampy Riparian Complex

Swampy Riparian Complex has been used to describe several communities of poor drainage areas located in high rainfall basalt country,

especially around the Warragul and Thorpdale areas. Included in this EVC and relevant to the Gippsland study area is Swamp Forest described in the Central Highlands study (VicRFASC 1997) and used here as a basis for the floristic description of Swampy Riparian Complex. Swampy Riparian Woodland is also included in this complex for the extant mapping in West and South Gippsland.

Swampy Riparian Complex favours swampy flats and gentle gradient drainage lines. It occurs on the Tertiary volcanic rich red soils at an elevation of 40-300m above sea level. Average annual rainfall is in the vicinity of 1000-1150mm. Few areas remain intact due to extensive clearing for agriculture and those remaining are normally dominated by weeds.

The emergent eucalypt is usually Swamp Gum *Eucalyptus ovata* over Blackwood *Acacia melanoxylon* and Swamp Paperbark *Melaleuca ericifolia* although Scented Paperbark *Melaleuca squarrosa* can also be present. Other shrubs include Hazel Pomaderris *Pomaderris aspera*, Prickly Moses *Acacia verticillata*, Prickly Currant-bush *Coprosma quadrifida* and Hop Goodenia *Goodenia ovata*. Soft Tree-fern *Dicksonia antarctica* is also often present. The ground layer is primarily ferny to sedgy in character, including mixtures of wet forest and swamp species. Sedges present include Leafy Flat-sedge *Cyperus lucidus*, Tall Sedge *Carex appressa*, *Lepidosperma* and *Juncus* spp., as well as grasses such as *Poa* spp. Common Reed *Phragmites australis* is often found in areas of standing water. The understorey has a number of Water Ferns *Blechnum* spp., sedges *Carex* spp. and a range of herbs. Tall Sword-sedge *Lepidosperma elatius* is prevalent on the marginal wet flat remnants. The low gradients were largely spring or seepage-fed, and historical anecdotes indicate they were swampy and lacked defined drainage lines.

Swampy Riparian Complex represents the poor drainage areas of Wet Forest and Damp Forest.

EVC 127 Valley Heathy Forest

Valley Heathy Forest grows on gentle slopes at the base of granite intrusions. Correspondingly, it primarily grows on granite but occasionally occurs on other geologies. Soils are duplex, with clayey-sand overlying heavier clays and bimodal where during wet periods soils are reduced to a soupy mix and during dry periods they dry to hard clays. Within the study area, Valley Heathy Forest is found north of Cobbannah Creek, south of Castleburn and near Wilkinson Creek, south east of Ensay.

Valley Heathy Forest forms a low forest to woodland, where Broad-leaved Peppermint *Eucalyptus dives*, Red Stringybark *E. macrorhyncha* and Brittle Gum *E. mannifera* form the overstorey and Blackwood *Acacia melanoxylon* grows commonly as an understorey tree.

The mid stratum is dominated by shorter heathy shrubs and characteristic of this EVC. Species

include Small-leaf Parrot-pea *Dillwynia phyllicoides*, Trailing Podolobium *Podolobium procumbens*, Common Heath *Epacris impressa*, Cranberry Heath *Astroloma humifusum* and Honey-pots *Acrotriche serrulata* under a scattering of taller shrubs including Shiny Cassinia *Cassinia longifolia*, Prickly Bush-pea *Pultenaea forsythiana* and Prickly Broom-heath *Monotoca scoparia*.

Atypical of other heathy EVCs, Valley Heathy Forest carries a diversity of lilies, grasses and forbs in the ground layer. In addition, seasonal wetness of the soils provides habitat for wetter species such as Tasman Flax-lily *Dianella tasmanica* and Common Bog-sedge *Schoenus apogon*. Common species in the ground layer include *Lagenifera* spp., Kangaroo Grass *Themeda triandra*, Weeping Grass *Microlaena stipoides*, Bordered Panic *Entolasia marginata*, Wallaby Grasses *Austrodanthonia* spp. and Plume Grasses *Dichelacne* spp. A diverse array of orchids *Orchidaceae* spp. are seasonally present.

EVC 128 Grassy Forest

Grassy Forest was not recorded in the extant mapping due mainly to its extensive clearing for agriculture in West Gippsland and thus the description for this EVC is based on that for the Central Highlands (VicRFASC 1997). It is mapped only in the pre-1750's mapping in the Modella, Yannathan, Longwarry area but is more extensive in the Central Highlands study area. It develops on Tertiary outwash alluvium and occurs on pale soils which have poor drainage during the wettest period of the year. Elevation is 40-100m above sea level and average annual rainfall is in the vicinity of 950-1000 mm.

It is characterised by a dominance of Messmate *Eucalyptus obliqua* and Narrow-leaved Peppermint *Eucalyptus radiata* with associated species including Silver-leaf Stringybark, *Eucalyptus cephalocarpa* and Yellow Box *Eucalyptus melliodora*. Swamp Gum *Eucalyptus ovata* and Manna Gum *Eucalyptus viminalis* are common around gullies or seepage areas. Whilst the overstorey composition resembles that for Herb-rich Foothill Forest, tree stature is often reduced and the understorey has greater affinities with drier vegetation types.

Understorey species include a diverse array of graminoids such as Red-anther Wallaby Grass *Joycea pallida*, Wallaby Grasses *Austrodanthonia* spp., Spear Grasses *Austrostipa* spp., especially Veined Spear-grass *Austrostipa rudis* and Tussock Grasses *Poa* spp., with Weeping Grass *Microlaena stipoides*, Soft Tussock-grass *P. morrisii*, Grey Tussock-grass *P. sieberiana*, Velvet Tussock-grass *P. rodwayi*, Variable Sword-sedge *Lepidosperma laterale* and Kangaroo Grass *Themeda triandra* usually at lower levels of abundance if present. Black Sheoke *Allocasuarina littoralis*, Black Wattle *Acacia mearnsii* and Blackwood *Acacia melanoxylon* can be

conspicuous, and Thatch Saw-sedge *Gahnia radula* is typically present.

Forbs and perennial geophytes are also common and can include species such as Creeping Bossiaea *Bossiaea prostrata*, Pale Grass-lily *Caesia* spp., Golden Weather-glass *Hypoxis* spp., Early Nancy *Wurmbea* spp., Milkmaids *Burchardia umbellata*, Tall Bluebell *Wahlenbergia stricta*, Tufted Bluebell *Wahlenbergia communis*, Small Poranthera *Poranthera microphylla*, Stinking Pennywort *Hydrocotyle laxiflora*, Grass Trigger-plant *Stylidium graminifolium*, Blue Pin-cushion *Brunonia australis*, Vanilla-lilies *Arthropodium* spp., Shrubby Fireweed *Senecio minimus*, Annual Fireweed *S. glomeratus*, Cotton Fireweed *S. quadridentatus*, and Bent Goodenia *Goodenia geniculata*.

EVC 132 Plains Grassland

Floristic Community:

132-01 *Gippsland* Plains Grassland

Gippsland Plains Grassland was once common on the central Gippsland plains, especially in the Sale, Nambrok and Tinamba areas but is now a depleted EVC due mainly to widespread clearing for agriculture. The almost flat plains are derived from Upper Pleistocene alluvium of poorly drained, heavy clays. The average annual rainfall is less than 650mm and elevation is relatively low at 20-40m above sea level.

Description of the composition of the depleted grasslands relies heavily on surviving remnants of the adjacent *Gippsland* Plains Grassy Woodland and a knowledge of grassland and woodland ecology from other regions (Lundt, 1997). Grasslands and adjacent woodlands in western Victoria share a similar flora and few species are known to be restricted to grasslands. Consequently, it is likely that many of the species in surviving grassy woodland remnants on the lowland Gippsland plain, which occur in grasslands in other regions, also occurred in the extinct grasslands. The composition of remnant grassy forests and woodlands in Gippsland is strongly affected by management history and soil texture.....Vegetation remnants from which trees have been removed and which occur on relatively heavily-textured topsoils, are likely to be most similar in composition to the depleted Gippsland grasslands (Lundt 1977).

One of the dominant grasses which would have occurred is Kangaroo Grass *Themeda triandra* which is a common species in *Gippsland* Plains Grassy Woodland and also dominates natural grasslands on heavily textured soils in western Victoria, the ACT and Tasmania (Lundt, 1997). Other forbs and grasses would have included Spear-grasses *Austrostipa* spp., Tussock-grasses *Poa* spp., Smooth Wallaby-grass *Austrodanthonia laevis*, Long-hair Plume Grass *Dichelachne crinita*, Chocolate-lily *Arthropodium strictum*, Milkmaids *Burchardia umbellata*, Yellow Rush-lily *Tricoryne elatior*, Yellow Bulbine-lily *Bulbine bulbosa*, Common Everlasting *Chrysocephalum apiculatum*,

Variable Billy-buttons *Craspedia variabilis*, Scaly Buttons *Leptorhynchos squamatus*, Lemon Beauty-heads *Calocephalus citreus*, Common Bog-sedge *Schoenus apogon*, Common Rice-flower *Pimelea humilis*, Short-stem Sedge *Carex breviculmis*, Blue Grass-lily *Caesia calliantha*, Five-awned Spear-grass *Pentapogon quadrifidus*, Common Onion-grass *Romulea rosea* var. *australis*, Wattle Mat-rush *Lomandra filiformis*, Small St John's Wort *Hypericum gramineum*, Pale Sundew *Drosera peltata* ssp. *peltata*, Common Centaury *Centaureium erythraea*, Creeping Bossiaea *Bossiaea prostrata*, Hairy Hawkbit *Leontodon taraxacoides*, Narrow Plantain *Plantago gaudichaudii*, Lesser Quaking-grass **Briza minor*, Large Quaking-grass **Briza maxima* and Purple Diuris *Diuris punctata*.

Floristic Community:

132-05 *South Gippsland* Plains Grassland
This floristic community occurs at the Alberton Cemetery in South Gippsland where it develops on fertile clay soils. Elevation is near sea level at Alberton and average annual rainfall is approximately 750 mm.

South Gippsland Plains Grassland is characterised by a grassy ground cover that commonly includes Kangaroo Grass *Themeda triandra*, tussocks of Tussock-grass *Poa* spp., Smooth Wallaby-grass *Austrodanthonia laevis* and numerous other native and introduced grasses. It has a range of lilies such as Yellow Bulbine-lily *Bulbine bulbosa* as well as sedges. The herb, Scaly Buttons *Leptorhynchos squamatus*, is sometimes present, along with Common Bog-sedge *Schoenus apogon* and low shrubs of Creeping Bossiaea *Bossiaea prostrata* and Common Rice-flower *Pimelea humilis*. The group is closely related to Damp Sands Herb-rich Woodland which tends to develop on slightly less fertile but better drained sites with more sandy profiles. Boundaries between the two groups can be distinctive as Bracken *Pteridium esculentum* and Spiny-headed Mat-rush *Lomandra longifolia* cover tends to be suddenly reduced on the more fertile soils exploited by this group.

Floristic Community:

132-07 *Nooramunga* Plains Grassland
Nooramunga Plains Grassland is confined to St. Margaret Island and Snake Island in Shallow Inlet, South Gippsland. These Coastal Barrier Islands consist of Quaternary-derived silts, clays and muds to loamy/peaty sands on low lying flats approximately 1m above sea level. Annual rainfall is in the vicinity of 650-750 mm.

The soils are moistened by contiguity with water-tables from the "lakes" of Corner Inlet. These grassy flats are generally surrounded by Damp Sands Herb-rich Woodland on slightly more elevated sand sheets and Estuarine Wetland on tidally-inundated flats of lagoonal and swamp deposits. There is some evidence that the extent of the grasslands is mediated by fire since the Swamp Paperbarks of the Estuarine Wetland can invade the grasslands. This is a feature of the *South Gippsland* Plains

Grassland which occurs on the nearby coastal plain.

The composition of the community encompasses a number of halophytes including Sea Rush *Juncus kraussii*, Bare Twig-sedge *Baumea juncea*, Rounded Noon-flower *Disphyma crassifolium* and Shiny Swamp-mat *Selliera radicans*. A variety of grasses are present including Long-hair Plume-grass *Dichelachne crinita*, Australian Salt-grass *Distichlis distichophylla*, Lesser Quaking-grass **Briza minor*, Yorkshire Fog *Holcus lanatus* and *Aira* and *Agrostis* spp.

EVC 133 Limestone Pomaderris Shrubland

Floristic Community:

133-03 *Silurian* Limestone Pomaderris Shrubland *Silurian* Limestone Pomaderris Shrubland is restricted to Marble Gully, east of Omeo. It occurs on steep, outcropping north-facing Silurian limestone at an elevation of 750m above sea level and receives a moderate annual rainfall of 740mm. Effective rainfall is low due to the north-facing aspect and the shallow soils which retard moisture retention. This community is listed under the Flora and Fauna Guarantee Act.

Eucalypts occur as scattered emergents and are not a dominant component of this community. Drooping She-oak *Allocasuarina verticillata*, Silver Banksia *Banksia marginata* and Silver Bundy *Eucalyptus nortonii* form a stunted, open woodland on the steeper slopes, while Blue Gum *E. globulus* and occasionally Manna Gum *E. viminalis* form denser, taller stands on the flatter areas around the gullies.

The dominant feature of *Silurian* Limestone Pomaderris Shrubland is the density of shrubs. The shrub layer is not particularly diverse, predominantly consisting of four tall species, Hairy Bursaria *Bursaria lasiophylla*, Winged Everlasting *Ozothamnus adnatus*, Limestone Pomaderris *Pomaderris oraria* ssp. *calcicola* and Sticky Hop-bush *Dodonaea viscosa*, which are generally scattered on the slopes. These shrubs often form dense stands in small areas. Other common shrubs include Sprawling Cassia *Senna aciphylla*, Common Correa *Correa reflexa*, Shiny Cassinia *Cassinia longifolia* and Pale-fruit Ballart *Exocarpos strictus*. Species of *Pimelea* are also very common in the shrub layer. Bootlace Bush *Pimelea axiflora* is common in the taller shrub layer, whilst Diosma Rice-flower *Pimelea flava* ssp. *dichotoma*, and Smooth Rice-flower *Pimelea glauca* are common semi-woody shrubs.

The ground layer is densely covered by graminoids including Short-stemmed Sedge *Carex breviculmis*, Black-anther Flax-lily *Dianella revoluta* and Spiny-headed Mat-rush *Lomandra longifolia*. Vanilla -lily *Arthropodium* sp. aff. *milleflorum* is also common. Grasses are also prominent and include Kangaroo Grass *Themeda triandra* and Grey Tussock-grass *Poa sieberiana*, Common Wheat-grass *Elymus scabrus*, Velvet Wallaby-grass *Austrodanthonia*

pilosa and Crested Spear-grass *Austrostipa blackii*.

Forbs are numerous and include Kidney-weed *Dichondra repens*, Grassland Wood-sorrel *Oxalis perennans*, Slender Bluebell *Wahlenbergia gracilis* s.l., Common Centaury **Centaureum erythraea*, Cotton Fireweed *Senecio quadridentatus*, Pimpernel **Anagallis arvensis* and Austral Carrot *Daucus glochidiatus*. Several weed species are present, possibly due to the proximity of private land.

Blanket Fern *Pleurosorus rutifolius* and Austral Bracken *Pteridium esculentum* are common within this floristic community, whilst Small-leaved Clematis *Clematis microphylla* and Pink Bindweed *Convolvulus erubescens* are the most common climbers.

Floristic Community:

133-04 *Tertiary* Limestone Pomaderris Shrubland *Tertiary* Limestone Pomaderris Shrubland is confined to the cliffs of the Tambo River and the eastern side of Maringa Creek estuary as well as Lake Tyers and Lake Bunga in East Gippsland. It occurs on exposed northern or western aspects and is invariably associated with limestone cliffs and lake shores or rivers. The terra rossa self mulching clay loam soils are derived from Tertiary limestones and marls. It is found at low altitudes of between 10-30m above sea level and receives a moderate rainfall of approximately 700mm per annum.

The structure of *Tertiary* Limestone Pomaderris Shrubland varies according to the stability of the cliffs on which it grows (being closed on more stable sites and open on less stable areas). This floristic community is susceptible to environmental weed invasion resulting from adjacent agricultural development which has in several cases actually encroached upon the community.

Characteristic shrubs include Coast Pomaderris *Pomaderris oraria*, Limestone Pomaderris *P. oraria* ssp. *calcicola*, Sticky Hop-bush *Dodonaea viscosa*, Common Correa *Correa reflexa* and Bootlace Bush *Pimelea axiflora*. A distinctive feature is the suite of fleshy-fruited bird-dispersed species often more typical of coastal environments. These species include Boobialla *Myoporum insulare*, Coast Beard-heath *Leucopogon parviflorus*, Sea-berry Saltbush *Rhagodia candolleana*, Bower Spinach *Tetragonia implexicoma* and Smilax Asparagus **Myrsiphyllum asparagoides*.

The ground cover includes the forbs Kidney-weed *Dichondra repens*, Bedstraw *Galium migrans* and Grassland Wood-sorrel *Oxalis perennans*, and the grasses Common Wheat-grass *Elymus scabrus* and Long-leaf Wallaby-grass *Notodanthonia longifolia*. Common weeds present are Sow-thistle **Sonchus oleraceus* and Spear Thistle **Cirsium vulgare*.

EVC 135 Gallery Rainforest

Floristic Community:

135-01 *Ephemeral Streams* Gallery Rainforest
Ephemeral Streams Gallery Rainforest is extensive on the Mitchell River in the Mitchell River National Park, along Iguana Creek and several of the gullies and creeks that run into the Mitchell River. It is also found on the Tambo River and the Timbarra River. The soils are composed of small amounts of silt, large amounts of sand, with various cobbles, boulders and outcropping rocks. *Ephemeral Streams* Gallery Rainforest is subject to the full force of floods and hence can be highly disturbed. The high light levels due to the removal of trees during floods leads to high numbers of forbs. Depending on the length of time between floods, the density of ferns will vary. The ephemeral nature of this community means that there are periods during summer where the sites are quite dry and hence cannot support a lush fern layer as in other rainforest EVCs.

The overstorey is dominated by Kanooka *Tristaniopsis laurina* and entirely lacks Lilly Pilly *Acmena smithii*. Eucalypts are not a component of *Ephemeral Streams* Gallery Rainforest, but may intrude from surrounding vegetation types.

Shade tolerant shrubs include Prickly Currant-bush *Coprosma quadrifida*, River Lomatia *Lomatia myricoides*, Bootlace Bush *Pimelea axiflora*, Hazel Pomaderris *Pomaderris aspera* and Forest Boronia *Boronia muelleri*. Floods can create gaps in the overstorey and hence more light penetration can lead to a suite of shade-intolerant species occupying the site. These include White-sallow Wattle *Acacia floribunda*, Hop Goodenia *Goodenia ovata*, Snow Daisy-bush *Olearia lirata*, Victorian Christmas-bush *Prostanthera lasianthos* and Round-leaf Mint-bush *P. rotundifolia*.

Mature woody lianes are absent from *Ephemeral Streams* Gallery Rainforest as they cannot survive the strong floods that periodically engulf this environment. Woody lianes are only ever present as seedlings which is also the case for tree-ferns.

Ferns that can tolerate periods of moisture deprivation include Common Maidenhair *Adiantum aethiopicum*, Common Ground-fern *Calochlaena dubia*, Common Rasp-fern *Doodia media* ssp. *australis*, Green Rock Fern *Cheilanthes austrotenuifolia*, Austral Bracken *Pteridium esculentum* and Tender Brake *Pteris tremula*. Fishbone Water-fern *Blechnum nudum* is found at some sites in moist niches in soaks or near standing pools. Common Filmy Fern *Hymenophyllum cupressiforme* is the only common epiphytic fern.

Graminoids can be a conspicuous feature of the ground layer, sometimes forming dense patches. Species include Tasman Flax-lily *Dianella tasmanica*, Spiny-headed Mat-rush *Lomandra longifolia* and Variable Sword-sedge *Lepidosperma laterale*. Common grasses that are present but not in high density include Tasman Bent-grass *Deyeuxia*

rodwayi, Bordered Panic *Entolasia marginata*, Cane Holey Grass *Hierochloa rariflora*, Weeping Grass *Microlaena stipoides* and Forest Wire-grass *Tetrarrhena juncea*. Forbs are also not abundant but species often present include Bidgee-widgee *Acaena novae-zelandiae*, Kidney-weed *Dichondra repens*, Creeping Cudweed *Euchiton gymnocephalus* s.s., Star Cudweed *E. involucratus*, Austral Brooklime *Gratiola peruviana*, Common Lagenifera *Lagenifera stipitata*, Slender Lagenifera *L. gracilis*, Coarse Stinkweed *Opercularia aspera*, Shade Plantain *Plantago debilis*, Self-heal **Prunella vulgaris* and Ivy-leaf Violet *Viola hederacea*.

EVC 136 Sedge Wetland

Sedge Wetland occurs on open freshwater swamps containing deep peat soils. Eucalypt species are typically absent from this EVC as the environment is too wet. Those that do occur on the periphery, Forest Red Gum *Eucalyptus tereticornis* and Swamp Gum *E. ovata* are adapted to conditions of impeded drainage. This wetland group is widespread across the Gippsland Plains and at Wilsons Promontory. It is particularly common in the sandy areas of the Holey Plains State Park and Providence Ponds Flora and Fauna Reserve.

Sedge Wetland is typically dominated by Pithy Sword-sedge *Lepidosperma longitudinale*, but also includes a range of wetland herbs such as Running Marsh-flower *Villarsia reniformis*, Swamp Goodenia, *Goodenia humilis*, Centella *Centella cordifolia* and Floating Club-sedge *Isolepis fluitans*.

The group is closely related to Wetland Formation, which includes a diversity of freshwater wetland habitats. With increased salinity these groups merge into Estuarine Wetland, Coastal Saltmarsh and even Mangrove Shrubland.

EVC 140 Mangrove Shrubland

This coastal vegetation is only recorded in the study area in the protected low energy coastal environments of South Gippsland, in areas such as Anderson Inlet to the west, the islands of Corner and Shallow Inlets, and McLoughlins Beach towards the western end of the Ninety Mile Beach. It reaches its national southern limit of range at Millers Landing, Wilsons Promontory. Soils consist of deep, salt-affected silts, sands and clays and average annual rainfall is 650-950 mm.

Mangrove Shrubland occupies the upper inter-tidal zone and is commonly dominated by only one species, White Mangrove *Avicennia marina* ssp. *australasica* which forms dense thickets. Dwarf Grass-wrack *Zostera muelleri* is also sometimes present.

Thickets of White Mangrove are mapped as Mangrove Shrubland whilst stunted scattered individual mangroves in halophyte-dominated areas are mapped as Coastal Saltmarsh since they represent less frequently inundated habitats with much higher levels of soil salinity (Hutchings and Saenger, 1987).

EVC 141 Sandy Flood Scrub

Sandy Flood Scrub is confined to the Perry River in the Providence Ponds Flora and Fauna Reserve and downstream of the Reserve but has the potential to have occurred elsewhere on the Perry land system such as at Toms Creek before European settlement. The dense scrub typically occurs on terraces and river banks composed of sand and gravel and in wetland habitats associated with pools of standing water. Elevation is relatively low, at 20-80m above sea level and average annual rainfall is 600-700 mm.

Sandy Flood Scrub is dominated by Burgan *Kunzea ericoides* with emergent trees of White Stringybark *Eucalyptus globoidea*, Snow Gum *E. pauciflora*, and But But *E. bridgesiana* being sometimes present. Small trees and shrubs include Hazel Pomaderris *Pomaderris aspera*, Black Wattle *Acacia mearnsii* and Silver Wattle *A. dealbata*.

The understorey consists of tussocks of Spiny-headed Mat-rush *Lomandra longifolia*, with a herb-rich groundcover of adventitious native and introduced species such as Hairy Centrolepis *Centrolepis strigosa*, Cudweed *Euchiton* sp., Common Maidenhair *Adiantum aethiopicum*, Woodrush *Luzula* sp., and Thyme Spurge *Phyllanthus hirtellus*. Aquatic plants include Milfoil *Myriophyllum* sp., Austral Brooklime *Gratiola peruviana*, Centella *Centella cordifolia* and Pondweed *Potamogeton* sp. Crimson Bottlebrush *Callistemon citrinus* and Scrambling Coral-fern *Gleichenia microphylla* are found on seepage lines upslope from the river.

EVC 151 Plains Grassy Forest

Floristic Community:

151-01 *South Gippsland* Plains Grassy Forest
This grassy forest type is found on the plains and areas of low relief in South Gippsland, especially north and east of Yarram in the Mullungdung and Won Wron State Forests. Soils are sandy gravelly clay loams of Tertiary origin. Elevation ranges from 15m to approximately 180m above sea level and average annual rainfall is 600-850 mm. The group is closely related, floristically, to Herb-rich Foothill Forest, Lowland Forest and Box Ironbark Forest. It represents the dry, fertile side of Herb-rich Foothill Forest merging into Lowland Forest with decreased soil fertility. An increase in soil fertility and decreasing rainfall results in a merging with *Gippsland* Plains Grassy Woodland and Box Ironbark Forest.

South Gippsland Plains Grassy Forest is dominated by Yellow Stringybark *Eucalyptus muelleriana* but may also include Messmate *E. obliqua*, Narrow-leaf Peppermint *E. radiata*, Apple-topped Box/But But *E. angophoroides/bridgesiana* with Swamp Gum *E. ovata* in the poorer drainage areas, White Stringybark *E. globoidea*, Gippsland Blue Gum *E. globulus* ssp. *pseudoglobulus* and even Silver-top *E. sieberi*.

The ground cover is characteristically herbaceous and grassy and may include the sub-shrubs, Common Raspwort *Gonocarpus tetragynus* and Common Rice-flower *Pimelea humilis*, and the shrubs, Prickly Tea-tree *Leptospermum continentale*, Common Heath *Epacris impressa*, Creeping Bossiaea *Bossiaea prostrata* and Swamp Paperbark *Melaleuca ericifolia*. Characteristic shrubs are Hedge Wattle *Acacia paradoxa* and Rough Guinea-flower *Hibbertia aspera* but these species are not particularly frequent. The grasses Common Tussock-grass *Poa labillardieri*, Weeping Grass *Microlaena stipoides* and Reed bent-grass *Deyeuxia quadriseta*, are commonly present as are Wattle Mat-rush *Lomandra filiformis*, Spiny-headed Mat-rush *L. longifolia* and a number of ubiquitous weeds. The herb-rich ground cover includes Small Poranthera *Poranthera microphylla*, Ivy-leaf Violet *Viola hederacea*, Slender Lagenifera *Lagenifera gracilis*, Small St John's Wort *Hypericum gramineum*, Sprawling Bluebell *Wahlenbergia gracilis*, and Variable Stinkweed *Opercularia varia*. Other species present are the ferns Austral Bracken *Pteridium esculentum* and the sedge Thatch Saw-sedge *Gahnia radula*.

Floristic Community:

151-02 *Gippsland* Plains Grassy Forest
Gippsland Plains Grassy Forest occurs on old Tertiary river terraces to the north and east of the Gippsland plains in areas such as Sarsfield, Calulu, Swan Reach, Kalimna West and Nungurner. Soils are sandy gravelly clay loams of Tertiary origin. Elevation ranges from 15m to approximately 180m above sea level and average annual rainfall is 600-850 mm.

Eucalypts which are common in the overstorey include Forest Red Gum *Eucalyptus tereticornis*, Coast Grey Box *E. bosistoana*, Blue Box *E. baueriana*, But But *E. bridgesiana*, White Stringybark *E. globoidea*, Red Ironbark *E. tricarpa* and Red Box *E. polyanthemos*. Black Wattle *Acacia mearnsii* is the only understorey tree and shrubs present include Lightwood *Acacia implexa*, Shiny Cassinia *Cassinia longifolia* and Sweet Bursaria *Bursaria spinosa*.

The understorey is rich in grasses, including Blady Grass *Imperata cylindrica*, Spear-grass *Austrostipa* spp., Wallaby-grass *Austrodanthonia* spp., Bordered Panic *Entolasia marginata*, Plume-grass *Dichelachne* spp., Bent-grass *Deyeuxia* spp., Common Love-grass *Eragrostis brownii* and *Panicum* spp. A range of herbs is common, including Common Lagenifera *Lagenifera stipitata*, Kidney-weed *Dichondra repens*, Ivy-leaf Violet *Viola hederacea*, Stinking Pennywort *Hydrocotyle laxiflora* and Purple Coral-pea *Hardenbergia violacea*. The creeper, Common Apple-berry *Billardiera scandens*, is also present.

The floristic composition of *Gippsland* Plains Grassy Forest is intermediate between Lowland Forest and Plains Grassy Woodland.

EVC 154 Bird Colony Shrubland

Bird Colony Shrubland is restricted to the islands to the south and west of Wilsons Promontory and the Seal Island group to the east of Wilsons Promontory. The shrubland develops on the more topographically protected east and south-east facing slopes of these islands where the soil is typically a dark brown, loamy sand derived from Devonian granite. The soils are subject to intense seasonal trampling and tunnelling by large colonies of mutton-birds, penguins and other seabirds. Fertility of these soils is aided by the bird droppings. Elevation averages 40-100m above sea level and rainfall is approximately 900 mm per annum.

Bird Colony Shrubland is dominated by Australian Hollyhock *Lavatera plebeia* which in late spring and early summer forms a spectacular display of white and mauve flowers on islands such as Anser Island and Great Glennie Island. Other dominant species include Seaberry Saltbush *Rhagodia candolleana* ssp. *candolleana* and White Elderberry *Sambucus gaudichaudiana*. Species which may also be present include Four-leaved Allseed *Polycarpon tetraphyllum*, Spicy Everlasting *Ozothamnus argophyllus* and Drooping Sheoke *Allocasuarina verticillata*.

EVC 160 Coastal Dune Scrub

Coastal Dune Scrub consists of dense scrub which forms on the secondary and primary dunes of ocean beaches. The soils are siliceous or calcareous sands that have a very low humus content. Average annual rainfall is 700 mm with elevation being around 1-15m above sea level. In both the pre-1750's and extant mapping it is mainly mapped as a mosaic with Coastal Dune Grassland and called Coastal Dune Scrub Mosaic.

Dense thickets of Coast Tea-tree *Leptospermum laevigatum* and Coast Beard-heath *Leucopogon parviflorus* often occur together with Coast Banksia *Banksia integrifolia* and Coast Wattle *Acacia sophorae*. Species common in the understorey include Coast Daisy-bush *Olearia axillaris*, Coast Everlasting *Ozothamnus turbinatus*, Bower Spinach *Tetragonia implexicoma* and Karkalla *Carpobrotus rossii*.

EVC 161 Coastal Headland Scrub

Floristic Community:

161-02 *South Gippsland Coastal Headland Scrub*
This windswept coastal vegetation type occurs on exposed coasts and headlands in South Gippsland. Two types of *South Gippsland Coastal Headland Scrub* have been recognised in the study area. The first is found on Cretaceous sedimentary promontories, headlands and cliffs along the South Gippsland coast west of Wilsons Promontory such as at Cape Liptrap. Elevation is 40-80m above sea level and average annual rainfall is 1000 mm.

This group is a heath typically dominated by Coast Tea-tree *Leptospermum laevigatum* but also includes shrubs of Drooping Sheoke *Allocasuarina verticillata*, Silver Banksia *Banksia marginata*,

Coast Banksia *B. integrifolia*, Spreading Wattle *Acacia genistifolia* and Prickly Tea-tree *Leptospermum continentale*. Other shrubs present are Prickly Geebung *Persoonia juniperina*, Dusty Miller *Spyridium parvifolium*, Coast Everlasting *Ozothamnus turbinatus*, Cushion Bush *Leucophyta brownii*, Coast Beard-heath *Leucopogon parviflorus*, and Hop Goodenia *Goodenia ovata*. Grasses such as Prickly Spear-grass *Austrostipa stipoides* and Blue Tussock-grass *Poa poiformis* may also be present.

The second group is found in areas less prone to salt spray where tall scrub develops such as at Walkerville. It occurs on a range of geologies and elevation is 20-40m above sea level. Average annual rainfall is 1000 mm. It is dominated by Coast Wattle *Acacia sophorae* but includes low trees of Messmate *Eucalyptus obliqua*, Coast Banksia *Banksia integrifolia* and Drooping Sheoke *Allocasuarina verticillata*. The understorey contains shrubs of Hop Goodenia *Goodenia ovata*, Common Heath *Epacris impressa*, Dusty Miller *Spyridium parvifolium*, Coast Beard-heath *Leucopogon parviflorus*, Large-leaf Bush-pea *Pultenaea daphnoides*, Sweet Bursaria *Bursaria spinosa* and Austral Bracken *Pteridium esculentum*. The group is intermediate in floristic composition between Lowland Forest and Coastal Dune Scrub Mosaic.

Floristic Community:

161-03 *Granitic Coastal Headland Scrub*
Granitic Coastal Headland Scrub is confined in the study area to Wilsons Promontory. It is found on windy, exposed rocky coastal headlands subject to periodic salt-spray such as Pillar Point. It typically develops on gravelly sandy clay loams derived from granite which tend to be shallow and skeletal near bedrock exposure. Elevation is in the range of 10-150m above sea level and average annual rainfall is 900-1000 mm.

Granitic Coastal Headland Scrub is usually dominated by copses of Drooping Sheoke *Allocasuarina verticillata* and dense thickets of the shrubs White Kunzea *Kunzea ambigua*, Coast Tea-tree *Leptospermum laevigatum*, with scattered Wirilda *Acacia retinodes* and Prickly Moses *Acacia verticillata*.

One sub-community of this floristic community is characteristically depauperate in species, and consists of dense thickets of Drooping Sheoke *Allocasuarina verticillata* and White Kunzea *Kunzea ambigua* with a thick groundcover of Sheoke needles. The understorey includes species indicative of "salt spray influences" such as White Correa *Correa alba*, Sea Box *Alyxia buxifolia*, Coast Ballart *Exocarpos syrticola* and the succulent Karkalla *Carpobrotus rossii*, as well as more ubiquitous species such as Large-leaf Bush-pea *Pultenaea daphnoides*, Common Heath *Epacris impressa*, Silky Guinea-flower *Hibbertia sericea*, Hop Goodenia *Goodenia ovata*, Dusty Miller *Spyridium parvifolium*, Common Correa *Correa*

reflexa, Grass Trigger-plant *Stylidium* aff. *graminifolium*, Saltbush spp. *Rhagodia* spp., and Sand-hill Sword-sedge *Lepidosperma concavum*.

It is closely related to Granitic Hills Woodland which is often found adjoining the group in less exposed sites.

EVC 163 Coastal Tussock Grassland

Floristic Community:

163-01 *Headland* Coastal Tussock Grassland
Headland Coastal Tussock Grassland typically develops on the most exposed windswept coastal headlands which are subject to periodic gale-force, salt-laden winds such as at Cape Liptrap and Wilsons Promontory. It often occurs downslope from Coastal Headland Scrub. This floristic community occurs on a variety of geologies including Cretaceous sedimentary rocks and Devonian granites with soils being shallow, stony loams or sand. Floristically, *Headland* Coastal Tussock Grassland is closely related to Coastal Dune Scrub Mosaic but the latter differs in that it develops on deep, uniform, sandy soils. Elevation is from 5-80m above sea level and average annual rainfall is 1000mm.

The vegetation develops on steep, stony slopes and is usually dominated by Blue Tussock-grass *Poa poiformis*. The herbaceous groundcover includes Coast Sow-thistle *Actites megalocarpa*, Coast Groundsel *Senecio spathulatus*, Buck's-horn Plantain *Plantago coronopus*, Austral Carrot *Daucus glochidiatus*, *Crassula* spp. and Wood-sorrel *Oxalis* spp.

Salt-adapted coastal species include the shrubs White Correa *Correa alba*, Bower Spinach *Tetragonia implexicoma*, Coast Beard-heath *Leucopogon parviflorus*, Thyme Rice-flower *Pimelea serpyllifolia*, and Coast Tea-tree *Leptospermum laevigatum*. Common herbs found are Sea Celery *Apium prostratum* and Rounded Noon-flower *Disphyma crassifolium* and sedges present include Knobby Club-sedge *Isolepis nodosa*.

Floristic Community:

163-02 *Estuarine Flats* Coastal Tussock Grassland

Estuarine Flats Coastal Tussock Grassland is highly localised to small areas of the South Gippsland coastline such as McLoughlins Beach, Duck Point at Corner Inlet and Tidal River, Wilsons Promontory. It has historically been cleared for agriculture and grazing due to its tussock/ grassland nature. It typically occurs on the margins of Coastal Saltmarsh on well-drained sandy soils associated with current or old beach berms or sand sheets. It sometimes develops within Coastal Saltmarsh where sand sheets have been deposited. Elevation is near sea level and average annual rainfall is 650-950 mm.

The tussock grass, Prickly Spear-grass *Austrostipa stipoides* usually dominates with the halophyte Coast Saltbush *Atriplex cinerea* being a good

indicator species. Other species include the herb, Variable Groundsel *Senecio pinnatifolius*, the halophytes Austral Seablite *Suaeda australis*, Rounded Noon-flower *Disphyma crassifolium* ssp. *clavellatum*, Beach Rocket **Cakile maritima* ssp. *maritima*, and Seaberry Saltbush *Rhagodia candolleana*. Knobby Club-sedge *Isolepis nodosa* is also often present.

Floristic Community:

163-04 *Depauperate* Coastal Tussock Grassland
Depauperate Coastal Tussock Grassland is restricted to the most exposed coastal islands off Wilsons Promontory developed on Devonian granite. These include Norman, Anser, Great Glennie and Shellback Islands. Elevation is from 5-80m above sea level and average annual rainfall is 1000mm. This tussock grassland is characterised by its depauperate species composition. The unstable, undermined substrate contains a dense network of mutton-bird burrows which are prone to continuous cycles of soil collapse, erosion, deposition and excavation. Conspicuous areas of bare ground (inter-tussock spaces) are evident but weed species and native herbs are notably absent or rare, perhaps due to the combined stress of wind exposure, salt spray and soil disturbance by burrowing birds.

The soil is typically a dark brown, loamy sand which is subject to periods of intense trampling and tunnelling by large colonies of mutton-birds and even penguins. Other bird species such as Pacific Gulls are also in large numbers. Fertility of the soils is added by the bird droppings. Elevation averages 40-100m above sea level and rainfall is approximately 900 mm per annum.

These depauperate grasslands are dominated by Blue Tussock Grass *Poa poiformis* and probably lack herb development because of desiccation due to exposure to frequent, strong, salt-laden winds and intense trampling pressure from the extremely high densities of sea birds. Other species occasionally present are Kangaroo Apple, *Solanum aviculare*, White Elderberry *Sambucus gaudichaudiana* and Variable Groundsel *Senecio pinnatifolius*.

EVC 164 Creekline Herb-rich Woodland

Floristic Community:

164-01 *Gippsland* Creekline Herb-rich Woodland
Gippsland Creekline Herb-rich Woodland occurs on shallow drainage lines with ephemeral flows and small winter pools in the Plains Grassy Forest areas of the Won Wron and Mullungdung State Forests in South Gippsland. It is found at elevations ranging from 60-140m above sea level and annual rainfall is in the vicinity of 650-800 mm. Soils consist mainly of alluvial deposits of seasonally wet sands.

Gippsland Creekline Herb-rich Woodland consists of scattered shrubs and understorey trees of of Blackwood *Acacia melanoxydon*, Hop Wattle *A. stricta*, and Snow Diasy-bush *Olearia lirata* with open crowns of Swamp Gum *Eucalyptus ovata*. A

herb-rich ground layer of graminoids characterises this EVC including Bidgee-widgee *Acaena novae-zelandiae*, Weeping Grass *Microlaena stipoides*, *Pratia* spp, and Matted Nertera *Nertera granadensis*. Other species present include Thatch Saw-sedge *Gahnia radula*, Common Maidenhair *Adiantum aethiopicum* and Spiny-headed Mat-rush *Lomandra longifolia*.

EVC 169 Dry Valley Forest

Dry Valley Forest occurs in minor gullies, ephemeral streams or on river flats. Soils are colluvially or alluvially-derived fertile silts and silty clays. This EVC has affinities with Riparian Forest but occupies much drier sites where water flow is less constant and draws much of its moisture from the water table rather than directly from the stream. Remnants are often weed-invaded as much of the area surrounding the river flat areas of Dry Valley Forest has been cleared for agriculture.

There are two communities of Dry Valley Forest: *River Flat* Dry Valley Forest and *Minor Gully* Dry Valley Forest.

Floristic Community:

169-01 *River Flat* Dry Valley Forest

River Flat Dry Valley Forest occurs as fragmented remnant patches bordering cleared land on fertile river flats. It grows in rainshadow areas where rainfall averages 850mm per annum. Although the ground stratum is often weed-invaded native forbs are also abundant.

The overstorey is open and tall and a variety of eucalypts may be present though no single species dominates. Common species include Narrow-leaf Peppermint *Eucalyptus radiata* and Manna Gum *E. viminalis* in wetter sites and Yellow Box *E. melliodora*, Red Stringybark *E. macrorrhyncha* and Apple Box/But But *E. angophoroides/bridgesiana* in drier sites. Common understorey trees include Silver Wattle *Acacia dealbata*, Blackwood *A. melanoxylon*, Black Wattle *A. mearnsii* and Hazel Pomaderris *Pomaderris aspera*.

Shrubs line the stream bank and are typical of riverine environments including Shiny Cassinia *Cassinia longifolia*, Common Cassinia *C. aculeata*, Burgan *Kunzea ericoides*, Prickly Currant-bush *Coprosma quadrifida*, Tree Violet *Hymenanthera dentata*, Tree Everlasting *Ozothamnus ferrugineus*, Sweet Bursaria *Bursaria spinosa*, Victorian Christmas-bush *Prostanthera lasianthos* and River Lomatia *Lomatia myricoides*.

A few ferns line the stream bank and the flats surrounding the river including Austral Bracken *Pteridium esculentum*, Common Maidenhair *Adiantum aethiopicum*, Green Rock Fern *Cheilanthes austrotenuifolia* and Necklace Fern *Asplenium flabellifolium*. This floristic community lacks the ferns associated with wetter riverine environments such as Riparian Forest.

Grasses contribute much to the biomass of this floristic community and include Tussock-grasses *Poa* spp., Common Hedgehog-grass *Echinopogon ovatus*, Silvery Hair-grass *Aira caryophylla*, Stiped Wallaby-grass *Austrodanthonia racemosa* var. *racemosa*, Weeping Grass *Microlaena stipoides*, Short-hair Plume-grass *Dichelachne micrantha*, Common Wheat-grass *Elymus scabrus* and Long-hair Plume-grass *Dichelachne crinita* contributing. Weedy grasses are infrequent.

River Flat Dry Valley Forest is rich in forbs, the most common including Cat's Ears *Hypochoeris radicata*, Creeping Wood-sorrel *Oxalis corniculata* spp. agg., Bidgee-widgee *Acaena novae-zelandiae*, Kidney-weed *Dichondra repens*, Creeping Cudweed *Euchiton gymnocephalus* s.s., Spear Thistle *Cirsium vulgare*, Slender Dock *Rumex brownii*, Branched Centaury *Centaureum tenuiflorum*, Hairy Pennywort *Hydrocotyle hirta*, Tall Fleabane *Conyza bonariensis* and Cinquefoil Geranium *Geranium potentilloides*.

Twining Glycine *Glycine clandestina* and Mountain Clematis *Clematis aristata* are common climbers in *River Flat* Dry Valley Forest. Small-leaf Bramble *Rubus parvifolius*, Blackberry *Rubus fruticosus* spp. agg. and Sweet Briar *Rosa rubiginosa* are common along the stream bank.

Floristic Community:

169-02 *Minor Gully* Dry Valley Forest

Minor Gully Dry Valley Forest occurs on minor gullies or ephemeral streams with fertile colluvially or alluvially-derived silts and silty clays. Rainfall is relatively low at approximately 700mm per annum and it grows at low altitudes on valley floors averaging of 230m above sea level. *Minor Gully* Dry Valley Forest can be found along the Wonnangatta and Tambo Rivers and in rainshadow country around Swifts Creek.

The tree layer consists of species normally found in both wet and dry situations. Mountain Grey Gum *Eucalyptus cypellocarpa*, Apple Box *E. angophoroides*, White Stringybark *E. globoidea* and Red Box *E. polyanthemus* form a tall, open overstorey. Associated eucalypt species vary with the moisture levels. Manna Gum *E. viminalis* occurs in wetter situations where this EVC abuts Riparian Forest and Yellow Box *E. melliodora* occurs where this EVC abuts Grassy Dry Forest. Silver Wattle *Acacia dealbata* and Blackwood *A. melanoxylon* are common sub-dominants usually growing as scattered individuals or in small clumps but may form almost a dense layer in wetter sites.

The shrub layer, like the overstorey is a mixture of plants from drier and wetter sites. Shiny Cassinia *Cassinia longifolia*, Burgan *Kunzea ericoides*, Hazel Pomaderris *Pomaderris aspera*, Snow Daisy-bush *Olearia lirata* and Common Cassinia *Cassinia aculeata* are the most common species but many other species may be present and locally abundant such as Prickly Currant-bush *Coprosma quadrifida*,

Bootlace Bush *Pimelea axiflora*, Tree Hakea *Hakea eriantha* and Hop Goodenia *Goodenia ovata*.

The ground layer is distinctive. A diversity of microhabitats occurs within a site due to the ephemeral nature of the water flows. Ferns such as Common Maidenhair *Adiantum aethiopicum* and Fishbone Water-fern *Blechnum nudum* may be abundant in the damper areas and Austral Bracken *Pteridium esculentum* in drier sites.

The graminoids are structurally conspicuous. They include Sword Tussock-grass *Poa ensiformis*, Common Tussock-grass *P. labillardierei*, Soft Tussock Grass *P. morrisii*, Grey Tussock Grass *P. sieberiana* and occasionally in the wettest sites Slender Tussock-grass *P. tenera*. Other large tussock-forming graminoids include Spiny-headed Mat-rush *Lomandra longifolia*, Variable Sword Sedge *Lepidosperma laterale* and Tasman Flax-lily *Dianella tasmanica* which may form large swards up to a metre high. Weeping Grass *Microlaena stipoides* and Thatch Saw-sedge *Gahnia radula* grow in the inter-tussock spaces, also occasionally forming dense swards. Weeping Grass is often grazed by native herbivores when it grows in this form.

The herbaceous flora is diverse. Ivy-leaf Violet *Viola hederacea*, Trailing Speedwell *Veronica plebeia*, Wood-sorrel *Oxalis corniculata* spp.agg, Kidney-weed *Dichondra repens* and Cinquefoil Cranesbill *Geranium potentilloides* are most common, whilst a large diversity of other species are less conspicuous. Fireweed Groundsel *Senecio linearifolius*, normally a member of wetter vegetation, is a common component of this floristic community.

Climbers are also a conspicuous component of this vegetation. The native Mountain Clematis *Clematis aristata* and Common Apple-berry *Billardiera scandens* are commonly joined by the introduced Blackberry **Rubus fruticosus* spp. agg. Other climbers include Twining Glycine *Glycine clandestina* and Love Creeper *Comesperma volubile*.

EVC 175 Grassy Woodland

There are three communities of Grassy Woodland: *Serpentine* Grassy Woodland, *Rainshadow* Grassy Woodland and *Dargo* Grassy Woodland.

Floristic Community:

175-07 *Serpentine* Grassy Woodland
Serpentine Grassy Woodland is highly restricted and endemic to the west of Mt Wellington and Gable End. It occurs on Cambrian serpentine geology and although fertile, it contains toxic heavy metals, particularly nickel and chromium (Alexander 1996). Areas with the highest levels of nickel and chromium result in "serpentine barrens" which are characterised by red brown soils with scattered mats of Tufted Knawel *Scleranthus diander* and occasional clumps of grass and sedge (Davies 1997). It occurs at an average of 600m above sea

level, although it can range from 520-680m above sea level.

Serpentine Grassy Woodland consists of an open woodland of Snow Gum *Eucalyptus pauciflora* and Apple Box/But But *E. bridgesiana/ angophoroides* but Candlebark *E. rubida* may also be present. The shrub layer is noticeably absent, with small prostrate Common Hovea *Hovea linearis*, Curved Rice-flower *Pimelea linifolia* and Honey-pots *Acrotriche serrulata* being the only commonly occurring shrubs.

A variety of grasses and other herbs occur in the understorey. Kangaroo Grass *Themeda triandra* is by far the most common grass with Common Wheat-grass *Elymus scaber* also occurring frequently. Wallaby Grass *Austrodanthonia* spp., Grey Tussock-grass *Poa sieberiana* var. *sieberiana*, Common Blown-grass *Agrostis avenacea* var. *avenacea*, Long-hair Plume-grass *Dichelacne crinita* and Hairy Plume-grass *D. hirtella* are also present. Short-stem Sedge *Carex breviculmis* and Bitter Cryptandra v *Cryptandra amara* var. *longiflora* are also common.

There is a small range of other herbs that are frequently found including Common Bog-sedge *Schoenus apogon*, Common Centaury **Centaureum erythraea*, Tufted Knawel *Scleranthus diander*, Grass Trigger-plant *Stylidium graminifolium*, Leafy Daisy *Brachyscome rigidula*, Austral Bugle *Ajuga australis* and Black-anther Flax-lily *Dianella revoluta*. The VROT Common Spleenwort *Asplenium trichomanes* ssp. *trichomanes* is also present.

Creeping Bossiaea *Bossiaea prostrata*, Purple Coral-pea *Hardenbergia violacea* and Pink Bindweed *Convolvulus erubescens* are common creepers.

Floristic Community:

175-05 *Rainshadow* Grassy Woodland
Rainshadow Grassy Woodland is restricted to the rolling hills and ridges of the Tambo River valley in the vicinity of Swifts Creek, Ensay and Cassilis. It occurs on Ordovician granodiorites on well-drained sandy-gravelly loam soils at an elevation of 200-700m above sea level with rainfall less than 700mm per annum.

The dominant overstorey tree is White Box *Eucalyptus albens* with occasional Red Stringybark *E. macrorhynca* and Kurrajong *Brachychiton populneus*. The sparse understorey consists of Shiny Cassinia *Cassinia longifolia*, Red-stem Wattle *Acacia rubida*, Tree Violet *Hymenanthera dentata*, and Austral Indigo *Indigofera australis*. Grass species which characterise *Rainshadow* Grassy Woodland include Leafy Wallaby-grass *Austrodanthonia fulva*, Kangaroo Grass *Themeda triandra*, Dense Spear-grass *Austrostipa densiflora*, Rough Spear-grass *S. scabra*, Common Wheat-grass *Elymus scaber* and Grey Tussock-grass *Poa sieberiana* var. *sieberiana*. The most dominant

forbs are Slender Tick-trefoil *Desmodium varians*, *Einadia* sp., Tall Bluebell *Wahlenbergia stricta*, Pale Vanilla-lily *Arthropodium milleflorum*, Cotton Fireweed *Senecio quadridentatus*, and Rough Bedstraw *Galium gaudichaudii* with the ferns Necklace Fern *Asplenium flabellifolium* and Green Rock Fern *Cheilanthes austrotenuifolia* also being common.

Floristic Community:

175-12 *Dargo* Grassy Woodland

Dargo Grassy Woodland occurs on the low rolling hills of the *Dargo* Valley. The geology consists of granodiorites with soils being well-drained sandy-gravelly loams. Elevation is 200-400m above sea level and average annual rainfall is 700-800 mm.

Structurally, this floristic community is an open woodland with scattered shrubs and small trees of Blackwood *Acacia melanoxylon*, Clustered Everlasting *Chrysocephalum semipapposum* and Burgan *Kunzea ericoides* and a dense field layer of grasses and forbs. The overstorey is dominated by Yellow Box *Eucalyptus melliodora*, But But *E. bridgesiana*, Candlebark *E. rubida*, and occasionally Snow Gum *E. pauciflora*. The dense ground layer includes Kangaroo Grass *Themeda triandra*, Common Wheat-grass *Elymus scabrus*, Rough Spear-grass *Austrostipa scabra*, Clover Glycine *Glycine latrobeana*, Sweet Bursaria *Bursaria spinosa*, Yellow Rush-lily *Tricoryne elatior* and St. John's Wort *Hypericum* spp.

EVC 177 Valley Slopes Dry Forest

Floristic Community:

177-02 *Gippsland* Valley Slopes Dry Forest

Gippsland Valley Slopes Dry Forest occurs on steep, eroding slopes in dry country above the Mitchell, *Dargo* and *Tambo* Rivers. Soils are skeletal though fertile and well-drained, with occasional rock outcropping which constantly erodes and falls into the river where it undercuts steep slopes. The unconsolidated soils are partially due to low biomass in the vegetation which does little to bind the soil. Effective rainfall is low due to low site quality including skeletal soils and steep slopes. This EVC carries a mixture of wet and dry species as river fogs and river margins provide increased moisture.

The overstorey is open in structure, eucalypts present including Yellow Box *Eucalyptus melliodora*, Red Box *E. polyanthemos* and River Peppermint *E. elata*. Black Wattle *Acacia mearnsii* may form an open forest. Lightwood *A. implexa* is lightly scattered as a small tree to large shrub.

The shrub layer is not very diverse although structurally it is usually fairly well developed. Shiny Cassinia *Cassinia longifolia* is visually prominent amongst a range of smaller, usually heavily grazed species including Prickly Currant-bush *Coprosma quadrifida*, Austral Indigo *Indigofera australis*, Sweet Bursaria *Bursaria spinosa*, Hairy Bursaria *Bursaria lasiophylla* and occasionally Tree Violet

Hymenanthera dentata. Saloop Saltbush *Einadia hastata* is indicative of the dry nature of this community.

The ground layer is unusual in that it carries a mix of species common to both drier or wetter sites which do not usually occur together. For example the juxtaposition of Mother Shield-fern *Polystichum proliferum* and Saloop *Einadia hastata*. Ferns, particularly common rock dwelling species such as Necklace Fern *Asplenium flabellifolium* and Rock fern *Cheilanthes austrotenuifolia*, contribute significantly to the overall ground cover in spaces between the rocks. Austral Bracken *Pteridium esculentum* is also relatively common.

Grasses and sedges are less diverse, but visually prominent. Large tussock-forming species include Long-leaf Wallaby Grass *Notodanthonia longifolia*, Variable Sword-sedge *Lepidosperma laterale* and Spiny-headed Mat-rush *Lomandra longifolia*. Sward-forming graminoids are widespread throughout the vegetation but contribute little to the overall biomass and are usually grazed. These include Common Hedgehog-grass *Echinopogon ovatus* and Weeping Grass *Microlaena stipoides*. Forbs are diverse comprising a large proportion of the overall diversity. The most common forbs include Prickly Starwort *Stellaria pungens*, Kidney Weed *Dichondra repens*, Cat's Ear *Hypochoeris radicata* and Slender Dock *Rumex brownii*. Indian Weed *Sigesbeckia orientalis*, Scrub Nettle *Urtica incisa*, Forest Starwort *Stellaria flaccida* and Southern Tick-trefoil *Desmodium gunnii* may be present as tangled, impenetrable masses.

Twining Glycine *Glycine clandestina* and Wonga Vine *Pandorea pandorana* are common climbers in *Gippsland* Valley Slopes Dry Forest.

EVC192 Montane Rocky Shrubland

Floristic Community:

192-05 *Wilson's Promontory* Montane Rocky Shrubland

Wilson's Promontory Montane Rocky Shrubland is only recorded from a few highly localised areas at *Wilson's Promontory* such as Mt LaTrobe. It occurs around the windswept rocky summits of the highest peaks between about 600-700m above sea level and where rainfall is above 1000 mm per annum. The group includes a range of structural forms from rocky shrubland through scrub to forest. The rocky crests are presently treeless although historic records suggest that this is a result of a major wildfire in 1951. Old stumps suggest that a tall forest would have been present before the big fire. Messmate/Mountain Ash hybrid *Eucalyptus obliqua/regnans* is widespread downslope from the crests.

Two forms of *Wilson's Promontory* Montane Rocky Shrubland were recorded during the study. The first is wind-pruned rocky shrubland less than 1m in height which occupies the treeless rocky crests. It is dominated by Common Heath *Epacris impressa*, Bush Broom-heath *Monotoca elliptica*, Lemon

Bottlebrush *Callistemon pallidus*, Long Clubmoss *Huperzia varia*, and Dusty Daisy-bush *Olearia phlogopappa* var. *phlogopappa*. It also includes Reed Bent-grass *Deyeuxia quadriseta* growing on rocks, as well as Hard Water-fern *Blechnum watsii*, Red-fruit Saw-sedge *Gahnia sieberiana*, Pretty Grass-flag *Libertia pulchella*, Tasman Flax-lily *Dianella tasmanica*, Mother Shield-fern *Polystichum proliferum* and even low shrubs of Myrtle Beech *Nothofagus cunninghamii*. Areas of poor drainage include the moss *Sphagnum cristatum* and expanses of Brickmakers' Saw-sedge *Gahnia grandis*. These areas were probably Cool Temperate Rainforest before the last major wildfire in 1951 and may revert to this group provided they remain free of fire.

The second form of this group consists of *Eucalyptus obliqua/regnans* hybrids to a height of about 25m emergent over an understorey of Tree Broom-heath *Monotoca elliptica*, Starry Daisy-bush *Olearia stellulata*, occasional Myrtle Beech *Nothofagus cunninghamii*, Common Heath *Epacris impressa* and Lemon Bottlebrush *Callistemon pallidus*. A dense ground cover of Hard Water-fern *Blechnum watsii* and Tasman Flax-lily *Dianella tasmanica* is typically present.

Wilson's Promontory Montane Rocky Shrubland shows strong biogeographic affinities with Tasmania as nearly all of the species are also found in that State. Downslope from the mountain summits, the group merges into *Granitic* Wet Rocky Outcrop Scrub on shallow soils, Wet Forest on the deeper soils and Cool Temperate Rainforest in the most protected sites.

Floristic Community:

192-07 *Gippsland* Montane Rocky Shrubland *Gippsland* Montane Rocky Shrubland occurs at elevations of 1000m above sea level. It may be floristically similar to Rocky Outcrop Shrubland but carries a suite of species tolerant of environmental conditions typical of higher elevations. It forms a dense shrubland, amongst outcropping rocks, and is subject to low cloud cover and snowfall during winter.

Trees are stunted and sparse and form part of the shrub layer. Species present may include Broad-leaved Peppermint *Eucalyptus dives* and species indicative of montane environments such as Mountain Gum *E. dalrympleana* and Snow Gum *E. pauciflora*.

Shrubs form a dense, but sometimes patchy layer. Species present include Daphne Heath *Brachyloma daphnoides*, Digger's Speedwell *Derwentia perfoliata*, Pale-fruit Ballart *Exocarpos strictus*, Grey Guinea flower *Hibbertia obtusifolia*, Shiny Cassinia *Cassinia longifolia*, Sticky Hop-bush *Dodonaea viscosa* ssp. *cuneata*, Woolly Grevillea *Grevillea lanigera*, Burgan *Kunzea ericoides*, Prickly Broom-heath *Monotoca scoparia* and Moth Daisy-bush *Olearia erubescens*. Shrubs particular to montane elevations include Grey Beard-heath

Leucopogon attenuatus and Sharp Beard-heath *L. fraseri*.

A diversity of forbs and graminoids may be present but rarely provide much cover. They grow in protected situations between rock crevices where some soil has developed and where moisture is retained. Common graminoids include Hill Wallaby-grass *Austrodanthonia eriantha*, Plume-grass *Dichelachne sieberiana* s.l., Common Tussock-grass *Poa labillardierei*, Grey Tussock-grass *P. sieberiana*, Squirrel-tail Fescue *Vulpia bromoides*, Black-anther Flax-lily *Dianella revoluta*, Spiny-headed Mat-rush *Lomandra longifolia* and Common Woodruff *Luzula meridionalis* var. *flaccida*.

Common forbs include Australian Stonecrop *Crassula sieberiana* ssp. *tetramera*, Austral Carrot *Daucus glochidiatus*, Common Raspwort *Gonocarpus tetragynus*, Cat's Ear **Hypochoeris radicata*, Magenta Stork's-bill *Pelargonium rodneyanum*, Prickly Starwort *Stellaria pungens* and Sprawling Bluebell *Wahlenbergia gracilis* s.l.

EVC 195 Seasonally Inundated Shrubby Woodland

Floristic Community:

195-02 *Plains* Seasonally Inundated Shrubby Woodland

Seasonally Inundated Shrubby Woodland occurs on flat terrain where rivers bank up from lakes during high flows. Soils thus 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 the summer heat baking hard the soil surface. The overstorey trees are predominantly large, sparse eucalypts, with the understorey shrubs being dense, but in isolated patches, with much bare ground in between. Whilst much of the ground is unvegetated, species diversity is quite high.

This EVC is confined in the study area to the Quaternary deposits of silts and clays on the lower reaches of the Avon River north-east of Sale. Annual rainfall is in the vicinity of 600 mm and elevation is 5-20m above sea level.

Seasonally Inundated Shrubby Woodland is characterised by occasional Forest Red Gum *Eucalyptus tereticornis* over a dense shrubby understorey including Swamp Paperbark *Melaleuca ericifolia*, Blackwood *Acacia melanoxylon*, River Bottlebrush *Callistemon sieberi*, and Woolly Tea-tree *Leptospermum lanigerum*. Common Tussock-grass *Poa labillardierei* is also present.

EVC 201 Shrubby Wet Forest

Floristic Community:

201-02 *Gippsland* Shrubby Wet Forest *Gippsland* Shrubby Wet Forest grows at montane elevations ranging between 720m-1130m above sea level. It grows adjacent to Wet Forest on the slightly drier ridges and is characterised by a suite of

shrubs and ferns reflecting this environmental difference.

The overstorey is dominated by Messmate Stringybark *Eucalyptus obliqua* and Gippsland Peppermint *Eucalyptus croajingalensis*. Other species may include Mountain Grey Gum *Eucalyptus cypellocarpa*, Alpine Ash *E. delegatensis*, White Stringybark *E. globoidea*, Mountain Ash *E. regnans*, Silvertop Ash *E. sieberi* and Manna Gum *E. viminalis*. Silver Wattle *Acacia dealbata* is commonly present and may form an almost complete cover in areas where the overstorey canopy is more open, often in response to disturbance.

There is a high diversity of large mesic shrubs in the understorey, a characteristic this EVC shares with Shrubby Damp Forest. Common species include: Prickly Coprosma *Coprosma quadrifida*, Snowy Daisy-bush *Olearia lirata*, Elderberry Panax *Polyscias sambucifolia*, Musk Daisy-bush *Olearia argophylla*, Common Cassinia *Cassinia aculeata*, Rough Coprosma *Coprosma hirtella*, Tree Lomatia *Lomatia fraseri*, Mountain Hickory Wattle *Acacia obliquinervia*, Blanket-leaf *Bedfordia arborescens*, Shiny Cassinia *Cassinia longifolia*, Gorse Bitter-pea *Daviesia ulicifolia*, Bootlace Bush *Pimelea axiflora*, Hazel Pomaderris *Pomaderris aspera*, and Victorian Christmas-bush *Prostanthera lasianthos*. Often one or a few of these species will dominate depending on environmental factors and disturbance history. The tall shrub layer is also characterised by an abundance of tree-ferns. In wetter situations Soft Tree-fern *Dicksonia antarctica* is the dominant species whilst in drier situations Rough Tree-fern *Cyathea australis* is the more prominent. Other ferns include the ground ferns Austral Bracken *Pteridium esculentum* and Mother Shield-fern *Polystichum proliferum*.

The ground stratum carries a diversity of herbs and grasses though their contribution to the overall biomass may be quite small. Most of the herbs are mesic and require high humidity and rainfall. Some of the more common herbs and graminoids include Ivy-leaf Violet *Viola hederacea*, Wombat Berry *Drymophila cyanocarpa*, Hairy Pennywort *Hydrocotyle hirta*, Bidgee Widgee *Acaena novae-zelandiae*, Mountain Cotula *Leptinella filicula*, Slender Tussock-grass *Poa tenera* and Tasman Flax-lily *Dianella tasmanica*. Many of these herbs may become locally dominant where disturbance opens the canopy.

Mountain Clematis *Clematis aristata* is the only common climber.

EVC 206 Sub-alpine Grassland

Floristic Community:

206-06 *Nunniang* Sub-alpine Grassland
Nunniang Sub-alpine Grassland occurs primarily on the *Nunniang* Plateau at altitudes of around 1200m above sea level. Structurally and floristically this EVC is dominated by grasses, any shrubs present tending to be small and cryptic. The fertile and highly organic soils which are derived from granodiorite

provide a suitable substrate for a lush cover of grasses and forbs, many specific to montane/sub-alpine environments. Snow persists for several months over winter. Species richness is low, indicative of the harsh environment.

Shrubs are nearly absent from *Nunniang* Sub-alpine Grassland, the only two species recorded at more than one site being Small-fruit Hakea *Hakea microcarpa* and Coral Heath *Epacris microphylla*.

The ground layer is dominated by grasses. Common species include Velvet Wallaby-grass *Austrodanthonia pilosa*, Smooth Wallaby-grass *A. laevis*, Purplish Blown Grass *Agrostis aemula*, Silvery Hair-grass **Aira caryophyllea*, Early Hair-grass **A. praecox*, Hill Wallaby-grass *R. erianthum*, Yorkshire Fog **Holcus lanatus*, Fine-leaf Snow-grass *Poa clivicola*, Squirrel-tail Fescue **Vulpia bromoides*, Common Wheat-grass *Elymus scabrus* and Short-hair Plume-grass *Dichelachne micrantha*.

A variety of forbs may be present but their occurrence is not consistent at all sites. The most common include Rosetted Cranesbill *Geranium antrorsum*, Creeping Cudweed *Euchiton gymnocephalus* s.s., Variable Plantain *Plantago varia*, Solenogyne *Solenogyne gunnii* and Twin-flower Knawel *Scleranthus biflorus*. The most common forbs are all rosette-forming, which is a common adaptation to the cold environment.

EVC 207 Montane Grassy Shrubland

Montane Grassy Shrubland occurs only at Victoria Falls, west of Omeo in the Gippsland study area. It grows in association with steep, rocky outcrops immediately upslope from the Victoria River. The geology is Ordovician and Silurian gneiss and granodiorite. Soils are shallow, dark brown stony loams to clay loams. Altitude is 920m and average annual rainfall is approximately 700mm.

The overstorey is characterised by localised emergent Snow Gum *Eucalyptus pauciflora*, Candlebark *E. rubida* and Silver Wattle *Acacia dealbata* over a grassy shrubland understorey. The shrub stratum Daphne Heath *Brachyloma daphnoides*, Tree Violet *Hymenantherea dentata* Woolly Grevillea *Grevillea lanigera*, Blunt-leaf Bitter-pea *Daviesia mimosoides* ssp. *mimosoides* and Mint-bush *Prostanthera* sp.

The ground stratum is dominated by Kangaroo Grass *Themeda triandra*, Grey Tussock-grass *Poa sieberiana*, Blue Snow-grass *Poa phillipsiana*, Prickly Snow-grass *Poa costiniana*, Long-hair Plume-grass *Dichelachne crinita* and Rough Spear-grass *Austrostipa scabra* ssp. *scabra*. The diversity of forbs present includes relatively dense Clustered Everlasting *Chrysocephalum semipapposum* Fireweed Groundsel *Senecio linearifolius*, Rough Bedstraw *Galium gaudichaudii*, Austral Cranesbill *Geranium solanderi*, Prickly Starwort *Stellaria pungens*, Australian Stonecrop *Crassula sieberiana*, Hare's foot Clover **Trifolium arvense*, Shady Wood-sorrel

Oxalis exilis, Yellowish Bluebell *Wahlenbergia luteola* and the ferns Common Maidenhair *Adiantum aethiopicum* and Necklace Fern *Asplenium flabellifolium*

EVC 210 Sub-alpine Wet Heathland

Sub-alpine Wet Heathland occurs at elevations of above 1100m above sea level, in soaks or along small streams and often abuts Sub-alpine Grassland with which it may form mosaics or complexes. During winter, this EVC can tolerate long periods of snow cover and low temperature. It is virtually treeless, and is characterised by a dense layer of low shrubs

There are three floristic communities of Sub-alpine Wet Heathland: *Montane Valley* Sub-alpine Wet Heathland, *Rich Soil* Sub-alpine Wet Heathland and *Creekline* Sub-alpine Wet Heathland.

Floristic Community:

210-01 *Montane Valley* Sub-alpine Wet Heathland *Montane Valley* Sub-alpine Wet Heathland is associated with creeks and minor to mid-sized streams in montane valleys around Surveyors Creek and various plateaus within the study area. It grows in harsh environments of low temperatures driven by a frost regime associated with cold air drainage and receives snow for several weeks over winter. Soils are peaty and often waterlogged due to a build up of *Sphagnum* spp. around the base of shrubs. Average elevation is 1110m above sea level.

The tree layer is variable, ranging from non-existent to a very open woodland. Black Sallee *Eucalyptus stellulata* is the most common species associated with these woodlands and shrublands but Snow Gum *E. pauciflora* and Candlebark *E. rubida* occur occasionally on the fringes or in areas within treeless patches that have a deeper and drier soil. Often the trees are small and spindly.

The shrub layer is structurally dominant and diverse, almost always forming a very dense layer, 1-2m tall. Many of these shrubs are indicative of wet environments where the soil is often waterlogged for many months of the year. Taller shrubs that can sometimes reach 2m in height include Small-fruit Hakea *Hakea microcarpa*, Mountain Tea-tree *Leptospermum grandifolium*, Myrtle Tea-tree *L. myrtifolium*, Alpine Bottlebrush *Callistemon ptyoides*, Common Cassinia *Cassinia aculeata* and Gorse Bitter-pea *Daviesia ulicifolia*. Small, heathy shrubs characterise this EVC. The most common including Swamp Heath *Epacris paludosa*, Mountain Beard-heath *Leucopogon hookeri*, Alpine Grevillea *Grevillea australis*, Common Oxylobium *Oxylobium ellipticum*, Alpine Baeckea *Baeckea gunniana*, Leafy Bossiaea *Bossiaea foliosa*, Drumstick Heath *Epacris breviflora*, Sticky Everlasting *Ozothamnus thyroideus*, Silky Daisy-bush *Olearia myrsinoides*, Coral Heath *Epacris microphylla*, Stalked Guinea-flower *Hibbertia pedunculata*, Tall Rice-flower *Pimelea ligustrina* and Slender Rice-flower *P. linifolia*.

Spreading Rope-rush *Empodisma minus* and Mountain Cord-rush *Restio australis* dominate the ground layer, often forming quite dense stands amongst the shrubs. Tall Sedge *Carex appressa* and Pale Rush *Juncus pallidus* may occur along the edges of the creeks in addition to Alpine Water-fern *Blechnum penna-marina* which is the only commonly occurring fern.

A few species of grasses are present, but contribute little to the structure of the vegetation. Common grasses include Tussock Grass *Poa australis* spp. agg., Reed Bent-grass *Deyeuxia quadriseta*, Weeping Grass *Microlaena stipoides* and Short-hair Plume-grass *Dichelachne micrantha*. A diversity of forbs may be present but they do not contribute significantly in cover. Commonly occurring species include Bidgee Widgee *Acaena novae zelandiae*, Shining Pennywort *Hydrocotyle sibthorpioides*, Prickly Starwort *Stellaria pungens*, Mountain Cotula *Leptinella filicula*, Creeping Raspwort *Gonocarpus micranthus* ssp. *micranthus*, Common Raspwort *Gonocarpus tetragynus*, Button Everlasting *Helichrysum scorpioides*, Cat's Ear *Hypochoeris radicata* and Showy Violet *Viola betonicifolia*.

Floristic Community:

210-03 *Rich Soil* Sub-alpine Wet Heathland *Rich Soil* Sub-alpine Wet Heathland occurs at elevations around 1200m above sea level in the east and north-east of the study area on the Nunniong Plateau and in the highest area of Beloka State Forest. It occurs in low-lying areas where the soil is saturated and may occasionally fringe small streams or creeks. Rainfall is high, at 1000mm per annum and snow persists over winter. The dominant features of *Rich Soil* Sub-alpine Wet Heathland are the open nature of the vegetation, the lack of trees and the density of low-growing shrubs.

This vegetation is treeless, shrubs being structurally dominant. Small-fruit Hakea *Hakea microcarpa* is the only tall shrub and is patchy throughout the heathland. Low shrubs dominate, sometimes forming a closed community. Coral Heath *Epacris microphylla* and Drumstick Heath *E. breviflora* form dense stands at many sites, interspersed with other small shrubs, including Delicate Bush-pea *Pultenaea tenella* and Trailing Beard Heath r *Leucopogon piliferus*. Occasionally *Baeckea* spp. will also form dense stands.

Common sedges include Mountain Cord-rush *Restio australis* and Tassel Rope-rush *Empodisma minus* which may form dense mats. Other wet species include Sick-le-leaf Rush *Juncus falcatus*, Alpine Joint-leaf Rush *J. sandwithii*, Fen Sedge *Carex gaudichaudiana* and Tall Carex *C. appressa*. Moss *Sphagnum* spp. and Milfoil *Myriophyllum* spp. are also present, indicating slow-running water.

Grasses are present in *Rich Soil* Sub-alpine Wet Heathland, however they occur as small individuals,

and contribute little to the ground cover. Species include Prickly Snow-grass *Poa costiniana*, Hooker Fescue *Austrofestuca hookeriana*, Smooth Wallaby-grass *Austroanthonia laevis*, Velvet Wallaby-grass *R. pilosum* and Thick Bent-grass *Deyeuxia crassiuscula*. Where *Rich Soil* Sub-alpine Wet Heathland borders or forms mosaics with Sub-alpine Grassland, the density of grasses increases and the density of shrubs decreases.

Forbs are a diverse component of the ground layer, but do not contribute highly to the ground cover. Common species include Matted St John's Wort *Hypericum japonicum*, Mountain Velleia *Velleia montana*, Mountain Woodruff *Asperula gunnii*, Bog Buttercup *Ranunculus pimpinellifolius*, Alpine Cotula *Cotula alpina*, Creeping Raspwort *Gonocarpus micranthus* ssp. *micranthus*, White Clover **Trifolium repens*, Thread Speedwell *Veronica* sp. aff. *gracilis*, Australian Caraway *Oreomyrrhis ciliata*, Fan Tuft-rush *Oreobolus distichus* and Twin-flower Knawel *Scleranthus biflorus* s.l.

Rich Soil Sub-alpine Wet Heathland and *Montane Valley* Sub-alpine Wet Heathland differ in that trees may be present in the latter, it carries a greater diversity of small heathy shrubs and some taller shrubs and is associated more with small streams and creeks than the former.

Floristic Community:

210-04 *Creekline* Sub-alpine Wet Heathland *Creekline* Sub-alpine Wet Heathland occurs along creeks and in drainage lines associated with the upper reaches of the Tambo River. It is found at elevations around 1150m above sea level and receives high annual rainfall of 1100mm. It occupies similar environments to *Montane Valley* Sub-alpine Wet Heathland, but occurs only in the north-east of the study area. Soils are alluvial silts, sands and loams.

The overstorey is variable from virtually treeless, with only a few scattered individuals to an open woodland. Species present are Snow Gum *Eucalyptus pauciflora*, Candlebark *E. rubida* and Black Sallee *E. stellulata*. This mix of eucalypts is similar to *Montane Valley* Sub-alpine Wet Heathland, however Black Sallee dominates *Montane Valley* Sub-alpine Wet Heathland and is nearly always present, whereas it is less common in *Creekline* Sub-alpine Wet Heathland.

Tall shrubs dominate the shrub layer, as opposed to small shrubs in *Rich Soil* Sub-alpine Wet Heathland. Mountain Baeckea *Baeckea utilis* is the dominant shrub in this community, forming dense stands with other tall shrubs such as Small-fruit Hakea *Hakea microcarpa*, Myrtle Tea-tree *Leptospermum mytifolium*, Mountain Milkwort *Comesperma retusum* and Prickly Tea-tree *Leptospermum continentale*. Drumstick Heath *Epacris breviflora* and Coral Heath *E. microphylla* often form dense stands beneath the taller shrub layer. The small

shrubs is less diverse than in *Rich Soil* Sub-alpine Wet Heathland.

Sedges, rushes and Restionaceae species are common in this wet environment. The most prominent species are Mountain Cord-rush *Restio australis* and Spreading Rope-rush *Empodisma minus* which may form dense stands. Other common species include Slender Twig-sedge *Baumea gunnii*, Common Bog-sedge *Schoenus apogon*, Fen Sedge *Carex gaudichaudiana*, Tall Sedge *C. appressa*, Short-stem Sedge *C. breviculmis*, Rush *Juncus sarophorus* and Sickle-leaf Rush *J. falcatus*. Alpine Water-fern *Blechnum penna-marina* sometimes occurs along the edges of streams.

Several grasses are common but contribute little to the ground cover. At some sites Prickly Snow-grass *Poa costiniana* can form dense tussocks along the creek edge, with Short Bent-grass *Deyeuxia brachyathera* and Yorkshire Fog **Holcus lanatus* occurring as scattered individuals. Other graminoids include Grass Trigger Plant *Stylidium graminifolium*, and Pale Vanilla-lily *Arthropodium milleflorum*.

Forbs are numerous, but do not contribute significantly to the ground cover. The most common forbs are Creeping Raspwort *Gonocarpus micranthus* ssp. *micranthus*, Matted St John's Wort *Hypericum japonicum*, Cat's Ear **Hypochoeris radicata*, Bidgee-widgee *Acaena novae-zelandiae*, Bog Buttercup *Ranunculus pimpinellifolius*, Australian Caraway *Oreomyrrhis eriopoda* and Self-heal **Prunella vulgaris*.

EVC 233 Wet Sands Thicket

Floristic Community:

233-02: *Strzeleckis* Wet Sands Thicket *Strzeleckis* Wet Sands Thicket is only recorded at one location in South Gippsland, in association with a sand/gravel quarry on the Toora Wonyip Rd, north of Toora. It occurs on Tertiary outwash geology on fine sandy grey loams to sands at an elevation of 170m above sea level. Average annual rainfall is in the vicinity of 1000 mm. Floristically, this community is similar to Lowland Forest.

Strzeleckis Wet Sands Thicket consists of dense, impenetrable heathy scrub group dominated by Narrow-leaf Wattle *Acacia mucronata*, with thickets of Wiry Bauera *Bauera rubioides*, and Prickly Tea-tree *Leptospermum continentale*. It also includes Mueller's Bush-pea *Pultenaea muelleri*, Forest Wire-grass *Tetrarrhena juncea*, Red-fruit Saw-sedge *Gahnia sieberiana*, Stinkwood *Zieria arborescens*, Austral Bracken *Pteridium esculentum*, Shade Raspwort *Gonocarpos humilis*, Scented Paperbark *Melaleuca squarrosa*, Snow Daisy-bush *Olearia lirata*, Broom Spurge *Amperea xiphoclada*, Bushy Broom-heath *Monotoca glauca* and Notched Phebalium *Phebalium bilobum*. The climbers, Common Apple-berry *Billardiera scandens* and Love Creeper *Comesperma volubile*, are also present.

EVC 309 Calcareous Swale Grassland

Floristic Community:

309-01 *Shrub-invaded* Calcareous Swale Grassland

Shrub-invaded Calcareous Swale Grassland is confined to Wilsons Promontory where it develops on the swales of the sand dunes on the isthmus in the northern part of the Park. Geology consists of Quaternary aeolian sand sheets and elevation is 20m or less above sea level. Average annual rainfall is 900-950 mm. Exclusion plots and historical records suggest that this community was once a grassland (E. Chesterfield, pers.comm.) but has been degraded due to high grazing pressures from native and introduced animals (Chesterfield *et al.*, 1995), resulting in shrub invasion. In recent years some slashing and burning trials have been undertaken to maintain the vegetation in an open state.

The group is dominated by the unpalatable low stature species, Twig-sedge *Baumea juncea* with shrubs such as Silky Guinea-flower *Hibbertia sericea*, Coast Tea-tree *Leptospermum laevigatum*, and Drooping Sheoke *Allocasuarina verticillata*. Other species present are the herbs Bidgee-widgee *Acaena novae-zelandiae*, Kidney-weed *Dichondra repens*, and Small-leaved Clematis *Clematis microphylla*. Exclusion trials in this group at Wilsons Promontory support tall, dense grasslands of Kangaroo Grass *Themeda triandra* and various other native grasses such as Plume-grasses *Dichelachne* and Wallaby Grasses *Austrodanthonia* spp.

EVC 310 Wet Rocky Outcrop Scrub

Floristic Community:

310-01 *Granitic* Wet Rocky Outcrop Scrub
Granitic Wet Rocky Outcrop Scrub is only recorded on the higher peaks of Wilsons Promontory at an altitude of about 600m above sea level. The geology consists of Devonian granite with shallow gravelly or loamy soils and average annual rainfall is 1000 mm.

The floristic community is dominated by Lemon Bottlebrush *Callistemon pallidus* and Tree Broom-heath *Monotoca elliptica* scrub up to about 5m in height. Low trees of the hybrid Messmate/Mountain Ash *Eucalyptus obliqua/regnans* are sometimes present.

In the more topographically protected sites the understorey includes mossy stems and epiphytic ferns such as Austral Filmy Fern *Hymenophyllum australe*, Common Finger-fern *Grammitis billardieri* and Kangaroo Fern *Microsorium pustulatum*. Groundcover species include Hard Water-fern *Blechnum watsii* and Soft Tree-fern *Dicksonia antarctica*. Scattered shrubs of Myrtle Beech *Nothofagus cunninghamii*, Mountain Pepper *Tasmannia lanceolata*, Dusty Daisy-bush *Olearia phlogopappa* var. *phlogopappa*, and the VROT Rock Banksia *Banksia saxicola* are present. Another

VROT, Long Clubmoss *Huperzia varia*, is also found in this community.

Granitic Wet Rocky Outcrop Scrub merges into Cool Temperate Rainforest in the most protected high altitude gullies and slopes and, typically, downslope at lower altitude it merges into Wet Forest. *Granitic* Wet Rocky Outcrop Scrub may once have been Cool Temperate Rainforest and may presently represent an early successional stage of rainforest.

EVC 311 Berm Grassy Shrubland

Berm Grassy Shrubland is found on the small sand dunes formed as a result of wave action at the heads of beaches. It is found at St. Margaret Island in Shallow Inlet, South Gippsland and is most likely found on other islands in the inlet as well but is too small to map at a scale of 1:100000. Soils consist of coarse sands originating from unconsolidated undulating Pleistocene marine and aeolian deposits on coastal plains. The typical coarse sands are derived from wave action on exposed margins of the islands. This EVC is found at a very low elevation of 0.5m above high tide and the annual rainfall is 650-700 mm.

A number of halophytes are commonly found in this EVC including Coast Saltbush *Atriplex cinerea*, Rounded Noon-flower *Disphyma crassifolium* ssp. *clavellatum*, Beaded Glasswort *Sarcocornia quinqueflora* and Seaberry Saltbush *Rhagodia candolleana*. Grasses and forbs present include Variable Groundsel *Senecio pinnatifolius*, Annual Fireweed *S. glomeratus*, Buck's-horn Plantain *Plantago coronopus*, Four-leaved Allseed *Polycarpon tetraphyllum*, Common Mouse-ear Chickweed *Cerastium glomeratum*, White Cudweed *Vellerophyton dealbatum*, Coast Sow-thistle *Actites megalocarpa*, Sow-thistle *Sonchus oleraceus*, Jersey Cudweed *Pseudognaphalium luteoalbum*, Hairy Hawkbit *Leontodon taraxacoides*, Marram Grass *Ammophila arenaria*, Plume-grass *Dichelachne* sp, Grey Tussock-grass *Poa sieberiana*, Coast Fescue *Austrofestuca littoralis* and Coast Barb-grass *Parapholis incurva*.

It is closely related to Coastal Dune Scrub Mosaic and *Estuarine Flats* Coastal Tussock Grassland.

EVC 315 Shrubby Foothill Forest/Damp Forest Complex

Shrubby Foothill Forest/Damp Forest Complex is confined to gully systems on the foothills of the Great Dividing Range in the catchment of the lower Thomson River before it enters the plains. It is a shrubby form of Damp Forest, where narrow-leaved shrubs dominate rather than mesic, broad-leaved shrubs which are characteristic of *Gippsland* Shrubby Damp Forest. The soils are moist Tertiary gravels and sands but are not as fertile as those in Damp Forest. Rainfall is very high, averaging 1110mm per annum and average elevation is 435m above sea level.

The overstorey forms a medium to tall forest with no single dominant although Silvertop Ash *Eucalyptus*

sieberi is very common. Other species present are Messmate *Eucalyptus obliqua* and Mountain Grey Gum *E. cypellocarpa* (common to Damp Forest) and Yellow Stringybark *E. muelleriana* or Yertchuk *E. considiana* (common to Shrubby Foothill Forest or Lowland Forest). Silver Wattle *Acacia dealbata* is common at wetter sites as a large multi-stemmed shrub.

Structurally and floristically the shrub layer is the most dominant feature of this complex. Floristic diversity is high and characterised by species that prefer moist environments but also have a degree of adaptation to wildfire. Common species are Snowy Daisy-bush *Olearia lirata*, Narrow-leaf Wattle *Acacia mucronata*, Prickly Tea-tree *Leptospermum continentale*, Sunshine Wattle *Acacia terminalis*, Shiny Cassinia *Cassinia longifolia* and Eastern Prickly Bush-pea *Pultenaea forsythiana*. Less widespread and abundant species (although they may locally dominate) include Gorse Bitter-pea *Daviesia ulicifolia*, Wedge-leaf Everlasting *Ozothamnus cuneifolius*, Snowy Daisy-bush *Olearia lirata*, Dusty Daisy-bush *Olearia phlogopappa* and Common Cassinia *Cassinia aculeata*.

A group of smaller, fire-tolerant shrubs are present including Common Heath *Epacris impressa*, Hop Goodenia *Goodenia ovata*, Golden Bush-pea *Pultenaea gunnii* and Hairy Pink-bells *Tetratheca labillardieri*. Broom Spurge *Amperea xiphoclada* and Blue Dampiera *Dampiera stricta* although not strictly shrubs are semi-woody and are sufficiently large and abundant in this complex to contribute to the diversity of the shrub layer.

Ground ferns in this complex are distinctive as they usually form an almost complete layer. Austral Bracken *Pteridium esculentum* and Common Ground-fern *Calochlaena dubia* form extensive colonies. Rough Tree-fern *Cyathea australis* is common and conspicuous, commonly growing as scattered individuals or small clumps

The ground layer is relatively low in species diversity and density. Only a few of the hardest and least fire-sensitive species occur here. Forest Wire-grass *Tetrarrhena juncea*, Tussock Grass *Poa australis* spp. agg., Spiny-headed Mat-rush *Lomandra longifolia*, Common Raspwort *Gonocarpus tetragynus* and Ivy-leaf Violet *Viola hederacea* are the most common and abundant.

EVC 316 Shrubby Damp Forest

Floristic Community:

316-01 *Gippsland* Shrubby Damp Forest
Gippsland Shrubby Damp Forest has affinities with several EVCs and occupies habitats intermediate between the habitats of Shrubby Dry Forest and Damp Forest. It grows in gullies and on protected slopes on relatively skeletal but fertile sedimentary soils. This EVC occurs at elevations of around 500m above sea level and receives a low to moderate annual rainfall of approximately 750mm.

The overstorey is dominated by White Stringybark *Eucalyptus globoidea* and Mountain Grey Gum *E. cypellocarpa* along with a variety of other species including Silvertop Ash *E. sieberi*, Messmate *E. obliqua*, Broad-leaved Peppermint *E. dives*, Gippsland Peppermint *E. croajingolensis*, Narrow-leaved Peppermint *E. radiata*, Red Box *E. polyanthemos* ssp. *vestita*, Forest Red Box *E. polyanthemos* ssp. *longior* and Red Stringybark *E. macrorhyncha*. Silver Wattle *Acacia dealbata* is a more static component of the overstorey than the eucalypts, with Pale Hickory Wattle *A. falciformis* occurring in drier sites.

The mid-stratum is usually dense and carries a moderate diversity of common and widespread medium to large shrubs characteristic of both drier and damper environments. Species requiring moisture include Shiny Cassinia *Cassinia longifolia*, Common Cassinia *C. aculeata*, Snowy Daisy-bush *Olearia lirata*, Prickly Currant-bush *Corposma quadrifida*, Hazel Pomaderris *Pomaderris aspera*, Blanket-leaf *Bedfordia arborescens*, Musk Daisy-bush *O. argophylla* and Hop Goodenia *Goodenia ovata*. Drier species include Cherry Ballart *Exocarpos cupressiformis*, Gorse Bitter-pea *Daviesia ulicifolia*, Grey Guinea-flower *Hibbertia obtusifolia* and Common Heath *Epacris impressa*.

The ground layer also carries common and widespread species. Grasses are present, but provide little cover. Common species include Tussock Grass *Poa australis* spp. agg., Forest Wire-grass *Tetrarrhena juncea* and Weeping Grass *Microlaena stipoides*. Spiny-headed Mat-rush *Lomandra longifolia*, Tasman Flax-lily *Dianella tasmanica*, Black-anther Flax-lily *D. revoluta*, Nodding Blue-lily *Stypantra glauca* and Grass Trigger-plant *Stylidium graminifolium* are the most common graminoids.

Forbs are sparse and include Ivy-leaf Violet *Viola hederacea*, Common Lagenifera *Lagenifera stipitata*, Cinquefoil Cranes-bill *Geranium potentilloides*, Hairy Pennywort *Hydrocotyle hirta*, and Raspworts *Gonocarpus* spp.

Austral Bracken *Pteridium esculentum*, is common, with the climbers Mountain Clematis *Clematis aristata* and Common Apple-berry *Billardiera scandens* also being present.

EVC 318 Montane Swamp

Montane Swamp occurs in the headwaters of the Tambo River and in Morass Creek, north east of Benambra. It forms in drainage-lines on wet alluviums at montane and sub-montane elevations and has an average annual rainfall of 650-750mm.

Montane Swamp is unsampled in Morass Creek but is likely to be similar to that in the headwaters of the Tambo River. Here the vegetation is virtually treeless but eucalypts may be present including Candlebark *Eucalyptus rubida*, Black Sallee *E. stellulata* and Snow Gum *E. pauciflora*.

Generally, this EVC is characterised by an open shrub layer dominated by Mountain Baeckea *Baeckea utilis* an/or Myrtle Tea-tree *Leptospermum myrtifolium* with a heathy understorey dominated by Coral Heath *Epacris microphylla*, Drumstick Heath *E. breviflora*, and Small-fruit Hakea *Hakea micorcarpa*.

The field layer carries a diversity of sedges, grasses, forbs and ferns including Common bog-sedge *Schoenus apogon*, Spreading Rope-rush *Empodisma minus*, Mountain Cord-rush *Restio australis*, Slender Twig-sedge *Baumea gunnii*, Tall Sedge *Carex apressa*, Club-sedge *Isolepis subtilissima*, Jointed Rush *Juncus articulatus*, Graceful Fescue *Festuca asperula*, Prickly Snow-grass *Poa costiniana*, Mountain Cotula *Leptinella filicula*, Common Woodruff *Asperula conferta* and Alpine Water-fern *Blechnum penna-marina*.

EVC 319 Montane Herb-rich Woodland

Floristic Community:

319-01 *Mitta Mitta Headwaters* Montane Herb-rich Woodland

Mitta Mitta Headwaters Montane Herb-rich Woodland occurs in the north-east of the study area, on southern and eastern-facing slopes or in protected gullies of the headwaters of the Mitta Mitta and Tambo Rivers. It forms at elevations of around 1000m above sea level and receives a high rainfall of almost 1110mm per annum. It is subject to cold air drainage which influences the species mix. Structurally, this EVC is similar to Herb-rich Foothill Forest which grows at lower elevations

The overstorey is dominated by Narrow-leaf Peppermint *Eucalyptus radiata* s.l. with the montane species Mountain Gum *E. dalrympleana* ssp. *dalrympleana*, Snow Gum *E. pauciflora* and Candlebark *E. rubida* present as sub-dominants. Broad-leaved Peppermint *E. dives* is occasionally present. Silver Wattle *Acacia dealbata* is abundant in the understorey.

The shrub layer is neither diverse nor dense although some species do occur frequently. These include Handsome Flat-pea *Platylobium formosum*, Common Cassinia *Cassinia aculeata* and Prickly Bush-pea *Pultenaea forsythiana*. Species occasionally present include Moth Daisy-bush *Olearia erubescens*, Pale-fruit Ballart *Exocarpos strictus*, Rough Coprosma *Coprosma hirtella*, Gorse Bitter-pea *Daviesia ulicifolia*, Honey-pots *Acrotriche serrulata* and Grey Guinea-flower *Hibbertia obtusifolia*.

The ground layer carries a diversity of herbs and graminoids. Non-grass graminoids include Spiny-headed Mat-rush *Lomandra longifolia*, Pale Vanilla-lily *Arthropodium milleflorum*, Tasman Flax-lily *Dianella tasmanica*, Grass Trigger-plant *Stylidium graminifolium*, Common Woodrush *Luzula meridionalis* var. *flaccida* and Wattle Mat-rush *Lomandra filiformis*. Common grasses include Grey Tussock-grass *Poa sieberiana*, Velvet Wallaby-

grass *Rytidopsermum pilosum*, Kangaroo Grass *Themeda triandra*, Common Wheat-grass *Elymus scabrus* and Short-hair Plume-grass *Dichelachne micrantha*. Forbs account for a high proportion of species diversity in this EVC. Prickly Woodruff *Asperula scoparia*, Tall Bluebell *Wahlenbergia stricta* ssp. *stricta*, Cudweed *Euchiton gymnocephalus* s.s., Stinking Pennywort *Hydrocotyle laxiflora*, Common Raspwort *Gonocarpus tetragynus*, Showy Violet *Viola betonicifolia* ssp. *betonicifolia* and Common Centaury *Centaureum erythraea* are some of the more common species present. Species specific to montane environments include Australian Buttercup *Ranunculus lappaceus*, Hawkweed *Picris *Picris hieracioides* spp. agg., Mountain Gentian *Gentianella diemensis* and Forest/Subalpine Buttercup *Ranunculus plebius/scapiger*.

Twining Glycine *Glycine clandestina* and Mountain Clematis *Clematis aristata* are common climbers.

EVC 320 Heathy Dry Forest/Grassy Dry Forest Complex

Heathy Dry Forest/Grassy Dry Forest Complex has floristic and environmental characteristics of both EVCs. It is characterised by dense field layer of grasses, growing within a mixture of shrubs typical of Heathy Dry Forest. It occurs on relatively flat country at reasonably high elevations, averaging almost 900m above sea level and in high rainfall areas of around 850mm per annum. Examples of this EVC are mapped in the north east of the study area in the Bowen Mountains/ Beloka area and east of Omeo.

Heathy Dry Forest/Grassy Dry Forest Complex forms an open forest dominated by Broad-leaved Peppermint *Eucalyptus dives* and Brittle Gum *E. mannifera*. Red Stringybark *E. macrorhyncha* may be co-dominant.

Silver Wattle *Acacia dealbata* is sometimes present as a tall understorey shrub. A few ubiquitous, medium height shrubs occur above the lower heathy shrub layer. These include Handsome Flat-pea *Platylobium formosum*, Shiny Cassinia *Cassinia longifolia*, Common Cassinia *Cassinia aculeata*, Pale-fruit Ballart *Exocarpos strictus* and Hop Bitter-pea *Daviesia latifolia*. Small heathy shrubs form a moderately dense field layer, with the most commonly including Grey Guinea-flower *Hibbertia obtusifolia*, Heath Pink-bells *Tetradthea bauerifolia*, Prickly Broom-heath *Monotoca scoparia*, Daphne Heath *Brachyloma daphnoides*, Honey Pots *Acrotriche serrulata*, Ploughshare Wattle *Acacia gunnii*, Slender Rice-flower *Pimelea linifolia*, Woolly Grevillea *Grevillea lanigera*, Common Beard-heath *Leucopogon virgatus* and Dwarf Sour-bush *Choretrum pauciflorum*.

The ground layer is rich in graminoids. Grey Tussock-grass *Poa sieberiana*, Red-anther Wallaby-grass *Joycea pallida*, Velvet Wallaby-grass *Austrodanthonia pilosa* and Short-hair Plume-grass *Dichelachne micrantha* form a dense cover and are interspersed with a few taller graminoids

including Spiny-headed Mat-rush *Lomandra longifolia*, Black-anther Flax-lily *Dianella revoluta*, Wattle Mat-rush *Lomandra filiformis* and Grass Trigger-plant *Stylidium graminifolium*.

Forbs contribute little in biomass to the ground cover, however several are commonly present. These include Common Raspwort *Gonocarpus tetragynus*, Tall Bluebell *Wahlenbergia stricta* ssp. *stricta*, Common Centaury **Centaureum erythraea*, Narrow Groundsel *Senecio tenuiflorus* and Creeping Cudweed *Euchiton gymnocephalus* s.s. Purple Coral-pea *Hardenbergia violacea* can often be found scrambling amongst the ground layer.

EVC 334 Billabong Wetland

Billabong Wetland is an old anabranch of a river system that is gradually infilling and often contains deep permanent water which is periodically replenished by flood waters. It occurs on the active flooding terraces of the major streams in Gippsland, including the LaTrobe, Thomson and Macalister Rivers. Soils consist of poorly drained clay alluvium deposits of Holocene origin. Annual average rainfall is in the vicinity of 500-800 mm and elevation ranges from 20-80m above sea level.

Species which characterise Billabong Wetland include Tall Spike-sedge *Elaeocharis sphacelata*, Milfoil *Myriophyllum* spp., Pondweed *Potamogeton* spp. and Azolla *Azolla* spp. The draw-down zones on the margins of these wetlands have a diverse herbaceous component that includes *Agrostis* spp., Knotweed *Persicaria* spp., Brooklime *Gratiola* spp., Centella *Centella cordifolia* and various Bog-sedge *Schoenus* spp.

EVC 681 Deep Freshwater Marsh

The EVC Deep Freshwater Marsh is mainly confined to the swampy plains and wetlands in the Sale area although it also occurs south of Bairnsdale at Macleod Morass. It is confined to deep swamps on the Morass land system of clays, peats and silts. (Conservation and Natural Resources 1992). Elevation is close to sea-level and average annual rainfall is 550-650 mm.

A number of aquatic plants characterise Deep Freshwater Marsh including Giant Rush *Juncus ingens*, Water-ribbons *Triglochin procerum*, Milfoil *Myriophyllum* spp. and Common Reed *Phragmites australis* on the margins.

EVC 686 Wet Heathland/Damp Heathland Mosaic

Wet Heathland/Damp Heathland Mosaic occurs on Quaternary and Tertiary outwash deposits on the Yanakie isthmus and further west in the Middle and Lower Tarwin areas of South Gippsland. Soils on these low rolling hills range from sodden to well-drained with sandy or peaty horizons developed over clays or sand subsoils. Elevation is low, to around 40m above sea level while average annual rainfall is 900-1000mm.

The overstorey in the Damp Heathland component may include Bog Gum *Eucalyptus kitsoniana* with generally an understorey consisting of a range of epacrid shrubs such as Common Heath *Epacris impressa* and other shrubs including Hairpin Banksia *Banksia spinulosa*, Snow Daisy-bush *Olearia lirata* and Bush-pea *Pultenaea* spp. Coral-ferns *Gleichenia* spp., Elderberry *Panax Polyscias sambucifolia* and Spreading Rope-rush *Empodisma minus* are also present.

Dominant shrubs in the Wet Heathland component are Prickly Tea-tree *Leptospermum continentale*, Scrub Sheoke *Allocasuarina paludosa*, Slender/Green Sheoke *A. misera/paradoxa*, Blunt-leaf Heath *Epacris obtusifolia*, Woolly-style Heath *Epacris lanuginosa*, Scented Paperbark *Melaleuca squarrosa*, Pink Swamp-heath *Sprengelia incarnata*, Coral Heath *Epacris microphylla* and Smooth Parrot-pea *Dillwynia glaberrima*. The ground cover includes Long Purple-flag *Patersonia occidentalis*, Creeping Raspwort *Gonocarpus micranthus* and Screw Fern *Lindsaea linearis*. Swamp Selaginella *Selaginella uliginosa*, Spreading Rope-rush *Empodisma minus*, Tall Yellow-eye *Xyris operculata* and Button Grass *Gymnoschoenus sphaerocephalus* are all good indicator species of this poor drainage group. Other species commonly present are Slender Bog-sedge *Schoenus lepidosperma*, Common Rapier-Sedge *Lepidosperma filiforme*, Slender Twine-rush *Leptocarpus tenax*, Rigid Bush-pea *Pultenaea stricta*, Austral Grass-tree *Xanthorrhoea australis* and Spreading Rope-rush *Empodisma minus*.

EVC 689 Gippsland Plains Grassy Woodland/Gilgai Wetland Mosaic

Within the Redgum 2 land system of the Gippsland plains, a mosaic develops between *Gippsland Plains* Grassy Woodland and *Gilgai Wetland* which occurs in the wetter depressions of these plains (Conservation and Natural Resources 1992). *Gilgai* land forms occur as a result of self-mulching clays which crack and infill with crumbling peds over summer and swell with winter rain thus forming a complex series of humps and hollows. The vegetation of the humps and hollows is correspondingly complex in pattern (VicRFASC 1998). Vegetation in the hollows is *Gilgai Wetland* whilst that of the raised humps is *Gippsland Plains* Grassy Woodland. Elevation ranges from 20-90m above sea level and average annual rainfall is 500-800 mm.

The *Gilgai Wetland* is fringed by Rough-barked Honey-myrtle *Melaleuca parvistaminea* and Prickly Tea-tree *Leptospermum continentale* with a number of rushes, sedges and aquatic plants occupying the wet depressions. These include Tall Sedge *Carex appressa*, Common Spike-sedge *Elaeocharis acuta*, Rush *Juncus* spp., Mat Grass *Hemarthria uncinata*, Common Scale-rush *Lepyrodia muelleri*, *Pratia* spp., Knotweed *Persicaria* spp., Running Marsh-flower *Villarsia reniformis*, Milfoil *Myriophyllum* spp., and Buttercup *Ranunculus* spp..

For a description of characteristic species of *Gippsland Plains Grassy Woodland*, refer to the description of *Gippsland Plains Grassy Woodland*.

EVC 691 Aquatic Herbland/Plains Sedgy Wetland Mosaic

Aquatic Herbland/Plains Sedgy Wetland Mosaic forms in shallow depressions scattered across the Gippsland plains, mainly from the western shores of Lake Wellington to the Thomson River west of Sale. The mosaic occurs on mud or peaty sand to clay soils which are either temporarily or permanently inundated. Elevation is approximately 1-5m above sea level and average annual rainfall is 500-600 mm.

Aquatic Herbland is characterised by plants which can withstand long periods of inundation but are also tolerant of periods without water. This includes species such as *Pratia* spp., River Buttercup *Ranunculus inundatus*, Australian Lilaepsis *Lilaepsis polyantha*, Running Marsh-flower *Villarsia reniformis*, Centella *Centella cordifolia*, Shining Pennywort *Hydrocotyle sibthorpioides*, Milfoil *Myriophyllum* spp. and Water-ribbons *Triglochin procerum*.

The fringing zones in shallower waters are less frequently inundated and are wet for shorter periods of time, favouring the Plains Sedgy Wetland component of this mosaic. It is characterised by a number of sedges including Tall Sedge *Carex appressa*, Rush Sedge *C. tereticaulis*, Common Spike-sedge *Eleocharis acuta*, Slender Bog-sedge *Schoenus lepidosperma*, Swamp Club-sedge *Isolepis inundata* and Twig-sedge *Baumea* spp.

EVC 700 Swamp Scrub/Plains Sedgy Wetland Mosaic

Swamp Scrub/Plains Sedgy Wetland Mosaic is confined to a small number of wetlands on the Gippsland plains in the Bairnsdale area, especially near Hillside just south of the Mitchell River and the lower reaches of the Tambo River in the vicinity of Swan Reach.

The geology on which this mosaic occurs is Quaternary high level alluvial terraces consisting of heavy clay soils. The landform is peculiar in that these closed drainage swamps develop on dolines which are collapsed caves that underlie the Quaternary sediments. This leads to potentially deep swamps in shallow saucer-like depressions with limited catchments. As the swamps only rarely fill completely, they are usually dominated by herbs. Elevation is low, in the range of 20-25m above sea level and average annual rainfall is 650-680mm.

Swamp Scrub occurs on the fringes of these wetlands and is dominated by Swamp Paperbark *Melaleuca ericifolia*. Also present are Woolly Tea-tree *Leptospermum lanigerum* and Crimson Bottlebrush *Callistemon citrinus*. A herbaceous ground cover including Kidney-weed *Dichondra repens*, Bidgee-widgee *Acaena novae-zelandiae*, Common Tussock-grass *Poa labillardieri* and

Geranium spp. is common where light penetrates to ground level.

The Plains Sedgy Wetland component of this mosaic is characterised by a number of sedges including Tall Sedge *Carex appressa*, Rush Sedge *C. tereticaulis*, Common Spike-sedge *Eleocharis acuta*, Slender Bog-sedge *Schoenus lepidosperma*, Swamp Club-sedge *Isolepis inundata* and Twig-sedge *Baumea* spp.

EVC 702 Montane Grassland

Montane Grassland was identified mainly during the pre-1750's EVC mapping project. It is now a much depleted EVC due to extensive clearing for agriculture. It would have been extensive on the plains to the north and east of Benambra in the vicinity of Morass Creek and to the south of Lake Omeo and Benambra as a mosaic with Montane Grassy Woodland. One floristic community, *Limestone Montane Grassland*, is still extant and occurs in the Limestone Creek area east of Benambra (see EVC 702-01). Montane Grassland occurs on Quaternary alluvial flats of gravel, silts and minor clays. Elevation is approximately 700m above sea level and average annual rainfall is 650-700 mm.

The floristic description for this EVC is based on three quadrats taken at Lake Omeo in a disturbed grassland (Bramwell unpub. 1999). Grasses which are dominating include Slender Wallaby-grass *Austrodanthonia penicillata*, Rough Spear-grass *Austrostipa scabra* ssp. *scabra*, Common Wheat-grass *Elymus scabrus*, Grey Tussock-grass *Poa sieberiana* var. *sieberiana* and Kangaroo Grass *Themeda triandra*. Other grasses present include Common Blown-grass *Agrostis avenacea*, Common Wallaby-grass *Austrodanthonia caespitosa*, Velvet Wallaby-grass *A. pilosa*, and Long-hair Plume-grass *Dichelachne crinita*.

A number of herbs are also common including Hairy Sheep's Burr *Acaena agnipila*, Common Everlasting *Chrysocephalum apiculatum* s.l., Pink Bindweed *Convolvulus erubescens*, Cut-leaf Goodenia *Goodenia pinnatifida*, Scaly Buttons *Leptorhynchus squamatus*, Fuzzy New Holland Daisy *Vittadinia cuneata* var. *cuneata*, Roundleaf Wiltonia *Wiltonia rotundifolia*, Sweet Hound's-tongue *Cynoglossum suaveolens*, Southern Tick-trefoil *Desmodium gunnii*, Alpine Cranesbill *Geranium sessiliflorum* ssp. *brevicaule*, Austral Cranesbill *G. solanderi* s.l., Woolly New Holland Daisy *Vittadinia gracilis* and Yellowish Bluebell *Wahlenbergia luteola*. The sedges Common Sedge *Carex inversa* and Common Bog-sedge *Schoenus apogon* are also present as well as the lilies Pale Flax-lily *Dianella longifolia* and Bulbine Lily *Bulbine bulbosa*.

Floristic Community:

702-01 *Limestone Montane Grassland*
Limestone Montane Grassland occurs on Silurian limestones at montane elevations around 1000m above sea level. It forms an open grassland, with the ground layer dominated by herbs and grasses.

It occurs on the Great Divide east of Omeo in the Alpine National Park at Limestone Creek and Stony Creek (Davies 1997).

The dominant feature of *Limestone Montane Grassland* is the grassy ground layer, dominated by Kangaroo Grass *Themeda triandra*. Common Wheat-grass *Elymus scaber* and less commonly Weeping Grass *Microlaena stipoides* form a sward of grasses. Hooker's Tussock-grass v *Poa hookeriana* and Grey Tussock-grass *P. sieberiana* var. *hirtella* form small tussocks amongst the other grasses. Silvery Hair-grass **Aira caryophyllea* is also often present. Hooker's Tussock-grass is indicative of the montane elevations at which *Limestone Montane Grassland* occurs.

The most common forbs present include Austral Cranesbill *Geranium solanderi*, Cat's Ear **Hypochoeris radicata*, Common Woodruff *Asperula conferta*, Austral Carrot *Daucus glochidiatus*, Twigg Mullein **Verbascum virgatum*, Common Centaury **Centaureum erythraea*, Spear Thistle **Cirsium vulgare*, Tufted Knawel *Scleranthus diander*, Cotton Fireweed *Senecio quadridentatus*. Prickly Starwort *Stellaria pungens*, Slender Tick-trefoil r *Desmodium varians*, Austral Toad-flax Ve *Thesium australe*, Matted Lignum r *Muehlenbeckia axillaris*, Alpine Daisy-bush K *Olearia alpicola* and Dwarf Milkwort v *Polygala japonica*.

Other important graminoids include Short-stem Sedge *Carex breviculmis*, Black-anther Flax-lily *Dianella revoluta* and Common Woodrush *Luzula meridionalis*. Ferns present include Necklace fern *Asplenium flabellifolium* and Common Spleenwort r *Asplenium trichomanes* ssp. *quadrivalens*.

Shrubs that occur in isolated patches within *Limestone Montane Grassland* are Tree Violet *Hymenathera dentata*, Hairy Anchor Plant Rv *Discaria pubescens* and Pale-fruit Ballart *Exocarpos strictus* which are present in small numbers with minimal cover.

EVC 858 Calcarenite Dune Woodland

Calcarenite Dune Woodland is restricted to the alkaline sand dunes and swales on the isthmus at Wilsons Promontory, inland from the exposed Coastal Dune Scrub Mosaic and probably where salt spray influences are less extreme. It occurs at low elevations of 20-60m above sea level and average annual rainfall is 900-950 mm. It has only been mapped in the extant mapping where slashing has occurred.

Dominant shrubs are similar to Coastal Dune Scrub Mosaic and include Coast Tea-tree *Leptospermum laevigatum*, Coast Wattle *Acacia longifolia* ssp *sophorae*, Drooping Sheoke *Allocasuarina verticillata*, Sweet Bursaria *Bursaria spinosa* and Coast Beard-heath *Leucopogon parviflorus*. Ground cover species include numerous introduced herbs such as Cat's Ear *Hypochoeris radicata*, Thyme-leaved Sandwort *Arenaria serpyllifolia*, Fern Grass

Catopodium rigidum, Pimpernel *Anagallis arvensis* and Common Centaury *Centaureum erythraea*.

Other species often present include Slender Bush-pea *Pultenaea tenuifolia*, Silky Guinea-flower *Hibbertia sericea* s.l., Black-anther Flax-lily *Dianella revoluta* s.l., Spiny-headed Mat-rush *Lomandra longifolia*, Small-leaved Clematis *Clematis microphylla*, Honey-pots *Acrotriche serrulata*, Common Wheat-grass *Elymus scaber*, Coast Spear-grass *Austrostipa flavescens*, Long-hair Plume-grass *Dichelachne crinita*, Bidgee-widgee *Acaena novae-zelandiae*, Kidney-weed *Dichondra repens*, Common Woodrush *Luzula meridionalis* var. *flaccida*, Grass Trigger-plant *Stylidium graminifolium*, Variable Groundsel *Senecio pinnatifolius*, Shady Wood-sorrel *Oxalis exilis*, Knobby Club-sedge *Isolepis nodosa*, Common Lagenifera *Lagenifera stipitata*, Shiny Bog-sedge *Schoenus nitens*, Cinquefoil Cranesbill *Geranium potentilloides* and Short-stem Sedge *Carex breviculmis*.

EVC 863 Floodplain Reedbed

The EVC Floodplain Reedbed occurs on swamps on the Gippsland river plains, especially near the lower reaches of the Avon and Tambo Rivers as well as a small area adjacent to the Tambo River near Mossiface north of the Princes Highway.

Soils are Quaternary stream alluviums, floodplain and low level terrace deposits consisting of silts, clays and peats. Elevation is sea level to approximately 5m and average annual rainfall is 600-750mm.

The reedbeds are dominated by Common Reed *Phragmites australis* with other species present including Australian Gipsywort *Lycopus australis*, Large Bindweed *Calystegia sepium*, Common Boobialla *Myoporum insulare*, Kangaroo Apple *Solanum aviculare* and Scrub Nettle *Urtica incisa*. Swamp Paperbark *Melaleuca ericifolia* frequently fringes the margins of Floodplain Reedbed.

EVC 875 Blocked Coastal Stream Swamp

Blocked Coastal Stream Swamp is restricted to a few patches north of Darby River at Wilsons Promontory. This habitat is consistently flooded for long periods along the margins of coastal streams where the entrances become plugged by sand during low flow periods. The blockage is breached during floods, briefly exposing the wetlands before the mouth silts up and the dammed river overflows, flooding the habitat of this EVC. Soils are peats derived from Quaternary swamp and lagoonal deposits. Elevation is near sea level and average annual rainfall is 900 mm.

Blocked Coastal Stream Swamp typically consists of a tall dense sedgeland up to two metres in height dominated by Leafy Twig-sedge *Cladium procerum* but may also include Cumbungi *Typha domingensis* and scattered shrubs of Woolly Tea-tree *Leptospermum lanigerum* on its margins. It has

close geographic and floristic affinities with *Calcareous* Swamp Scrub.

EVC 876 Spray-zone Coastal Shrubland

Spray-zone Coastal Shrubland is restricted to the most exposed coastal headlands on the islands south and west of Wilsons Promontory, the Seal Island group and the adjacent mainland. It is extensively developed on Devonian granites with skeletal soils on exposed south and west-facing rocky slopes subject to extreme winds and salt-spray. Its structure ranges from tussock grassland to halophytic hermland to shrubland. Elevation averages 40-100m above sea level and rainfall is approximately 900 mm per annum.

The group typically includes Seaberry Saltbush *Rhagodia candolleana* ssp. *candolleana*, Sea Box *Alyxia buxifolia*, Bower Spinach *Tetragonia implexicoma*, Toothed Groundsel *Senecio pinnatifolius*, White Correa *Correa alba*, Jersey Cudweed *Pseudognaphalium luteoalbum*, Coast Everlasting *Ozothamnus turbinatus*, Karkalla *Carpobrotus rossii*, Rounded Noon-flower *Disphyma crassifolium* ssp. *clavellatum*, Bluish Bulbine Lily *Bulbine glauca*, Pink Purslane *Calandrinia calypttrata*, Coast Sow-thistle *Actites megalocarpa*, Tall Daisy *Brachyscome diversifolia*, Cushion Bush *Leucophyta brownii* and Prickly Spear-grass *Austrostipa stipoides*. Also common in this EVC on the islands is Blue Tussock-grass *Poa poiformis* which dominates the adjacent *Depauperate* Coastal Tussock Grassland.

Spray-zone Coastal Shrubland is an important habitat for a number of rare coastal plants such as Bluish Bulbine Lily *Bulbine glauca*, Crimson Berry *Cyathodes juniperina*, Coast Pomaderris *Pomaderris oraria*, Island Everlasting *Bracteantha papillosa* and Island Celery *Apium insulare*.

EVC 877 Lowland Herb-rich Forest

Floristic Community:

877-01 *Mount Elizabeth* Lowland Herb-rich forest *Mount Elizabeth* Lowland Herb-rich Forest has floristic affinities with Lowland Forest, Valley Grassy Forest and Grassy Dry Forest, however it carries a diversity and abundance of herbs which distinguish it from these EVCs. It occurs on ridges, and in gullies on gentle slopes to the north of Mt Elizabeth in the Tambo River Valley on reasonably fertile soils giving rise to the abundance of herbs.

The overstorey is moderate in height and characterised by a range of eucalypts where White Stringybark *Eucalyptus globoidea* often dominates in association with Apple Box *E. angophoroides*, Red Box *E. polyanthemos* and Mountain Grey Gum *E. cypellocarpa*. Red Stringybark *Eucalyptus macrorhyncha* and *E. sieberi* are usually less prominent.

In the small tree layer Silver Wattle *Acacia dealbata* and Large-leaf Hickory Wattle *A. falciformis* are frequently present and may dominate under certain burning regimes. This results in a subsequent

reduction in the understorey diversity and abundance.

A few frequent and widespread medium-height shrubs are conspicuous in the shrub stratum and may form a moderate to heavy cover. These include Shiny Cassinia *Cassinia longifolia*, Prickly Currant-bush *Coprosma quadrifida* and Prickly Bush-pea *Pultenaea forsythiana* (previously recorded as *Pultenaea juniperina*). Small heaths are common but do not contribute significantly to cover. Grey Guinea-flower *Hibbertia obtusifolia* occurs at most sites, with other small shrubs common at lower frequencies, such as Honeytops *Acrotriche serrulata*, Cranberry Heath *Astroloma humifusum* and Common Heath *Epacris impressa*. Common Rice-flower *Pimelea humilis* and Common Hovea *Hovea linearis* are relatively common, although structurally they are not prominent. The latter two reflect the slightly more fertile, deeper and better-drained soils.

The composition of the ground layer includes a range of tussock-forming graminoids where Grey Tussock-grass *Poa sieberiana* usually forms a moderately dense cover in addition to Wattle Mat-rush *Lomandra filiformis*, Spiny-headed Mat-rush *L. longifolia* and Variable Sword-sedge *Lepidosperma laterale* which make a significant contribution to the structure of the ground layer. Weeping Grass *Microlaena stipoides* is also common.

A diversity of dicotyledoneous forbs is present including Common Raspwort *Gonocarpus tetragynus*, Cats Ear *Hypochoeris radicata*, *Helichrysum scorpioides*, Stinking Pennywort *Hydrocotyle laxiflora*, Narrow Groundsel *Senecio tenuiflorus*, Small St John's Wort *Hypericum gramineum*, Hairy Speedwell *Veronica calycina*, Showy Violet *Viola betonicifolia* ssp. *betonicifolia*, Ivy-leaf Violet *V. hederacea*, Sundew *Drosera peltata*. Cinquefoil *Geranium potentilloides*, Prickly Starwort *Stellaria pungens*, Prickly Woodruff *Asperula scoparia*, Kidney Weed *Dichondra repens*, Common Lagenifera *Lagenifera stipitata* and Australian Buttercup *Ranunculus lappaceus*. Orchids are relatively common and include Pink Fingers *Caladenia carnea* spp. agg., Wax-lip Orchid *Glossodia major* and Musky Caladenia *Caladenia gracilis*.

There is a diversity of vines and scramblers that contribute significantly to the structure of the vegetation, this is a feature of other vegetation on Mount Elizabeth. Common species include Common Apple-berry *Billardiera scandens*, Coarse Dodder-laurel *Cassytha melantha*, Love Creeper *Comesperma volubile*, Twining Glycine *Glycine clandestina*, Purple Coral-pea *Hardenbergia violacea*, and Mountain Clematis *Clematis aristata*.

Floristic Community:

877-02 *Gippsland* Lowland Herb-rich Forest *Gippsland* Lowland Herb-rich Forest primarily occurs in gullies and along slopes on the Tertiary outwash slopes on the southern-fall of Great

Dividing Range and on Carboniferous sediments between Heyfield and Bruthen. Soils are colluvially-derived loams, rainfall is 7-800mm per annum and altitude approximately 200m.

Structurally, the vegetation appears to be grassy, shrubs not playing a major role, although they may be locally dominant. The overstorey is a medium height open forest dominated by a range of species including Red Stringybark *Eucalyptus macrorhyncha*, White Stringybark *E. globoidea*, Red Box *E. polyanthemos* and Apple-topped Box *E. angophoroides*. Scattered Blackwood *Acacia melanoxylon* occupies the small tree layer.

The shrub stratum variable in density but low in diversity. Species present may include Shiny Cassinia *Cassinia longifolia*, Burgan *Kunzea eridoides*, Sandfly Zieria *Zieria smithii* and Grey Guinea-flower *Hibbertia obtusifolia*.

The ground stratum highly diverse and characteristic for this EVC. It is dominated by a dense cover of grasses and a diversity of other graminoids and forbs. Graminoids present include Wallaby Grasses *Danthonia* spp., Spear-grasses *Austrostipa* spp., Grey Tussock-grass *Poa sieberiana*, Bordered Panic *Entolasia margina*, Weeping Grass *Microlaena stipoides*, Silvertop Wallaby-grass *Joycea pallida*, Short-stem Sedge *Carex breviculmis*, Wattle mat-rush *Lomandra filiformis*, Spiny-headed Mat-rush *L. longifolia* and Thatch Saw-sedge *Gahnia radula*. A high diversity of forbs may be present although each is low in cover and abundance. Species include Tall Sundew *Drosera peltata*, Button Everlasting *Helichrysum scorpioides*, Small St John's Wort *Hypericum gramineum*, Pimpernel **Anagallis arvensis*, Common Lagenifera *Lagenifera stipitata*, Ivy-leaf Violet *Viola hederacea*, Showy Violet *V. betonicifolia*, Trailing Speedwell *Veronica plebia*, Yellow Rush-lily *Tricoryne elatior*, Small Poranthera *Poranthera microphylla*, Shady Wood-sorrel *Oxalis exilis* and a range of orchids including Greenhoods *Pterostylis* spp., Bird-orchids *Chiloglottis* sp. and Spider-orchids *Caladenia* spp..

Climbers present are non-robust and include Common Apple-berry *Billardiera scandens*, Love Creeper *Comesperma volubile*, Common Hovea *Hovea linearis* and Variable Glycine *Glycine tabacina*. Ferns are not common although Austral Bracken *Pteridium esculentum* and Common Maidenhair *Adiantum aethiopicum* may be present.

EVC 878 Damp Sands Herb-rich Woodland/Swamp Scrub Complex

Damp Sands Herb-rich Woodland/ Swamp Scrub Complex is confined to St. Margaret Island in Shallow Inlet, South Gippsland. Soils consist of

narrow lenses of calcareous and siliceous sands over dark grey peat and a clay subsoil. Elevation is 1m or less above sea level and average annual rainfall is 650-700 mm.

This mapping unit contains an interesting and rich mixture of both EVCs in an environment that appears to be intermediate between the two. The peat supports Swamp Scrub elements, whilst the shallow sands help maintain the Damp Sands Herb-rich Woodland components.

The overstorey consists of scattered Coast Manna Gum *Eucalyptus viminalis* ssp. *pyroriana* over a number of tall shrubs including Swamp Paperbark *Melaleuca ericifolia*, Prickly Tea-tree *Leptospermum continentale*, Coast Ballart *Exocarpos syrticola*, Black Wattle *Acacia mearnsii*, and Spreading Wattle *Acacia genistifolia*. Smaller shrubs present include Variable Groundsel *Senecio pinnatifolius*, Clustered Bush-pea *Pultenaea dentata* and Tree Everlasting *Ozothamnus ferrugineous*.

The ground layer consists of a rich suite of herbs including Kidney-weed *Dichondra repens*, Variable Stinkweed *Opercularia varia*, Spear Thistle *Cirsium vulgare*, Common Centaury *Centaureum erythraea*, Magenta Stork's-bill *Pelargonium rodneyanum*, Annual Buttercup *Ranunculus sessiliflorus*, Sprawling Bluebell *Wahlenbergia gracilis*, Common Lagenifera *Lagenifera stipitata*, Small Poranthera *Poranthera microphylla*, Clustered/Creeping Cudweed *Euchiton gymnocephalus* s.l. and Hairy Speedwell *Veronica calycina*. The creeper, Running Postman *Kennedia prostrata*, is present as well as the grasses Reed Bent-grass *Deyueuxia quadriseta*, Grey Tussock-grass *Poa sieberiana*, Love-grass *Eragrostis* sp., Lesser Quaking-grass **Briza minor*, Hair-grass **Aira* sp. and Plume-grass *Dichelachne* sp and the sedges Knobby Club-sedge *Isolepis nodosa* and Bog-sedge *Schoenus* spp.

EVC 879 Coastal Dune Grassland

Coastal Dune Grassland consists of grasses and halophytes which are colonising the foredunes of the ocean beaches of Shallow Inlet. The soils are siliceous sands that have a very low humus content. Average annual rainfall is 700 mm with elevation being around 1-5m above sea level.

The most conspicuous plants of these foredunes are the grasses, Hairy Spinifex *Spinifex sericeus*, Marram Grass **Ammophila arenaria* and Coast Fescue *Austrofestuca littoralis*, the herbs Coast Sow-thistle *Actites megalocarpa*, Coast Groundsel *Senecio spathulatus* and Coast Candles *Stackhousia spathulata*. Other halophytes present include Sea Rocket **Cakile maritima* and Karkalla *Carpobrotus rossii*.

APPENDIX D: IUCN THREAT RATINGS FOR LOWER RISK AND DATA DEFICIENT PLANTS

Plants rated as Lower Risk in the Gippsland Region

A taxon is rated as Lower Risk if there was sufficient information to answer a particular rule but was not categorised as Critically Endangered, Endangered or Vulnerable. Taxa rated as lower risk can be considered secure in Gippsland and not at risk of extinction in the foreseeable future.

Taxon	IUCN	RARE
<i>Juncus falcatus</i>	LR	LR
<i>Poa sieberiana</i> var. <i>cyanophylla</i>	LR	LR

Plants rated as Data Deficient in the Gippsland Region

Two taxa were classified as Data Deficient with the IUCN (1994) rule set that were rated as Lower Risk using the RARE rule set (Keith 1998).

Taxon	IUCN	RARE
<i>Acacia howittii</i>	DD	LR
<i>Eucalyptus tereticornis</i>	DD	LR

Plants with insufficient information

Forty-five taxa had insufficient information on their distribution, abundance, biology and ecology in the Gippsland region to make a direct or indirect assessment of their risk of extinction using either the IUCN or RARE rule sets.

<i>Acacia retinodes</i> var. <i>uncifolia</i>	<i>Genoplesium nudum</i>
<i>Asplenium trichomanes</i> ssp. <i>trichomanes</i>	<i>Hovea pannosa</i> (rheophytic Omeo form)
<i>Astrotricha parvifolia</i>	<i>Hybanthus monopetalus</i>
<i>Boronia anemonifolia</i> ssp. B (Wilson's Promontory)	<i>Isolepis wakefieldiana</i>
<i>Brachyscome</i> aff. <i>formosa</i> Entity 1	<i>Lepidosperma canescens</i>
<i>Caladenia dilatata</i> s.s.	<i>Leptospermum emarginatum</i>
<i>Callitriche palustris</i>	<i>Lomandra glauca</i> s.s.
<i>Cardamine lilacina</i> s.s.	<i>Muellerina celastroides</i>
<i>Carex iynx</i>	<i>Ophioglossum petiolatum</i>
<i>Chionogentias cunninghamii</i>	<i>Ozothamnus rogersianus</i>
<i>Chionogentias cunninghamii</i> ssp. <i>major</i>	<i>Pelargonium</i> aff. <i>rodneyanum</i> (Lake Omeo)
<i>Corybas aconitiflorus</i>	<i>Platylobium triangulare</i>
<i>Corybas fimbriatus</i>	<i>Potamogeton australiensis</i>
<i>Corybas fordhamii</i>	<i>Pultenaea williamsonii</i>
<i>Corybas</i> sp. aff. <i>diemenicus</i> (Coastal)	<i>Ranunculus papulentus</i>
<i>Craspedia</i> sp. (Mt Stirling)	<i>Schoenus imberbis</i>
<i>Cyathodes juniperina</i>	<i>Stackhousia spathulata</i>
<i>Cymbonotus lawsonianus</i>	<i>Thomasia petalocalyx</i>
<i>Dampiera purpurea</i>	
<i>Epacris microphylla</i> var. <i>microphylla</i>	
<i>Eragrostis benthamii</i>	
<i>Eucalyptus elaeophloia</i>	
<i>Eucalyptus globulus</i> ssp. <i>maidenii</i>	
<i>Eucalyptus willisii</i> ssp. <i>willisii</i> s.s. (Prom)	
<i>Genoplesium arrectum</i>	
<i>Genoplesium despectans</i>	
<i>Genoplesium nudiscapum</i>	

APPENDIX E: Summary information of Listed (FFG Act or ESP Act) threatened plant taxa in the Gippsland RFA Region

Notes on interpretation:

1. The following species summaries include information about the number of records within the Gippsland region and Victoria for each taxon. This information is automatically derived from NRE databases, and may include historical records of populations which are now extinct or repeated records from the same populations. They do not therefore represent an accurate measure of the number of extant populations.
2. The tables which indicate the relative importance of potential threats to each taxon include ratings as follows: **1** equates to relatively low importance and **3** equates to relatively high importance.
3. The per cent of Gippsland population in the Reservation Status table represents an estimate of the proportion of the total number of plants occurring in each tenure category in the Region.

Filmy Maidenhair

Adiantum diaphanum

Family: Adiantaceae

Species Characteristics: Rhizome short, semi-erect, covered with reddish-brown scales; fibrous roots. Fronds tufted, 10-25 cm long; stipe slender, black, smooth. Lamina dark green, delicate, pinnate or with 1 or 2 lateral branches near base; rachises slender, dark, glabrous. Pinnules close-set, 3-13 cm long, sub-rhomboidal to oblong, minute stiff brown hairs on both surfaces. Sori 5-10, small, in notches between lobes (Duncan & Isaac, 1986).

Conservation Status:

ROTAP:

VROTS: endangered

FFG: listed; Action Statement

ESP: not listed

RESERVATION STATUS			RARITY
% of CRA population in biological conservation reserve	% of CRA population in other public land	% of CRA population on private land	% Australian population within RFA Region
0	90	10	0-25

Distribution in Gippsland RFA Region: In Victoria it is only known to occur in the Strzelecki Ranges of South Gippsland, in the catchments of Deadlock Creek (timber plantation managed by NRE), Coal Creek (Crown Land water frontage), Sunny Creek (Water Supply Catchment) and Bawdens Creek (private land) (SAC, 1989, nom., VROTPOP, Taylor & James, 1992). The species also occurs in New South Wales, Queensland, Norfolk Island, New Zealand, Fiji and southern China (Duncan & Isaac, 1986).

Habitat: It grows in small colonies along streams in shaded fern gullies surrounded by Wet Forest. It persists on wet rock faces around waterfalls or exposed sections of rock (Taylor & James, 1992). Associated species are Sickle Fern (*Pellaea falcata*), Austral Bracken (*Pteridium esculentum*), Forest Starwort (*Stellaria flaccida*) and Scrub Nettle (*Urtica incisa*) (VROTPOP).

Life History: Perennial. Sexual reproduction, and subsequent establishment from spores. Asexual reproduction is unknown. Natural disturbances are tolerated but regeneration is not dependent on particular rare or unpredictable events. Following fire, the species is an obligate seed regenerator; all or nearly all plants are killed and regeneration is solely from spores, often only via invasion from unburnt sites (Cheal, RFA database).

Threatening Processes operating in Gippsland RFA Region:

- The species is rare and has had a significant decline; disappearing from 2 collection sites including the type locality (SAC, 1991, final rec.)
- Weed invasion, particularly from blackberry, is a potential threat (SAC, 1991, final rec.)
- The species grows on densely shaded stream-banks, and hence any clearing of nearby vegetation could result in exposure, causing changes to humidity and shelter, essential to the maintenance of the fern's habitat (SAC, 1991, final rec., SAC, 1989, nom.)
- Clearing of surrounding vegetation in the catchment would cause lowering of water quality, add to silt loads, increase chemical runoff and alter stream flow (Taylor & James, 1992)

- Fern collectors and visitors have a detrimental effect by removing plants and degrading vegetation and soil stability (Taylor & James , 1992)
- Cattle grazing on the private land population currently has a low impact (VROTPOP).

Rating of Threats:

Disturbance	Rating	Source
Clearing of native vegetation	3	SAC, 1991, final rec.; Taylor & James, 1992
Fragmentation of native veg.	1	Taylor & James, 1992
Timber harvesting	2	VROTPOP; Taylor & James, 1992
Introduced plants	2	SAC, 1991, final rec.
Grazing/trampling	1	VROTPOP
Deliberate collecting/ harvesting	3	SAC, 1991, final rec; Taylor & James, 1992
Vandalism/human disturbance	3	SAC, 1991, final rec; Taylor & James, 1992
Dams/alteration to water regimes	3	SAC, 1991, final rec; Taylor & James, 1992
Other: chemical runoff from agriculture; erosion and siltation from vegetation clearance	3	SAC, 1991, final rec; Taylor & James, 1992

Current Management:

Taylor and James (1992) Action Statement, Taylor (1997) Action Statement Monitoring:

- Past management actions: Local naturalists and NRE staff have erected a small enclosure around the colony at Coal Creek, which has been inspected and maintained. At Deadlock Creek additional prescriptions have been added to timber harvesting plans. At Sunny Creek negotiations for a land swap have commenced. At Coal Creek a buffer of native streamside vegetation has been established on adjoining private land. Monitoring of the three public land sites is carried out annually. Weeding around the public land colonies is ongoing.
- Intended management actions: The La Trobe Water Authority is investigating setting up a committee of management for Sunny Creek Water Supply Catchment which would consider conservation requirements of *Adiantum diaphanum*: Measure size of existing populations and assess habitat conditions at each site annually; determine critical habitat area for *Adiantum diaphanum*; if necessary erect barrier and signs at sites to minimise visitor impact; remove by hand any weeds that threaten the colonies; encourage field naturalists to locate other colonies; draw up a public authority management agreement between Sunny Creek catchment management authority and NRE, and provide input into planning; reserve a 150m wide buffer either side of Deadlock Creek through the plantation, and NRE to retain management of this buffer if the plantation is sold or leased; assess the adequacy of streamside buffers for timber harvesting at Deadlock Creek and if necessary increase the size; liaise with landowners at Coal Creek and Bawdens Creek to identify streamside buffer zones of native vegetation required to protect colonies; encourage and assist landowners to fence and if necessary revegetate buffer zones; encourage conservation covenants on property titles to permanently protect habitat for *Adiantum diaphanum*.

Gilgai Blown Grass

Agrostis billardieri var. *filifolia*

Family: Poaceae

Species Characteristics: Tufted or shortly rhizomatous glabrous annual or perennial. Culms ascending, to about 45 cm high. Leaf blades scabrous, inrolled, to about 1.5 mm wide; ligules obtuse. Inflorescence an open panicle, to 25 cm long, rather slender and few-flowered, lower branches tardily becoming free from the upper leaf-sheath. Spikelets 4-7 mm long (excluding awn), usually purplish. Glumes and lemma smooth on the sides (Walsh, 1994).

Conservation Status:

ROTAP:

VROTS: vulnerable

FFG: listed

ESP: not listed

RESERVATION STATUS			RARITY
% of CRA population in biological conservation reserve	% of CRA population in other public land	% of CRA population on private land	% Australian population within RFA Region
0	100	0	25-50

Distribution in Gippsland RFA Region: Only recorded from Jack Smith Lake State Game Reserve. Outside the study area, the species is found on the western basalt plains and near Lyndhurst, beside Cranbourne railway line (SAC, 1995, nom.).

Habitat: The species grows on coastal flats in the lee of barrier dunes. It has been recorded in saltmarsh and sedgeland-grassland on brown sandy peats. Associated species are Beaded Glasswort (*Sarcocornia quinqueflora*), Austral Seablite (*Suaeda australis*), Common Tussock-grass (*Poa labillardierei*), Knobby Club-sedge (*Isolepis nodosa*) and Large Bindweed (*Calystegia sepium*) (FIS).

Life History: Facultative annuals, biennials or short-lived perennials. Sexual reproduction, and subsequent establishment from seeds. Asexual reproduction is unknown. Natural disturbances are tolerated, but regeneration is not dependent on particular rare or unpredictable events. Following fire, the species is an obligate seed regenerator; all or nearly all plants are killed and regeneration is solely from seed stored for a short time pre-fire. Germination and establishment are promoted by fire (Cheal, RFA database).

Threatening Processes operating in Gippsland RFA Region:

- Habitat disturbance by weed invasion and grazing (SAC, 1996, final rec.)
- Loss of habitat from draining of wetlands and agricultural uses (SAC, 1995, nom.)

Rating of Threats:

Disturbance	Rating	Source
Clearing of native vegetation	3	SAC, 1995, nom.
Fragmentation of native veg.	2	SAC, 1995, nom.
Introduced plants	2	SAC, 1996, final rec.
Grazing/trampling	2	SAC, 1996, final rec.

Current Management:

No active management

Slender Parrot-pea *capitata*

Almaleea

Family: Fabaceae

Species Characteristics: Slender, trailing shrub, branches to 1 m long, stems pubescent. Leaves narrowly elliptic, 3-9 mm long, 0.5-1.5 mm wide, upper surface glabrous, lower surface minutely scabrous, stipules to 1 mm long. Inflorescence a head of 4-10 flowers. Calyx hairy, 5-6 mm long including pedicel. Corolla orange-yellow with red markings, wings longer than keel. Pod turgid, rounded, dark grey to brown, hairy (Jeanes, 1996a).

Conservation Status:

ROTAP: rare

VROTS: rare

FFG: listed

ESP: not listed

RESERVATION STATUS			RARITY
% of CRA population in biological conservation reserve	% of CRA population in other public land	% of CRA population on private land	% Australian population within RFA Region
100	0	0	0-25

Distribution in Gippsland RFA Region: The species is found in the Alpine National Park (Cobberas-Tingaringy Unit) at Moscow Peak. Outside the RFA Region it is found on The Playgrounds plain at the base of Mt Cobberas, Rocky Plains, Rocky Plains Creek and Native Dog Flat north of Black Mountain Road, First Emu Flat, Forlorn Hope Plain, Stradbroke Creek and ENE of Mt Howitt (Scarlett, 1984, La Trobe, VROTPop, DCE, 1992d, SAC, 1990, nom.). Also found in NSW (Jeanes, 1996a).

Habitat: Subalpine and montane snow plains and open valleys on moist gently sloping sites on the edges of wet, badly drained flats. Altitudes are above 1200 m and precipitation more than 900 mm per annum. The species is usually a component of heathland dominated by Coral Heath (*Epacris microphylla*), Myrtle Tea-tree (*Leptospermum myrtifolium*) and Mountain Cord-rush (*Restio australis*) or of mixed shrubland/grassland, and may extend into Black Sallee (*Eucalyptus stellulata*) woodland (Scarlett, 1984, La Trobe).

Life History: Perennial. Sexual reproduction, with establishment from seeds occurs only occasionally. It may be limited to a few seasons because of dormancy within the propagules, habitat requirements or because establishment needs the temporary removal of competitors. Asexual reproduction is unknown. Regeneration is habitat dependent on particular rare and unpredictable events, and between such events plants may appear to be absent. Following fire, the species is an obligate seed regenerator, and all plants are killed. It tolerates occasional disturbance (Cheal, RFA database).

Threatening Processes operating in Gippsland RFA Region:

- The rarity of the species makes it susceptible to extinction through catastrophic events (SAC, 1991, final rec.).
- *Almaleea capitata* requires a specialised habitat on an ecotone between swamp and forest which is likely to be damaged by trampling by stock and brumbies seeking access to water, and by people and vehicles in emergency situations such as fire control activities (SAC, 1991, final rec.).
- Soil disturbance also increases the likelihood of weed invasion (SAC, 1990, nom.).
- Grazing from cattle, horses and rabbits is currently light and does not appear to be having an adverse impact on the species, but increased grazing pressure would be detrimental to the species (Scarlett, 1980, La Trobe).
- The greenhouse effect could result in a reduction of area of suitable habitat (Busby, 1988)

Rating of Threats:

Disturbance	Rating	Source
Introduced plants	1	SAC, 1990, nom.
Grazing/trampling	2	SAC, 1991, final rec.
Vandalism/human disturbance	1	SAC, 1991, final rec.
Other: greenhouse effect	1	Busby, 1988

Current Management:

DCE (1992d) Alpine National Park Cobberas-Tingaringy Unit Management Plan

- Planned management for all nationally threatened plant species: sites are to be included in the Special Protection Zone and will be managed with the aim of ensuring the survival of the significant species; a 'management statement' will be prepared, which will define the precise boundary of each site/area, and will provide management prescriptions covering conservation, monitoring, recreation, productive uses and other management activities; fire suppression, fuel reduction burning and the control of pest plants and animals will take into account the presence of significant species; efforts will be made to collate information on species distribution, ecology and threats, and known populations of significant species will be monitored.

- Planned management for *A. capitata*: sites will be monitored, particularly in regard to the effects of cattle and brumbies, and where necessary appropriate measures to protect the species undertaken.

Maidenhair Spleenwort

Asplenium hookerianum

Family: Aspleniaceae

Species Characteristics: Rhizome short, covered with scales. Fronds tufted, 5-20 cm long, with scattered scales extending up stipe to rachises and veins; stipes slender. Lamina oblong-triangular, pinnate to bipinnate, membranous; pinnae with slender stalks; pinnules obovate to triangular. Sori on lower surfaces along veins, distant from margins, short and oblong, protected by membranous indusium (Duncan & Isaac, 1986).

Conservation Status:

ROTAP: vulnerable

VROTS: endangered

FFG: final recommendation for listing

ESP: listed

RESERVATION STATUS			RARITY
% of CRA population in biological conservation reserve	% of CRA population in other public land	% of CRA population on private land	% Australian population within RFA Region
100	0	0	25-50

Distribution in Gippsland RFA Region: In Victoria it is known only from two localities on the Snowy Range, south of Mt Howitt in the Alpine National Park (Wonnangatta-Moroka Unit) (SAC, 1996, nom.). Also found in New South Wales, Tasmania and New Zealand (Duncan & Isaac, 1986).

Habitat: The species is an obligate cliff dweller, found only in sub-alpine regions. It has been found growing on sheltered rock faces above steep streams and under ledges and in crevices of sheltered vertical cliffs. Associated species include; Mountain Tea-tree (*Leptospermum grandifolium*), Sword Tussock-grass (*Poa ensiformis*), Mother Shield-fern (*Polystichum proliferum*) and Necklace Fern (*Asplenium flabellifolium*) (SAC, 1996, nom.).

Life History: Perennial. Sexual reproduction and subsequent establishment from seeds. Asexual reproduction is unknown. Regeneration is not dependent on particular rare or unpredictable events. The species requires long periods without major disturbance for survival and establishment. It occurs in habitats not normally subject to fire (Cheal, RFA database).

Threatening Processes operating in Gippsland RFA Region:

- The species requires long periods without major disturbance for survival and establishment, so any form of disturbance poses a potential threat. The rarity of the species makes it susceptible to catastrophic events (SAC, 1997, final rec.)
- Populations are susceptible to collection (SAC, 1997, final rec.)
- The species is palatable to stock, rabbits and other herbivores (SAC, 1997, final rec.)
- The greenhouse effect could result in a reduction of area of suitable habitat (Busby, 1988)

Rating of Threats:

Disturbance	Rating	Source
Grazing/trampling	2	SAC, 1997, final rec.
Deliberate collecting/ harvesting	2	SAC, 1997, final rec.
Other: greenhouse effect; rarity makes it susceptible to catastrophic disturbance	1,2	Busby, 1988; SAC, 1997, final rec.

Current Management:

DCE (1992) Alpine National Park Wonnangatta-Moroka Unit Management Plan

- Planned management for all nationally threatened plant species: sites are to be included in the Special Protection Zone and will be managed with the aim of ensuring the survival of the significant species; a 'management statement' will be prepared, which will define the precise boundary of each site/area, and will provide management prescriptions covering conservation, monitoring, recreation, productive uses and other management activities; fire suppression, fuel reduction burning and the control of pest plants and animals will take into account the presence of significant species; efforts will be made to collate information on species distribution, ecology and threats, and known populations of significant species will be monitored.

Aniseed Boronia

Boronia galbraithiae

Family: Rutaceae

Species Characteristics: Fennel-scented shrub to 2 m high. Branchlets glabrous, 4-angled, with glandular-tuberculate leaf bases forming flanges along the internodes. Leaves imparipinnate, to 25 mm long, glabrous; leaflets oblanceolate, terminal leaflet shortest, lower surface paler. Inflorescence axillary, 3-5 flowered; peduncle 4-angled, glandular-tuberculate. Sepals ovate-triangular; petals white to deep pink (Albrecht & Walsh, 1993).

Conservation Status:

ROTAP: rare

VROTS: vulnerable

FFG: listed

ESP: not listed

RESERVATION STATUS			RARITY
% of CRA population in biological conservation reserve	% of CRA population in other public land	% of CRA population on private land	% Australian population within RFA Region
100	0	0	75-100

Distribution in Gippsland RFA Region: The species is known only from the Alpine National Park (Wonnangatta -Moroka Unit); Insolvent Track near Mt Difficulty (Albrecht & Walsh, 1993).

Habitat: The species grows in dry sclerophyll forest on skeletal spurs and upper slopes between about 420 and 540 m altitude. The soil is shallow and derived from Ordovician sediments. Associated species include Silver-top (*Eucalyptus sieberi*), Cluster-flower Geebung (*Persoonia confertiflora*), Shrubby Platysace (*Platysace lanceolata*) and Silvertop Wallaby-grass (*Chionochoa pallida*) (Albrecht & Walsh, 1993).

Life History: Perennial. Sexual reproduction and subsequent establishment from seed. Asexual reproduction is unknown. It tolerates occasional major natural disturbances and requires such disturbance for the rare opportunity to establish and spread. After fire, the species is a facultative root resprouter; most plants survive fire and resprout from dormant buds, but there is also significant re-establishment from seed germination. (Albrecht & Walsh, 1993, Cheal, RFA database).

Threatening Processes operating in Gippsland RFA Region:

- The species is only known from one site, which makes it susceptible to catastrophic events (SAC, 1994, final rec.)

Rating of Threats:

Disturbance	Rating	Source
Other: known from only one site & susceptible to catastrophic events	2	SAC, 1994, final rec.

Current Management:

DCE (1992) Alpine National Park Wonnangatta-Moroka Unit Management Plan

- Planned management for all nationally threatened plant species: sites are to be included in the Special Protection Zone and will be managed with the aim of ensuring the survival of the significant species; a 'management statement' will be prepared, which will define the precise boundary of each site/area, and will provide management prescriptions covering conservation, monitoring, recreation, productive uses and other management activities; fire suppression, fuel reduction burning and the control of pest plants and animals will take into account the presence of significant species; efforts will be made to collate information on species distribution, ecology and threats, and known populations of significant species will be monitored.

Mountain Daisy

Brachyscome tenuiscapa

Family: Asteraceae

Species Characteristics: Erect stoloniferous perennial to 26 cm high, with glandular-septate hairs. Leaves in a basal rosette, sessile, slightly fleshy or rigid, oblanceolate to cuneate, 2-10 cm long and 6-18 mm wide, margins apically toothed. Flower heads solitary, to 10 mm diameter, on peduncle 6-19 mm long, disc florets yellow, ray florets mauve. Achenes broad-cuneate (Everett, 1992).

Conservation Status:

ROTAP: not listed

VROTS: vulnerable

FFG: listed

ESP: not listed

RESERVATION STATUS			RARITY
% of CRA population in biological conservation reserve	% of CRA population in other public land	% of CRA population on private land	% Australian population within RFA Region
80	10	10	25-50

Distribution in Gippsland RFA Region: Found on Lankey Plain and Omeo Plain on the Dargo High Plains south of Mt Hotham in the Alpine National Park (Bogong Unit). The species is also found on the Bogong High Plains in the North-East RFA Region (Adair and Scarlett, 1983, La Trobe). Outside Victoria it occurs in the Mt Kosciuszko area of New South Wales and mountains of Tasmania (Costin *et al.*, 1979).

Habitat: Restricted to alpine areas at altitudes in excess of 1500 m, with precipitation greater than 1200 mm per year. The species occurs in open grassland and herbfield, on gentle to moderate slopes, usually on shallow soils developed on Tertiary basalt, Ordovician metamorphics and Silurian granite (Scarlett, LaTrobe, 1984). It occupies inter-tussock bare patches in dense sod tussock grassland and *Celmisia-Poa* tall alpine herbfield (Costin *et al.*, 1979). Shrubs such as Mountain Beard-heath (*Leucopogon hookeri*) are present at the Omeo Plain site (Scarlett, La Trobe, 1983).

Life History: Flowering time is November (Everett, 1992). Sexual reproduction has not been observed; reproduction is by rhizomes. Plants occur in habitats not normally subject to fire. The species requires natural disturbances for the rare opportunity to establish and spread (Cheal, RFA database).

Threatening Processes operating in Gippsland RFA Region:

- The species grows in areas where grazing occurs and it may be palatable. It is presumed to be susceptible to grazing but there is no evidence that the species is preferred by cattle or that grazing has caused populations to decline. However, grazing may be a potential threat through habitat damage and trampling (SAC, 1991, final rec.).
- Competition by the introduced plant Cat's Ear (*Hypochoeris* spp.) is possible (SAC, 1991, final rec.).
- Hare grazing may cause some damage to the species (VROTPOP).
- The greenhouse effect could result in a reduction of area of suitable habitat (Busby, 1988)

Rating of Threats:

Disturbance	Rating	Source
Introduced plants	2	SAC, 1991, final rec.; VROTPOP
Grazing/trampling	2	SAC, 1991, final rec.
Other: greenhouse effect	1	Busby, 1988

Current Management:

- monitored for VROTPOP database in last 5 years.

DCE (1992) Alpine National Park Bogong Unit Management Plan

- Planned management of nationally significant plant species: sites are to be included in the Special Protection Zone and will be managed with the aim of ensuring the survival of the significant species; a 'management statement' will be prepared, which will define the precise boundary of each site/area, and will provide management prescriptions covering conservation, monitoring, recreation, productive uses and other management activities; fire suppression, fuel reduction burning and the control of pest plants and animals will take into account the presence of significant species; efforts will be made to collate information on species distribution, ecology and threats; surveys will be undertaken at sites which are predicted to contain significant species.

Swamp Everlasting

Bracteantha sp. aff. *subundulata*

Family: Asteraceae

Species Characteristics: Perennial rhizomatous herb. Leaves bright green, lanceolate, prominent mid-vein, clustered at base of flower stalks, scattered alternately along stalks, stem clasping. Flower heads terminal, stalks up to one metre; bract laminas shiny, papery, golden-orange. The taxon has not been formally described but is recognised by NRE, and is distinct from *Bracteantha subundulata* s.s. found at high altitudes (SAC, 1995, nom, Everett, 1992).

Conservation Status:

ROTAP:

VROTS: vulnerable

FFG: listed

ESP: not listed

RESERVATION STATUS			RARITY
% of CRA population in biological conservation reserve	% of CRA population in other public land	% of CRA population on private land	% Australian population within RFA Region
30	70	0	unknown

Distribution in Gippsland RFA Region: Blond Bay State Game Reserve and Gellions Run south of Yarram. Outside the study area, the species is found on the western basalt plains, far south western Victoria, French Island, near Cranbourne and Errinundra Plateau (SAC, 1995, nom., FIS).

Habitat: Lowland swamps, in both near-coastal sedge swamps with sandy soils, and grassy wetlands with heavy clay soils on fertile plains. Commonly associated species are Scented Paperbark (*Melaleuca squarrosa*) and Pithy Sword-sedge (*Lepidosperma longitudinale*) (SAC, 1995, nom.).

Life History: Facultative annuals, biennials or short-lived perennials. Sexual reproduction, and subsequent establishment from seeds. Asexual reproduction and establishment occurs commonly. Natural disturbances are tolerated, but regeneration is not dependent on particular rare or unpredictable events. After fire, the species is a facultative root resprouter; most plants survive fire and resprout from dormant buds, but there is also a significant re-establishment from seed germination (Cheal, RFA database).

Threatening Processes operating in Gippsland RFA Region:

- The species is threatened by habitat disturbance caused by road maintenance works, weed invasion, urban development and grazing (SAC, 1996, final rec.)
- It has declined in the past probably due to grazing by introduced stock and draining of wetlands (SAC, 1995, nom.)

Rating of Threats:

Disturbance	Rating	Source
Fragmentation of native veg.	2	SAC, 1995, nom.
Introduced plants	3	SAC, 1996, final rec.
Grazing/trampling	3	SAC, 1996, final rec.
Road construction/maintenance	2	SAC, 1996, final rec.
Other: urban development	2	SAC, 1996, final rec.

Current Management:

No active management

Dwarf Sedge

Carex paupera

Family: Cyperaceae

Species Characteristics: Dwarf, tussock-forming graminoid. Densely rhizomatous species forming a short, closely packed sward of strap-like leaves <0.5m tall arising from distinct tussocks. Fertile spikelets hidden among the leaves. (Scarlett, 1985, La Trobe).

Conservation Status:

ROTAP: rare

VROTS: vulnerable

FFG: listed

ESP: not listed

RESERVATION STATUS			RARITY
% of CRA population in biological conservation reserve	% of CRA population in other public land	% of CRA population on private land	% Australian population within RFA Region
100	0	0	50-75

Distribution in Gippsland RFA Region: It occurs on Lankey Plain, Omeo Plain and Big Nunniong Plain on the Dargo High Plains in the Alpine National Park. It is also found on the Bogong High Plains near Mt Jim and in the Mount Hotham area, within the North-East RFA Region (Scarlett, 1985, La Trobe, VROTPOP). Endemic to Victoria (Willis, 1970).

Habitat: Strictly confined to shallow, seasonally inundated 'snow pools' in alpine and sub-alpine grassland at altitudes of 1200-1760 m above sea level. These grasslands are dominated by Prickly Snow-grass (*Poa costiniana*), Mud Pratia (*Pratia surrepens*) and Alpine Candles (*Stackhousia pulvinaris*). All known stands occur on shallow clay-loam soils derived from Tertiary basalt. *C. paupera* is possibly adapted to the microhabitat within the snow pools to which it is confined as the soil within them is peaty black clay loam whilst that of the surrounding areas is red-brown clay loam (Scarlett, 1985, La Trobe). On the Bogong High Plains the 'snow pools' become extremely dry in late summer to early autumn due to the shallow soils being underlain by basalt rock (McDougall, 1982).

Life History: Although there is no detailed information about the biology of this species (Scarlett, 1985, La Trobe), it appears to be an annual, biennial or short-lived perennial. Sexual reproduction and subsequent establishment from the small seed-like nut. Asexual reproduction occurs via rhizomes. *C. paupera* occurs in habitats that are not normally subject to fire and requires long periods without major disturbance for survival and establishment (Cheal, RFA database).

Threatening Processes operating in Gippsland RFA Region:

- The snow pool habitat of the species appears to be relatively stable and little affected by cattle grazing or trampling (Scarlett, 1985, La Trobe). *C. paupera* is palatable and readily eaten by stock, rabbits and other mammalian herbivores (Cheal, RFA database). However, it occurs in wetter areas, which cattle visit only occasionally and it is probably not selectively grazed.
- Competition from other plants is a possible threat (VROTPOP).
- Any general disturbance will be a threat on account of the species' rarity (SAC, 1991, final rec.).
- The species is known from only two 10-minute grids in the State, at high altitudes. It is confined to shallow snow pools in grasslands, a type of vegetation that is rare in the Alps (SAC, 1991, final rec.). The greenhouse effect could result in a reduction of area of suitable habitat (Busby, 1988).

Rating of Threats:

Disturbance	Rating	Source
Fragmentation of native veg.	1	SAC, 1991, final rec.
Grazing/trampling	1	Scarlett, 1985, La Trobe
Other: greenhouse effect	1	Busby, 1988
Plant competition	1	VROTPOP

Current Management:

- Monitored for VROTPOP database in past 5 years
- DCE (1992) Alpine National Park Bogong Unit Management Plan
- Planned management for nationally significant plant species: sites are to be included in the Special Protection Zone and will be managed with the aim of ensuring the survival of the significant species; a 'management statement' will be prepared, which will define the precise boundary of each site/area, and will provide management prescriptions covering conservation, monitoring, recreation, productive uses and other management activities; fire suppression, fuel reduction burning and the control of pest plants and animals will take into account the presence of significant species; efforts will be made to collate

information on species distribution, ecology and threats; surveys will be undertaken at sites which are predicted to contain significant species.

- Planned management for *C. paupera*: appropriate measures will be taken to protect the species from grazing.

Slender Tree-fern

Cyathea cunninghamii

Family: Cyathaceae

Species Characteristics: Trunk erect, slender, to 20 m tall and 8-10 cm diameter, adventitious roots at base; stipe bases persistent, crumbly. Fronds 1.5-3 m long forming small crown; stipe short, coarse, black, dull, with sharp tubercles; scales at base papery, shiny, pale. Lamina dark green, 3-pinnate with pinnae shorter towards stipe; lower surfaces of rachises with scattered scales, upper surfaces with numerous, curled hairs. Pinnules sessile with adjacent, broad bases continuous. Sori in 2 rows on pinnules with 1 sorus per lobe, conspicuous; indusium prominent, cup like (Duncan & Isaac, 1986).

Conservation Status:

ROTAP: rare

VROTS: rare

FFG: listed

ESP: not listed

RESERVATION STATUS			RARITY
% of CRA population in biological conservation reserve	% of CRA population in other public land	% of CRA population on private land	% Australian population within RFA Region
70	10	20	0-25

Distribution in Gippsland RFA Region: South and Central Gippsland. It has been recorded in Tarra Bulga National Park, Wilsons Promontory National Park, Gunyah Gunyah Rainforest Reserve within State Forest, Deadlock Creek State Forest, Turton's Creek, Traralgon Creek and lands licensed for plantations in Strzelecki Ranges (Scarlett, La Trobe, 1979, Parks Victoria, 1997, Taylor and James, 1992, VROTPOP). Elsewhere in Victoria there are scattered populations in the Otways, Dandenongs, Healesville area, and East Gippsland (Lobert *et. al.* in prep). Also present in Tasmania, Chatham Island, New Zealand (Willis, 1970) and the Nadgee area of New South Wales (Lobert *et. al.* in prep).

Habitat: Confined to deep wet fern gullies and temperate rainforest protected from fire and wind. In mountainous terrain, above 1200 mm annual rainfall, clay loam soils (Scarlett, 1979). Usually on creek banks with constant moisture supply, but confined to small catchments and headwaters where plants are not damaged by flooding (Lobert *et. al.* in prep). These habitats commonly include an overstorey of Blackwood (*Acacia melanoxylon*), a mid-layer of Soft Tree-fern (*Dicksonia antarctica*) and a ground layer of ferns (Scarlett, La Trobe, 1979).

Life History: Perennial. Sexual reproduction, and subsequent establishment from spores. Asexual reproduction is unknown. It requires long periods without major disturbance for survival and establishment. Following fire, the species is an obligate seed regenerator; all or nearly all plants are killed by fire, and regeneration is solely from spores, often only via invasion from unburnt sites (Cheal, RFA database).

Threatening Processes operating in Gippsland RFA Region:

- The main threat to the species is private plantation harvesting to the margins of Cool Temperate Rainforest (S. Taylor, NRE, pers. com.).
- Another significant threat is fire, mainly caused by the forestry practice of lighting fires to promote regeneration. The fires are often very hot and can scorch fern gullies where plants of *C. cunninghamii* die from either the burn or from exposure after the fire, and regeneration is reduced. Although the species is widespread in Cool Temperate Rainforest which is protected from logging, burning and logging can occur very close to rainforest and fern gully margins, and the species is vulnerable to any breaches of buffer zones (SAC, 1992, final rec.)
- Populations not in forestry areas are also potentially threatened by wildfire (SAC, 1992, final rec.)
- The species may also be threatened by illegal collection and by trampling and disturbance which inhibit regeneration (SAC, 1992, final rec., Scarlett, 1979, La Trobe).
- The species is vulnerable due to its small population size, with usually only one or two plants occurring together (SAC, 1992, final rec.)
- It has probably declined from its former distribution in the Strzelecki Ranges because of land clearing (SAC, 1992, final rec.)
- Blackberries may inhibit regeneration (SAC, 1991, nom.) and can be a serious competitor after severe disturbance (Scarlett, 1979, La Trobe).
- Reproduction in the wild appears to be slow (Scarlett, 1980, La Trobe)

Rating of Threats:

Disturbance	Rating	Source
Fragmentation of native veg.	1	SAC, 1992, final rec.
Clearing of native vegetation	2	
Timber harvesting	2	SAC, 1992, final rec.

Fuel reduction burning	2	SAC, 1992, final rec.
Unplanned fire	2	SAC, 1992, final rec.
Introduced plants	2	Scarlett, 1987, La Trobe
Deliberate collecting/ harvesting	2	Scarlett, 1987, La Trobe; SAC, 1992, final rec.
Vandalism/human disturbance	2	Scarlett, 1987, La Trobe; SAC, 1992, final rec.
Reproductive problems	1	Scarlett, 1987, La Trobe

Current Management:

- Monitored for VROTPOP database in past 5 years
- Code of Forest Practices exclusion zones

Parks Victoria (1997) Wilsons Promontory National Park Management Plan

- A comprehensive Environmental Management Plan for the Park will be developed and implemented.
- Rare and threatened flora will be protected through appropriate fire management and control programs for pest plant and animals.
- Environmental research and monitoring will be promoted.

Natural Resources and Environment (1996b) Tarra-Bulga National Park Management Plan

- Cool Temperate Rainforest, which provides habitat for the species, will be protected by excluding fire and locating walking tracks outside these sensitive plant communities.

Draft Action Statement

Prickly Tree-fern

Cyathea leichhardtiana

Family: Cyathaceae

Species Characteristics: Trunk erect, slender, to 7 m tall and 12 cm diameter; persistent stipe bases. Fronds forming small crown; stipe short, coarse, dull brown, with numerous sharp spines (2-4 mm long); scales at base silky, pale, linear. Lamina very dark green, 3 pinnate with pinnae near stipe much reduced; primary and secondary pinnae oblong-lanceolate to narrowly oblong; lower surfaces of rachises dark red-brown, shiny, prickly, with scattered scales. Pinnules sessile with broad bases. Sori in 2 rows on pinnules, spherical; indusium not obvious (Duncan & Isaac, 1986).

Conservation Status:

ROTAP:

VROTS: vulnerable

FFG: listed

ESP: not listed

RESERVATION STATUS			RARITY
% of CRA population in biological conservation reserve	% of CRA population in other public land	% of CRA population on private land	% Australian population within RFA Region
100	0	0	0-25

Distribution in Gippsland RFA Region: An isolated occurrence in the study area at Fairy Dell Flora Reserve near Bruthen. Otherwise confined to East Gippsland, especially the Howe range area, (SAC, 1989, nom.). Also found in New South Wales and Queensland (Duncan & Isaac, 1986).

Habitat: Sheltered, densely shaded and often damp sites under a tall closed canopy of warm temperate rainforest, on both stream banks and valley slopes. Associated species include Lilly Pilly (*Acmena smithii*), Blue Oliveberry (*Elaeocarpus reticulatus*) and Soft Tree-fern (*Dicksonia antarctica*) (SAC, 1989, nom.).

Life History: Perennial. Sexual reproduction, and subsequent establishment from spores. Asexual reproduction is unknown. It requires long periods without major disturbance for survival and establishment. Following fire, the species is an obligate seed regenerator; all or nearly all plants are killed by fire, and regeneration is solely from spores, often only via invasion from unburnt sites (Cheal, RFA database).

Threatening Processes operating in Gippsland RFA Region:

- The major threat is from wildfire, causing mortality and habitat destruction (SAC, 1991, final rec.)
- Trampling and disturbance from excessive visitor use at Fairy Dell will retard regeneration (SAC, 1989, nom.)
- Illegal collecting of this attractive species is a potential threat (SAC, 1989, nom.)

Rating of Threats:

Disturbance	Rating	Source
Unplanned fire	2	SAC, 1991, final rec.
Deliberate collecting/ harvesting	1	SAC, 1991, final rec.
Vandalism/human disturbance	2	SAC, 1991, final rec.

Current Management:

The Fairy Dell site is protected by a management agreement, but there is no active management.

Purple Diuris

Family: Orchidaceae

Diuris punctata var. *punctata*

Species Characteristics: Terrestrial geophyte. Leaves one to three, slender, linear, to 25 cm long and 5 mm wide, channelled, grass-like, erect or lax, green. Flower stem to 50 cm tall, relatively robust, greenish brown. Flowers one to ten, to 50 mm across, purple with yellow on base of labellum mid-lobe, lateral sepals greenish brown. Distinguished from the similar *Diuris dendrobioides* by its darker purple flowers, proportionately shorter lateral sepals and slightly earlier flowering time and from *D. fragrantissima* by its more robust stature and larger, deep purple, unscented flowers (Backhouse & Jeanes, 1995).

Conservation Status:

ROTAP: not listed

VROTS: vulnerable

ESP: not listed

FFG: listed; no Action Statement

RESERVATION STATUS			RARITY
% of CRA population in biological conservation reserve	% of CRA population in other public land	% of CRA population on private land	% Australian population within RFA Region
0	10	90	0-25

Distribution in Gippsland RFA Region: It has been found on the railway reserve between Stratford and Bairnsdale and at Dawson, and on private land and other public land in the Briagolong area (Scarlett & Tonkinson, 1980-87, La Trobe). Elsewhere this species is widely distributed on low-altitude plains from near the coast to well inland (including most other RFA Regions) as well as South Australia, New South Wales and Queensland (Backhouse & Jeanes, 1995).

Habitat: The species is found on the plains where hard-setting grey loams have formed on Quaternary alluvium in Kangaroo Grass (*Themeda triandra*) dominated grassland. Associated species are; Forest Red Gum (*Eucalyptus tereticornis*), Lightwood (*Acacia implexa*), Blady Grass (*Imperata cylindrica*), Chocolate Lily (*Arthropodium strictum*) and Bulbine Lily (*Bulbine bulbosa*). Most sites appear to experience seasonal inundation (Scarlett & Tonkinson, 1980-87, La Trobe). Elsewhere this species is found in grasslands and grassy woodlands on rich, heavy, sandy loams, which may be inundated during winter months (Backhouse & Jeanes, 1995).

Life History: All species of *Diuris* are deciduous and die back to a fleshy tuberoid to avoid the summer extremes of dryness and heat. Tuberoids sprout after soaking rains in the autumn and the leaves develop fully before the inflorescence is produced. *D. punctata* var. *punctata* flowers from September to December. Replacement tuberoids are produced by all species and many increase vegetatively by daughter tuberoids. Pollination seems to be primarily by small native bees. The attraction of other species (for pollination) is unclear (Jones, 1988). Asexual reproduction and establishment occurs occasionally. In response to fire, this species is an optional root resprouter where most plants survive fire and resprout from underground tubers, but there is also a significant re-establishment from seed germination. Generally it requires long periods without major disturbance for survival and establishment (e.g. no fires, floods, clearing etc.)(Cheal, RFA database).

Threatening Processes operating in Gippsland RFA Region:

- Historically the species has undergone a massive decline. The species occurs in grasslands and grassy woodlands, habitat types, which have suffered a major decline since European settlement and have largely been converted to pasture (S.A.C., 1991, final rec.).
- Its habitat is threatened by soil disturbance and continuing land clearance. Ploughing is the greatest threat to the survival of the species and it probably only occurs in areas that have never been ploughed (S.A.C., 1991, final rec.).
- Invasion and competition from weeds threatens the species (Scarlett & Tonkinson, 1980-87, La Trobe)
- Removal of plants and flowers by collectors is also a threat (Scarlett & Tonkinson, 1980-87, La Trobe)
- Fire prevention works, that is, slashing, ploughing and herbicide spraying, have the potential to cause serious damage at several sites (Scarlett & Tonkinson, 1980-87, La Trobe)
- The long term absence of burning may cause the decline of *D. punctata* (Scarlett & Tonkinson, 1980-87, La Trobe)
- Ground disturbance and rubbish dumping associated with vehicle access causes damage to some populations (Scarlett & Tonkinson, 1980-87, La Trobe).
- The species is palatable to mammalian herbivores (Cheal, RFA database) but this is not considered to be a major threat (S.A.C., 1990, nom.). Heavy cattle grazing at some rail reserve sites has significantly reduced numbers of the orchid (Scarlett & Tonkinson, 1980-87, La Trobe).

Rating of Threats:

Disturbance	Rating	Source
Clearing of native vegetation	2	S.A.C., 1991, final rec.

Fragmentation of native veg.	3	S.A.C., 1991, final rec.
Lack of fire	1	Scarlett & Tonkinson, 1980-87, La Trobe
Introduced plants	3	Scarlett & Tonkinson, 1980-87, La Trobe
Grazing/trampling	2	S.A.C., 1990, nom.
Weed control	2	Scarlett & Tonkinson, 1980-87, La Trobe
Deliberate collecting/harvesting	2	Scarlett & Tonkinson, 1980-87, La Trobe
Vandalism/human disturbance	2	Scarlett & Tonkinson, 1980-87, La Trobe
Reproductive problems	2	Scarlett & Tonkinson, 1980-87, La Trobe
Other: fire prevention works	2	Scarlett & Tonkinson, 1980-87, La Trobe
soil disturbance	3	S.A.C., 1991, final rec.

Current Management:

On rail reserves, fencing, ecological burning and regular monitoring have been carried out.

Shining Anchor Plant

Discaria nitida

Family: Rhamnaceae

Species Characteristics: Much branched, rigid shrub, 2-5 m high; opposite, spreading, spiny branchlets; leaves not falling early. Spines 8-18 mm long, green; stems usually reddish-brown. Leaves opposite, 10-25 mm long; stipules 0.6-1.2 mm long. Flowers clustered, up to 10 at nodes; flowers c. 3 mm diameter, pedicels 5-10 mm long, hypanthium cupular. Capsule 3-lobed, 4-5 mm diameter, few develop at each node (Harden, 1990).

Conservation Status:

ROTAP: rare

VROTS: endangered

FFG: listed

ESP: not listed

RESERVATION STATUS			RARITY
% of CRA population in biological conservation reserve	% of CRA population in other public land	% of CRA population on private land	% Australian population within RFA Region
10	80	10	50-75

Distribution in Gippsland RFA Region: Known from two localities in Victoria; on the Victoria River and Spring Creek at Cobungra on private and public land, and on the Bundara River at Anglers Rest in the Alpine National Park (Bogong Unit) (VROTPOP). Also found in New South Wales (SAC, 1989, nom., Scarlett, La Trobe, 1980).

Habitat: Riparian environments, including stream banks, rock outcrops and riverside gravel and sand, no more than 5 m from waters edge. Occurs at elevations of 700-1100 m, with mean annual rainfall of c.800 mm, sometimes supplemented by snowfalls (Hall & Parsons, 1987). The species grows in riparian scrub, in association with Black Sallee (*Eucalyptus stellulata*), Snow Gum (*E. pauciflora*) and Dagger Wattle (*Acacia siculiformis*) (Scarlett, La Trobe, 1980).

Life History: Long-lived perennial. Seedlings are rarely seen, and conditions for regeneration are unknown (Scarlett, La Trobe, 1980). Sexual reproduction and subsequent establishment from seeds. Asexual reproduction is unknown. Regeneration is habitat dependent on particular rare or unpredictable events, and between such event plants may appear to be absent. It tolerates major natural disturbance and requires such disturbance for the rare opportunity to establish and spread. Following fire, the species is an obligate seed regenerator; all or nearly all plants are killed by fire, and regeneration is solely from seed. Fire also promotes germination and establishment (Cheal, RFA database).

Threatening Processes operating in Gippsland RFA Region:

- The species is heavily browsed by brumbies and cattle, which prevents seedling regeneration (Hall & Parsons, 1987).
- The species is extremely rare, comprising only about 30 individuals (SAC, 1991, final rec.).
- Erosion of riverbanks where it grows may be a threat (Scarlett, 1986, La Trobe).
- Weed invasion and control (VROTPOP).

Rating of Threats:

Disturbance	Rating	Source
Introduced plants	2	VROTPOP
Grazing/trampling	3	Hall & Parsons, 1987
Other: erosion	2	Scarlett, 1986, La Trobe

Current Management:

- Monitored for VROTPOP database in past 5 years
- DCE (1992a) Alpine National Park Bogong Unit Management Plan
- Planned management for all nationally threatened plant species: sites are to be included in the Special Protection Zone and will be managed with the aim of ensuring the survival of the significant species; a 'management statement' will be prepared, which will define the precise boundary of each site/area, and will provide management prescriptions covering conservation, monitoring, recreation, productive uses and other management activities; fire suppression, fuel reduction burning and the control of pest plants and animals will take into account the presence of significant species; efforts will be made to collate information on species distribution, ecology and threats, and known populations of significant species will be monitored.
 - Planned management for *D. nitida*: beds and banks of watercourses where it occurs will be protected from activities that may promote erosion, and the effects of grazing will be monitored and efforts will be made to reduce impacts on the species.

Hairy Anchor Plant

Discaria pubescens

Family: Rhamnaceae

Species Characteristics: Much branched, rigid shrub, 0.4-2.5 m high; opposite, spreading, branchlets dominated by spines; leaves often falling early. Spines 15-50 mm long, green; stems green. Leaves opposite, ovate to oblong, 3-15 mm long, finely toothed; stipules 1.5-3 mm long. Flowers clustered, 10-50 at base of spines; flowers c. 3 mm diameter, pedicels 5-10 mm long, hypanthium cupular. Capsule 3-lobed, 4-5 mm diameter (Harden, 1990).

Conservation Status:

ROTAP: rare

VROTS: vulnerable

FFG: listed; Action Statement

ESP: not listed

RESERVATION STATUS			RARITY
% of CRA population in biological conservation reserve	% of CRA population in other public land	% of CRA population on private land	% Australian population within RFA Region
0	60	40	25-50

Distribution in GIPPSLAND RFA Region: Populations of this species have been recorded in the Alpine National Park - Limestone Creek, Cowombat Flat (Cobberas-Tingaringy Unit), Mt Dawson and Bryce Plain (Wonnangatta -Moroka Unit); in other reserves - Victoria River, Spring Creek, Jim Jack Creek and Mt Battery at Cobungra, Quin Plain on Nunniong Plateau, Lake Omeo; and on private land - Omeo / Benambra area and Cobungra area (Scarlett, La Trobe, 1980, DCE, 1992c & d, VROTPOP). There are populations at Native Dog Flat, the Playgrounds and Little River, and small populations in Western Victoria in the Clunes area. The species formally had a widespread distribution in eastern Australia, but is now regarded as extinct in Queensland and endangered in Tasmania (Humphries, 1993).

Habitat: The species grows in grassy open woodlands and forests (Hall and Parsons, 1987) on loam soils derived from various rock types. It has been recorded on the sloping banks of creeks and on hillcrests, at altitudes of 600-1300 m. Commonly associated species include; Snow Gum (*Eucalyptus pauciflora*), Kangaroo Grass (*Themeda triandra*), Tussock grasses (*Poa* spp.) and Bidgee-widgee (*Acaena novae-zelandiae*) (Scarlett, La Trobe, 1980, VROTPOP)

Life History: Long-lived perennial. Regeneration from seed appears to be rare and seedlings are not often seen. Only a small proportion of plants in any stand bear seed in a season. The necessity of fire for seed regeneration is unknown. Old plants regenerate vegetatively after fire. The relative rarity of the species in heavily timbered sites suggests that it does not compete successfully with Eucalypts (Scarlett, La Trobe, 1980, Hall & Parsons, 1987). Sexual reproduction and subsequent establishment from seeds. Asexual reproduction is unknown. Regeneration is habitat dependent on particular rare or unpredictable events, and between such event plants may appear to be absent. It tolerates major natural disturbance and requires such disturbance for the rare opportunity to establish and spread (Cheal, RFA database).

Threatening Processes operating in GIPPSLAND RFA Region:

- *D. pubescens* is under threat from grazing by stock, rabbits or brumbies, because new shoots are very palatable (Hall & Parsons, 1987). Grazing on new growth may be responsible for the observed lack of regeneration (SAC, 1991, final rec). Where the species occurs in the Alpine National Park, light cattle grazing is permitted, which may hinder seedling establishment and new growth on adult plants (Humphries, 1993).
- Weed competition and shading can be a threat because the species appears to be adapted to fairly exposed areas (SAC, 1991, final rec.).
- Complete absence of natural seedling regeneration anywhere in the state (SAC, 1991, final rec.)
- Senescence and lack of juvenile recruitment will lead to eventual death of remaining individuals and thus local extinctions (Humphries, 1993).
- Erosion (VROTPOP).
- Herbicide spraying (VROTPOP).

Rating of Threats:

Disturbance	Rating	Source
Introduced animals	2	Hall & Parsons, 1987
Introduced plants	2	SAC, 1991, final rec.
Grazing/trampling	3	Hall & Parsons, 1987; SAC, 1991, final rec .
Weed control	2	VROTPOP
Reproductive problems	3	SAC, 1991, final rec.; Humphries, 1993

Current Management:

- Monitored for VROTPOP database in past 5 years
- DCE (1992c&d) Alpine National Park Cobberas-Tingaringy & Wonnangatta-Moroka Units Management Plans
- Planned management for all nationally threatened plant species: sites are to be included in the Special Protection Zone and will be managed with the aim of ensuring the survival of the significant species; a 'management statement' will be prepared, which will define the precise boundary of each site/area, and will provide management prescriptions covering conservation, monitoring, recreation, productive uses and other management activities; fire suppression, fuel reduction burning and the control of pest plants and animals will take into account the presence of significant species; efforts will be made to collate information on species distribution, ecology and threats, and known populations of significant species will be monitored.
- Planned management for *D. pubescens*: threats to the species will be taken into account in the assessment of carrying capacity for grazing; further research will be carried out on its ecology to determine the effects of fire; known populations will be monitored; Mount Dawson plants will be fenced to protect them from grazing.

Humphries (1993) Action Statement, **Morcom & Bramwell (1997)** Action Statement Monitoring

Past management actions: soil erosion and vegetation damage in the alpine regions of Victoria caused by cattle grazing has been listed as a potentially threatening process under the *Flora and Fauna Guarantee Act* 1988; grazing was withdrawn from Bryces Plain in 1989; grazing continues at 5 other sites subject to monitoring the effect on native vegetation and assessment of carrying capacity. Seedlings have been propagated at Swifts Creek. Good regeneration after fire has been recorded at Lake Omeo and Benambra although there has been no quantitative evidence. Monitoring the impacts of grazing by brumbies and cattle is ongoing at fenced sites at Cowombat Flat and Mount Dawson. Eradication of environmental weeds such as blackberries is ongoing in all areas.

- Intended management actions: prepare a critical habitat determination; where necessary fence public land frontages with adjoining landowners to protect populations from grazing; protect all sites from burning; assess recruitment and facilitate seedling establishment by removing competition from introduced grasses; eliminate competition from introduced woody weeds; monitor all existing populations to assess seedling recruitment and establishment and different management techniques, assess the effects of cattle grazing; liaise with landowners about appropriate management of stands on private lands and assist with grant applications; involve community groups in maintenance of populations and seed collection; collect seed from all populations for future reintroductions; investigate suitable locations for reintroductions.

Mountain Cress

Drabastrum alpestre

Family: Brassicaceae

Species Characteristics: Perennial herb or shrub. Base and rhizome woody; stems erect, rigid, terete or finely fluted, generally to 15 cm high, stalked branched hairs. Basal leaves in rosette, petiolate, to 5 cm long; stem leaves few, reducing to sessile. Inflorescence a raceme; petals clawed, white or lavender, 3.5-6 mm long. Fruit obovoid to ellipsoid, 5-9 mm long, dehiscent; seeds in 2 irregular rows (Entwisle, 1996).

Conservation Status:

ROTAP: rare

VROTS: vulnerable

FFG: listed

ESP: not listed

RESERVATION STATUS			RARITY
% of CRA population in biological conservation reserve	% of CRA population in other public land	% of CRA population on private land	% Australian population within RFA Region
100	0	0	25-50

Distribution in GIPPSLAND RFA Region: Now known only from near Pieman Creek Falls in the Alpine National Park (Wonnangatta-Moroka Unit) north of Licola (SAC, 1991, nom.). Also found in the A.C.T.

Habitat: Stony slopes in cold, relatively dry, high altitude areas (SAC, 1991, nom.). The Pieman Creek site, which is at the extreme of the former range, has shallow rocky soil derived from sandstone, annual precipitation of 1400mm mainly as snow, altitude of 1360 m and a north aspect. The species grows in a sub-alpine woodland of Snow Gum (*Eucalyptus pauciflora*) and Black Sallee (*E. stellulata*) with a sparse shrubby and herbaceous understorey (Scarlett, 1982).

Life History: Facultative annuals, biennials or short-lived perennials. Flowers spring to summer (Entwisle, 1996). Sexual reproduction, and subsequent establishment from seeds. Asexual reproduction is unknown. Natural disturbances are tolerated, but regeneration is not dependent on particular rare or unpredictable events. Following fire, the species is an obligate seed regenerator; all or nearly all plants are killed by fire, and regeneration is solely from seed, often only via invasion from unburnt sites (Cheal, RFA database).

Threatening Processes operating in GIPPSLAND RFA Region:

- The species has disappeared from several localities in the past and is now known from only one locality (SAC, 1991, final rec.).
- *D. alpestre* is palatable, and is subject to grazing, particularly by rabbits (SAC, 1991, final rec.).
- Chance events such as wildfire, could eliminate the remaining population (SAC, 1991, nom.).
- The species is possibly threatened by degradation of habitat by recreational activities (SAC, 1991, nom.). Its location is very close to where walkers climb to a sightseeing point above Pieman Creek Falls, thus causing accelerated erosion (Scarlett, 1982, La Trobe).
- Small population numbers may cause loss of genetic viability (SAC, 1991, nom.).
- There is a possible reduction in availability of suitable habitat as a result of the Greenhouse Effect (Busby, 1988)

Rating of Threats:

Disturbance	Rating	Source
Unplanned fire	2	SAC, 1991, final rec.
Introduced animals	2	SAC, 1991, final rec.
Grazing/trampling	2	SAC, 1991, final rec.
Recreation	1	SAC, 1991, final rec.; Scarlett, 1982, La Trobe
Reproductive problems	1	SAC, 1991, nom.
Other: greenhouse effect	1	Busby, 1988

Current Management:

DCE (1992c) Alpine National Park Wonnangatta-Moroka Unit Management Plan

- Planned management for all nationally threatened plant species: sites are to be included in the Special Protection Zone and will be managed with the aim of ensuring the survival of the significant species; a 'management statement' will be prepared, which will define the precise boundary of each site/area, and will provide management prescriptions covering conservation, monitoring, recreation, productive uses and other management activities; fire suppression, fuel reduction burning and the control of pest plants and animals will take into account the presence of significant species; efforts will be made to collate information on species distribution, ecology and threats, and known populations of significant species will be monitored.

- Planned management for *D. alpestris*: the effects of rabbits will be reduced, walkers will be encouraged to keep to walking tracks, all known sites will be monitored, research will be carried out on the ecology of the species.

Bog Willow-herb

Epilobium brunnescens ssp. *beaugleholei*

Family: Onagraceae

Species Characteristics: Matted, creeping, perennial herb; stems rooting at nodes and growing beyond the flowering regions, sub-glabrous to pubescent. Leaves opposite, elliptic or ovate, 3-14 mm long, 2-7 mm wide, glabrous. Flowers solitary in upper leaf axils; sepals and petals 4; inside of hypanthium glabrous; petals white, 3-5 mm long. Fruit a slender capsule (Jeanes, 1996).

Conservation Status:

ROTAP: vulnerable

VROTS: vulnerable

FFG: not listed

ESP: listed

RESERVATION STATUS			RARITY
% of CRA population in biological conservation reserve	% of CRA population in other public land	% of CRA population on private land	% Australian population within RFA Region
100	0	0	75-100

Distribution in GIPPSLAND RFA Region: Endemic to Victoria; confined to Snowy Range north of Licola in the Alpine National Park (Wonnangatta-Moroka Unit). *Epilobium brunnescens* is widespread in New Zealand (Scarlett, La Trobe, 1983).

Habitat: Moist, moss-covered, almost vertical rocks receiving splash from a sub-alpine waterfall (Jeanes, 1996). Altitude of 1300 m, and annual precipitation of 1600 mm mainly as snow (Scarlett, La Trobe, 1983).

Life History: Perennial. Flowers in summer (Jeanes, 1996). Little is known of the reproductive biology of the taxon (Scarlett, La Trobe, 1983). Sexual reproduction, and subsequent establishment from seeds. Asexual reproduction is unknown. It requires long periods without major disturbance for survival and establishment. Regeneration is not dependent on particular rare or unpredictable events. The species occurs in habitats not normally subject to fire. (Cheal, RFA database).

Threatening Processes operating in GIPPSLAND RFA Region:

- Its small population size makes it susceptible to extinction due to natural events such as rockfalls, drought, flood etc (Scarlett, 1983, LaTrobe).
- Over-collection may be a threat because of the rarity of the species (Scarlett, 1983, LaTrobe).
- The greenhouse effect could result in a reduction of area of suitable habitat (Busby, 1988)

Rating of Threats:

Disturbance	Rating	Source
Deliberate collecting/ harvesting	2	Scarlett, 1983, La Trobe
Other: greenhouse effect, susceptible to catastrophic events	1	Busby, 1988
	2	Scarlett, 1983, La Trobe

Current Management:

DCE (1992c) Alpine National Park Wonnangatta-Moroka Unit Management Plan

- Planned management for all nationally threatened plant species: sites are to be included in the Special Protection Zone and will be managed with the aim of ensuring the survival of the significant species; a 'management statement' will be prepared, which will define the precise boundary of each site/area, and will provide management prescriptions covering conservation, monitoring, recreation, productive uses and other management activities; fire suppression, fuel reduction burning and the control of pest plants and animals will take into account the presence of significant species; efforts will be made to collate information on species distribution, ecology and threats, and known populations of significant species will be monitored.

Carpet Willow-herb

Epilobium willisii

Family: Onagraceae

Species Characteristics: Matted, prostrate, perennial herb; stems rooting at nodes and growing beyond the flowering regions; stems to 6 cm long, sparsely pubescent. Leaves crowded, mostly opposite, narrowly elliptic, 0.5-1.5 cm long, 1.5-4 mm wide, glabrous, subsessile. Flowers solitary in upper leaf axils; sepals and petals 4; inside of hypanthium glabrous; petals purplish-pink, 3-4.5 mm long. Fruit a slender capsule (Jeanes, 1996).

Conservation Status:

ROTAP: rare

VROTS: extinct

FFG: listed

ESP: not listed

RESERVATION STATUS			RARITY
% of CRA population in biological conservation reserve	% of CRA population in other public land	% of CRA population on private land	% Australian population within RFA Region
100	0	0	0-25

Distribution in GIPPSLAND RFA Region: It has been collected only once, in 1969, from Lankey Plain on the Dargo High Plains, but has not been found again despite intensive searches. Although listed as extinct in Victoria, there is a possibility the species may survive on the Dargo High Plains because of difficulties in distinguishing it from *E. gunnianum* and *E. curtisiae* in the vegetative state (Scarlett, La Trobe, 1984). Also occurs on mountains of central and north-eastern Tasmania (SAC, 1991, nom.).

Habitat: Seasonally inundated depressions in tussock grassland of Prickly Snow-grass (*Poa costiniana*) at 1200 m (Scarlett, 1984). The depressions are a prominent feature of basalt areas on the Bogong High Plains, vary in size from a few m² to about 100m², and occur between dense *Poa* tussock stands. They are saturated after snow melt and extremely dry in mid-summer and early autumn (McDougall, 1982).

Life History: Long-lived perennial. Flowers in summer (Jeanes, 1996). Sexual reproduction, and subsequent establishment from seeds. Asexual reproduction occurs occasionally. It requires long periods without major disturbance for survival and establishment. Regeneration is not dependent on particular rare or unpredictable events. The species occurs in habitats not normally subject to fire. (Cheal, RFA database).

Threatening Processes operating in GIPPSLAND RFA Region:

The species may still survive unrecognised, and hence perceived threats would be:

- small population numbers, leading to threats from habitat degradation and from loss of genetic viability (SAC, 1991, nom.).
- grazing pressure from cattle, rabbit or native animals (SAC, 1991, nom.).
- chance events such as wildfire eliminating remaining populations (SAC, 1991, nom.).
- possible reduction in suitable habitat as a result of the Greenhouse Effect (Busby, 1988).

Rating of Threats:

Disturbance	Rating	Source
Unplanned fire	1	SAC, 1991, nom.
Grazing/trampling	1	SAC, 1991, nom.
Reproductive problems	1	SAC, 1991, nom.
Other: greenhouse effect	1	Busby, 1988

Current Management:

No active management

Purple Eyebright

Euphrasia collina ssp. *muelleri*

Family: Scrophulariaceae

Species Characteristics: Erect, semi-parasitic, many-branched perennial herb to 40 cm high. Leaves serrate, ovate-elliptical, opposite, 7-12 mm long and 3-6 mm wide. Flowers lilac to purple, sometimes with paler tube, to 15 mm long in racemes terminating the upper branches, each with prominent leafy bracts at their base. Calyx covered with dense, stiff hairs (Barker, 1982).

Conservation Status:

ROTAP: endangered

VROTS: endangered

FFG: listed

ESP: listed

RESERVATION STATUS			RARITY
% of CRA population in biological conservation reserve	% of CRA population in other public land	% of CRA population on private land	% Australian population within RFA Region
0	100	0	0-25

Distribution in Gippsland RFA Region: South-eastern part of Bowen Mountains east of Benambra in State forest. Other Victorian localities are Wren's Flat on the Jamieson River, Mornington Peninsula, Deep Lead Flora Reserve near Stawell, and an unverified record at Little River Gorge near McKillops Bridge (Scarlett, in prep, SAC, 1996, nom.). Once distributed from northern New South Wales near the Queensland border south through mainland south-eastern Australia and extending westwards as far as Mt Lofty and southern Flinders Ranges in South Australia, but now known only from Victoria (Barker, 1982).

Habitat: The Bowen Mountains population is found in Snow Gum (*Eucalyptus pauciflora*) grassy woodland (SAC, 1996, nom.).

Life History: A short-lived perennial, surviving from one to three years. Flowering is between August and November. Flowers are bisexual, and are cross-pollinated by insects, mainly by native bees. Asexual reproduction is unknown. The plants are all able to parasitise roots of other plants, but this is not obligatory and there are no specific hosts (Barker, 1982). The semi-parasitic biology of this plant has not been investigated but is expected to be important in reproductive requirements, habitat preferences and seedling establishment. There is a marked tendency for relatively dense, discreet stands to develop, which may be due to low dispersal capacity or specialised habitat or host plant requirements. (Scarlett, 1986.). The plant is an obligate seed regenerator after fire; nearly all plants are killed by fire and regeneration is solely from seed, germination and establishment is promoted by fire (Cheal, RFA database).

Threatening Processes operating in GIPPSLAND RFA Region:

- The species has suffered a significant decline in both range and abundance since European settlement because much of its habitat of grasslands, grassy open forests and woodlands has been cleared for agriculture and heavily grazed (SAC, 1997, final rec.).
- Numbers have declined since monitored in the 1984, and this is thought to be due to lack of burning (Scarlett, 1998, VROTPOP).
- Weed invasion is an additional threat to the species (Scarlett, 1998, VROTPOP).

Rating of Threats:

Disturbance	Rating	Source
Clearing of native vegetation	2	SAC, 1997, final rec.
Fragmentation of native veg.	2	SAC, 1997, final rec.
Lack of fire	3	Scarlett, 1998, VROTPOP
Introduced plants	2	Scarlett, 1998, VROTPOP

Current Management:

No active management

Rough Eyebright

Euphrasia scabra

Family: Scrophulariaceae

Species Characteristics: Erect, semi-parasitic annual herb to 50 cm tall. Leaves serrate, ovate-elliptic to elliptic, 6-20 mm long and 1-9.5 mm wide, covered by dense, scabrous hairs, margins recurved. Inflorescence terminal, dense racemes of yellow flowers, sometimes with red-brown striations on hood and lower lip behind each lobe, distal parts covered externally by dense, moderately long hairs; flowers to 14 mm long (Barker, 1982).

Conservation Status:

ROTAP: poorly known

VROTS: endangered

FFG: listed; Action Statement

ESP: not listed

RESERVATION STATUS			RARITY
% of CRA population in biological conservation reserve	% of CRA population in other public land	% of CRA population on private land	% Australian population within RFA Region
80	20	0	25-50

Distribution in Gippsland RFA Region: Mundy Plain in State forest and Bentley Plain in a Natural Features and Scenic Reserve. A population at Mt Dawson in the Alpine National Park (Wonnangatta-Moroka Unit) is now presumed extinct. Other Victorian locations are Delegate River, Little Bog Creek (East Gippsland RFA Region), King Spur Clearwater Creek and McNamara's Hut (North-East RFA Region) (Scarlett & Bartley, 1998). The species was widely collected last century from montane and riparian sites in Victoria, Western Australia, South Australia, New South Wales and Tasmania, but has dramatically declined in all states and is considered extinct in New South Wales and South Australia (Thompson, 1992).

Habitat: All Victorian populations are in herbfields or grasslands with low tree or shrub cover. In the Gippsland RFA Region the species is found in montane and subalpine woodlands (Scarlett & Bartley, 1998). The lowland form is usually found beside streams on organic loam or peat, where seasonal inundation may occur. The highland form occurs on sites with indications of high groundwater tables. It is most abundant between tall herbs in gaps which appear to be maintained by grazing (Thompson, 1992).

Life History: Flowering time is between October and April; the later part of this range for alpine areas. Flowers are bisexual, and are cross-pollinated by insects, mainly by native bees. The plants are all able to parasitise roots of other plants, but this is not obligatory and there are no specific hosts. (Barker, 1982). The species is strictly annual. Limited observations indicate that numbers of plants, their aggregation and stage of development are strongly influenced by seasonal conditions, and populations are subject to extreme fluctuations. *E. scabra* is semi-parasitic, but has no host plant specificity (Scarlett, 1986). Sexual reproduction occurs only occasionally, and may be limited to a few seasons because of dormancy within the propagules, habitat requirements or because establishment needs the temporary removal of competitors. Asexual reproduction is unknown. The species occurs in habitats where fire does not normally occur, and it requires long periods without major disturbance for survival and establishment (Cheal, RFA database).

Threatening Processes operating in GIPPSLAND RFA Region:

- Its rarity and the small size of existing stands exposes the species to damage from environmental fluctuations (SAC, 1991, final rec.). The species is an annual requiring frequent availability of suitable seed beds and ecological conditions, which increases the species vulnerability (SAC, 1990, nom.).
- Invasion and competition by introduced weeds, particularly Blackberries, is a threat.
- Populations in the Gippsland RFA Region are covered by cattle grazing licences with variable grazing pressure. Most sites are also grazed by rabbits, and some by brumbies. It is unclear whether grazing by introduced herbivores is deleterious by contributing to the species' decline through trampling, spreading weeds and affecting soil structure and nutrient status (Thompson, 1992).
- Recreational activities may pose a potential threat of trampling and collecting. Bentley Plain is 100m upstream from a well-established picnic area on the Nunniong Road which is accessible and attractive to walkers (Thompson, 1992).
- Any changes in hydrological conditions would be detrimental, as successful reproduction of the species appears to be closely related to water table levels (Thompson, 1992).

Rating of Threats:

Disturbance	Rating	Source
Introduced animals	2	Thompson, 1992
Introduced plants	2	Thompson, 1992
Grazing/trampling	2	Thompson, 1992

Recreation	2	Thompson, 1992
Dams/alteration to water regimes	2	Thompson, 1992
Reproductive problems		
Other: fluctuations in environmental conditions	2	SAC, 1990, nom

Current Management:

- monitored for VROTOP database in last 5 years.

DCE (1992c) Alpine National Park Wonnangatta-Moroka Unit Management Plan

- Planned management for nationally significant plant species: sites are to be included in the Special Protection Zone and will be managed with the aim of ensuring the survival of the significant species; a 'management statement' will be prepared, which will define the precise boundary of each site/area, and will provide management prescriptions covering conservation, monitoring, recreation, productive uses and other management activities; fire suppression, fuel reduction burning and the control of pest plants and animals will take into account the presence of significant species; efforts will be made to collate information on species distribution, ecology and threats; surveys will be undertaken at sites which are predicted to contain significant species.
- Planned management for *E. scabra*: all known populations will be monitored and if the species is suffering from trampling or grazing appropriate action will be taken; seed will be collected from known populations and lodged with the Royal Botanic Gardens.

Thompson (1992) Action Statement, Bramwell (1997) Action Statement Monitoring

- Past management actions: seed has been collected and propagated by La Trobe University researchers; a cattle and brumby enclosure was constructed at Bentley plain, and plots were monitored inside and outside the fence, but results were inconclusive because cattle got through the fence. An enclosure has been constructed at Mundy Plain to exclude cattle and horses while admitting native herbivores and rabbits, and the existing enclosure at Bentley Plain secured by an additional fence. Yearly monitoring for VROTOP database occurs. Blackberries have been sprayed at Mundy Plain. A Special Protection Zone from timber harvesting has been declared around Mundy Plain.
- Intended management actions: monitoring plots will be used to assess the effect of cattle and brumby grazing at Mundy and Bentley Plains leading to an assessment of whether to modify grazing licences or control brumbies; each site will be visited twice a year to map distribution and abundance of *Euphrasia scabra*, assess weed invasion and record flowering and seed set; searches for the species in the Alpine National Park in habitat predicted as suitable by computer modelling; applications to carry out sphagnum moss harvesting which will have a detrimental effect on *E. scabra* will be refused; public vehicle access to Mundy Plain will be closed to discourage camping; the use of Mundy Plain as a helipad for fire protection purpose will be confined to the north-western edge; *E. scabra* sites will be noted on fire management maps so fire related activities will not cause damage; seed will be collected from all sites and lodged with the Royal Botanic Gardens seed bank; small numbers will be propagated and introduced to existing sites or sites where it previously occurred; encourage research into the biology of *E. scabra*; critical habitat determination will be prepared

Clover Glycine

Glycine latrobeana

Family: Fabaceae

Species Characteristics: Decumbent or ascending herb. Stems short, non-stoloniferous, hairy. Leaves palmately trifoliolate, petiole 0.5-5 cm long; leaflets sessile to subsessile, those on mature leaves obovate to orbicular, 5-20 mm long, 4-12 mm wide, those of immature leaves often elliptic, upper surface glabrous, lower surface silky-strigose; stipules suborbicular, 1.5-2 mm long. Racemes of 3-8 flowers, peduncles mostly 5-10 cm long. Petals deep purple, keel shorter than wings. Pod linear-lanceolate, seeds dark brown (Jeanes, 1996).

Conservation Status:

ROTAP: vulnerable

VROTS: vulnerable

ESP: listed

FFG: listed

RESERVATION STATUS			RARITY
% of CRA population in biological conservation reserve	% of CRA population in other public land	% of CRA population on private land	% Australian population within RFA Region
100	0	0	0-25

Distribution in GIPPSLAND RFA Region: It has mostly been recorded from the lowland plains of south-west Victoria through to the Gippsland plains with an extension to Omeo (SAC, 1993, nom.). It is currently only known from near Pieman Creek on Bryce Plain in the Alpine National Park (Wonnangatta-Moroka Unit) (Scarlett, 1982, La Trobe). Also occurs in South Australia, New South Wales and Tasmania (Jeanes, 1996).

Habitat: Across the State the species occurs in grassland, grassy woodland, grassy heath and occasionally sclerophyll scrub woodland. Soil types vary, but are mainly of high to moderate fertility. It is found predominantly at low elevations. There is a wide range in annual rainfall, with a maximum in Spring. The Pieman Creek site is unusual in being at sub-alpine elevation. The species grows in a Tussock -grass (*Poa* spp.) sward on the fringe of Snow Gum (*Eucalyptus pauciflora*) open forest, with scattered shrubs such as Hairy Anchor Plant (*Discaria pubescens*) (Scarlett, 1984, La Trobe).

Life History: Perennial. Little is known of its biology. Flowering is in summer (Scarlett, 1980, La Trobe). Sexual reproduction from seed. Asexual reproduction is unknown. Natural disturbances are tolerated, but regeneration is not dependent on such disturbance. Following fire, the species is an obligate seed regenerator, with all plants being killed (Cheal, RFA database). Ecological burns are preferable in autumn, no more frequently than once every 5 years (Scarlett, 1980, La Trobe).

Threatening Processes operating in GIPPSLAND RFA Region:

- *G. latrobeana* has suffered severe depletion throughout its range, as a result of land clearance, cultivation and overgrazing (SAC, 1994, final rec.).
- Roadside stands are at risk from disturbance caused by firebreak ploughing and slashing (SAC, 1993, nom.).
- Populations on some public land blocks are potentially threatened by trail bikes and cars (SAC, 1993, nom.).
- Inappropriate burning regimes threaten the species because it is very susceptible to regular late spring- early summer burning which destroys flowers and seeds (SAC, 1993, nom.).
- Grazing by rabbits at Pieman Creek may be causing reduced flowering and seed set (Scarlett, 1982, La Trobe).

Rating of Threats:

Disturbance	Rating	Source
Clearing of native vegetation	2	SAC, 1994, final rec.
Fragmentation of native veg.	3	SAC, 1994, final rec.
Unplanned fire	2	SAC, 1993, nom
Introduced animals	2	Scarlett, 1982, La Trobe
Grazing/trampling	2	Scarlett, 1982, La Trobe
Recreation	1	SAC, 1994, nom.

Current Management:

DCE (1992c) Alpine National Park Wonnangatta-Moroka Unit Management Plan

- Planned management for all nationally threatened plant species: sites are to be included in the Special Protection Zone and will be managed with the aim of ensuring the survival of the significant species; a 'management statement' will be prepared, which will define the precise boundary of each site/area, and will provide management prescriptions covering conservation, monitoring, recreation, productive uses and other management activities; fire suppression, fuel reduction burning and the control of pest plants and animals will take into account the presence of significant species; efforts will be made to collate information on species distribution, ecology and threats, and known populations of significant species will be monitored.

Prostrate Cone-bush

Isopogon prostratus

Family: Proteaceae

Species Characteristics: Prostrate, spreading shrub, to 1 m or more diameter; branchlets reddish, pubescent. Leaves divided into acute linear lobes, to 10.5 cm long overall, minutely scabrous, flattened; petiole to 6 cm long. Inflorescence terminal, sessile, to 2 cm diameter; involucre bracts hairy; cone scales woolly, overlapping. Flowers to 12 mm long, yellow, glabrous. Cones globular, to 2 cm diameter (Foreman, 1996).

Conservation Status:

ROTAP:

VROTS: endangered

FFG: listed

ESP: not listed

RESERVATION STATUS			RARITY
% of CRA population in biological conservation reserve	% of CRA population in other public land	% of CRA population on private land	% Australian population within RFA Region
100	0	0	0-25

Distribution in GIPPSLAND RFA Region: The only currently known location in Victoria is in the Providence Ponds Flora and Fauna Reserve near Fernbank. A small occurrence on Mt Howe in far east Gippsland recorded in 1969 has not been found since. The species also occurs in New South Wales from near Sydney to the coast near Eden (SAC, 1994, nom., Foreman, 1996).

Habitat: Heath and dry sclerophyll forest on sandy soils, with an average annual rainfall of 600-700 mm. Associated species at the Fernbank site include Yertchuk (*Eucalyptus consideniiana*), Silver Banksia (*Banksia marginata*), Prickly Broom-heath (*Monotoca scoparia*), Heath Tea-tree (*Leptospermum myrsinoides*) and Cord-rush (*Restio* spp.) (SAC, 1994, nom., Foreman, 1996).

Life History: Perennial. Older plants usually have a substantial lignotuber. Flowers between October and December (Foreman, 1996). Sexual reproduction, with establishment from seed, occurs only occasionally, and may be limited to a few seasons because of dormancy within the propagules, habitat requirements or because establishment needs the temporary removal of competitors. Asexual reproduction is unknown. Regeneration is habitat dependent on particular rare and unpredictable events, and between such events the plants may appear to be absent. It requires such disturbance for the rare opportunity to establish and spread. After fire, the species is a facultative root resprouter; most plant survive fire and resprout from dormant buds, but there is also a significant re-establishment from seed germination (Cheal, RFA database).

Threatening Processes operating in GIPPSLAND RFA Region:

- The rarity of the species, both in distribution and abundance, makes it susceptible to local disturbance (SAC, 1994, final rec.).
- The population at Providence Ponds has undergone a severe decline (SAC, 1994, final rec.).
- No juvenile plants or seedlings have been observed at Providence Ponds since 1989 (SAC, 1994, final rec.). Flowering has been noted, but seeds are either not forming due to lack of native pollinating insects or are being predated by ants. Lack of fire may be a factor in lack of regeneration, as the species is adapted to resprouting after fire from lignotubers and seed is released from cones by fires (SAC, 1994, nom.).
- *Phytophthora cinnamomi* is a potential threat, as the Proteaceae family is very susceptible to this disease (SAC, 1994, final rec.).
- Grazing is a potential threat (SAC, 1994, final rec.).
- Earthworks nearby are a potential threat (VROTPOP).

Rating of Threats:

Disturbance	Rating	Source
Lack of fire	2	SAC, 1994, nom.
Disease	2	SAC, 1994, final rec.
Vandalism/human disturbance	1	VROTPOP
Dams/alteration to water regimes		
Reproductive problems	3	SAC, 1994, nom.
Other: rarity makes it susceptible to catastrophic events	2	SAC, 1994, final rec.

Current Management:

No active management

Spiny Pepper-cress

Lepidium aschersonii

Family: Brassicaceae

Species Characteristics: Perennial herb to 30 cm high; stems erect, tangled, small branches spinescent, hairy. Basal leaves pinnately lobed, to 12 cm long; stem leaves becoming smaller, lanceolate, auriculate, hairy. Inflorescence a raceme terminated by a spine. Sepals c. 0.8 mm long, petals reduced, linear. Fruit dry, 3.5-4.5 mm long, glabrous, wings narrow (Entwisle, 1996).

Conservation Status:

ROTAP: vulnerable

VROTS: endangered

FFG: listed

ESP: not listed

RESERVATION STATUS			RARITY
% of CRA population in biological conservation reserve	% of CRA population in other public land	% of CRA population on private land	% Australian population within RFA Region
0	100	0	0-25

Distribution in GIPPSLAND RFA Region: A disjunct population on the eastern edge of the bed of Lake Omeo at Benambra (Crown land). Scattered occurrences across the basalt plains of western Victoria (Scarlett, 1984, La Trobe). Also found in New South Wales (Entwisle, 1996).

Habitat: Lake Omeo is at an altitude of 700 m, and the bed of the lake where the species grows is black silty clay. Spiny Pepper-cress is subject to long cycles of alternate filling and drying out of the lake. It grows in a wetland dominated by Common Blown Grass (*Agrostis avenacea*) and Round-leaf Wilsonia (*Wilsonia rotundifolia*) (Scarlett, 1984, La Trobe).

Life History: Perennial. Flowers spring to autumn (Entwisle, 1996). Population numbers fluctuate greatly, and germination is from soil-stored seed when the lake dries out (Scarlett, 1984, La Trobe). Sexual reproduction, and subsequent establishment from seeds. Asexual reproduction is unknown. Regeneration is not dependent on particular rare or unpredictable events, but natural disturbances are tolerated. After fire, the species is a facultative root resprouter; most plants survive fire and resprout from dormant buds, but there is also a significant re-establishment from seed germination (Cheal, RFA database).

Threatening Processes operating in GIPPSLAND RFA Region:

- Grazing by cattle is causing pugging and damage to the soil where the population grows (VROTPOP).
- Four-wheel-drive vehicles are causing soil disturbance at the site (VROTPOP).
- A light plane runway is situated close to the population, which may have the potential to damage the site (VROTPOP).
- alterations to water regimes may be a potential threat (Scarlett, 1984, LaTrobe).

Rating of Threats:

Disturbance	Rating	Source
Grazing/trampling	2	SAC, 1992, final rec., VROTPOP
Recreation	2	VROTPOP
Dams/alteration to water regimes	1	Scarlett, 1984, La Trobe
Other: light plane use	1	VROTPOP

Current Management:

- Monitored for VROTPOP database in past 5 years

Marble Daisy-bush

Olearia astroloba

Family: Asteraceae

Species Characteristics: Small shrub to about 0.5 m. Stems erect, smooth, pale green when young, turning brown. Leaves grey-green, crowded, alternate, sessile, dentate margins towards apex. Inflorescence a solitary, terminal capitulum, 15-32 mm in diameter. Inner disc florets purple and bisexual, outer ray florets female and violet (Lander & Walsh, 1989).

Conservation Status:

ROTAP: vulnerable

VROTS: vulnerable

FFG: listed

ESP: listed

RESERVATION STATUS			RARITY
% of CRA population in biological conservation reserve	% of CRA population in other public land	% of CRA population on private land	% Australian population within RFA Region
0	100	0	75-100

Distribution in GIPPSLAND RFA Region: The species is endemic to Victoria and known only from the type locality at Marble Gully near "Bindi" on unreserved Crown Land (SAC, 1989, nom.).

Habitat: The species occurs on steep slopes with a northerly aspect. Soils are skeletal loams derived from marble. The site is at an elevation of 600 m, with a mean annual rainfall of 650 mm. The species grows in a dense shrubland dominated by *Pomaderris* sp. aff. *oraria* (Limestone) with occasional emergents of Drooping Sheoak (*Allocasuarina verticillata*) and Silver Bundy (*Eucalyptus nortonii*). A number of other rare or disjunctly occurring species grow in this community such as Winged Everlasting (*Helichrysum adnatum*) and Dense Bush-pea (*Pultenaea densifolia*) (SAC, 1989, nom.).

Life History: Perennial. Peak flowering time is June-July (Lander & Walsh, 1988). Sexual reproduction, with establishment from seeds, occurs only occasionally. It may be limited to a few seasons because of dormancy within the propagules, habitat requirements or because establishment needs the temporary removal of competitors. Asexual reproduction is unknown. Regeneration is not dependent on particular rare or unpredictable events, but natural disturbances are tolerated. The species occurs in habitats that are not normally subject to fire (Cheal, RFA database).

Threatening Processes operating in GIPPSLAND RFA Region:

- The small population size and restriction to one site make it very vulnerable to disturbance (SAC, 1989, nom.).
- Weeds in adjacent property are a potential threat (VROTPOP).

Rating of Threats:

Disturbance	Rating	Source
Introduced plants	1	VROTPOP
Other: rarity causes susceptibility to catastrophic events	2	SAC, 1989, nom.

Current Management:

- Regular monitoring
- Weed control
- Site planning to guide further conservation work such as burning or fire exclusion

Rock Poa

Poa saxicola

Family: Poaceae

Species Characteristics: Tufted or shortly rhizomatous, glabrous perennial. Culms erect, to 60 cm tall. Leaves abruptly tapered to a bluntish apex, to 25 cm long and 5 mm wide; ligule membranous, 1-5 mm long. Inflorescence a narrow, contracted panicle with few short, appressed branches, to 12 cm long, but commonly 5 cm long (Walsh, 1994), usually drooping at maturity. Spikelets plump (Vickery, 1970).

Conservation Status:

ROTAP:

VROTS: vulnerable

FFG: listed

ESP: not listed

RESERVATION STATUS			RARITY
% of CRA population in biological conservation reserve	% of CRA population in other public land	% of CRA population on private land	% Australian population within RFA Region
100	0	0	25-50

Distribution in Gippsland RFA Region: Cobberas Mountains and Bennisons Plains in the Alpine National Park (Cobberas-Tingaringy and Wonnangatta-Moroka Units). It is also recorded from Mt. Spion Kopje, Mt. Cope, Watchbed Creek and Buckety Plain areas of the Bogong High Plains in the North-East RFA Region (Frood, 1998, VROTPOP). Outside Victoria it extends to the ranges of the Australian Capital Territory and the high mountains of Tasmania (SAC, 1991).

Habitat: Alpine to subalpine areas, growing in low wet heath, rocky grassland, open shrubland (Walsh, 1994), and meadows or herbfields, often in the shelter of rocky outcrops (Costin, *et al.*, 1979) at elevations of 1270-1850 metres.

Life History: Perennial grass. Asexual reproduction and establishment occurs occasionally but sexual reproduction and subsequent establishment from seeds is usual. *P. saxicola* occurs in habitats that are not normally subject to fire and requires long periods without major disturbance for survival and establishment (Cheal, RFA database).

Threatening Processes operating in GIPPSLAND RFA Region:

- P. saxicola* is palatable and readily eaten by stock, rabbits and other mammalian herbivores (Cheal, RFA database). It occurs in areas that were grazed by cattle, although not heavily due to rocky terrain. There is no evidence that it is selectively grazed, but it can still be damaged by trampling (SAC, 1991, final rec.).
- The species is vulnerable to disturbance or degradation of habitat because of the limited availability of suitable habitat in Victoria and its low population levels (SAC, 1991, nom.). The species has had a serious decline, disappearing from two 10-minute grids in which it was reported prior to 1950, and now known only from four 10-minute grids. It occurs only rarely in small pockets within these grids, and may be on the point of disappearing from one of the 4 sites (SAC, 1991, final rec.). The greenhouse effect could result in a reduction of area of suitable habitat (Busby, 1988)

Rating of Threats:

Disturbance	Rating	Source
Grazing/trampling	2	SAC, 1991, final rec, VROTPOP
Other: greenhouse effect	1	Busby, 1988

Current Management:

DCE (1992d) Alpine National Park Cobberas-Tingaringy Unit Management Plan

- Planned management for nationally significant plant species: sites are to be included in the Special Protection Zone and will be managed with the aim of ensuring the survival of the significant species; a 'management statement' will be prepared, which will define the precise boundary of each site/area, and will provide management prescriptions covering conservation, monitoring, recreation, productive uses and other management activities; fire suppression, fuel reduction burning and the control of pest plants and animals will take into account the presence of significant species; efforts will be made to collate information on species distribution, ecology and threats; surveys will be undertaken at sites which are predicted to contain significant species.

Gaping Leek-orchid

Prasophyllum correctum

Family: Orchidaceae

Species Characteristics: Terrestrial geophyte. Leaf single, terete, to 30 cm long, erect, slender, dark green, reddish at base. Flower stem to 40 cm tall, slender, green. Flowers 10-20, to 10 mm across, widely opening, fragrant, in fairly long open spike; mainly yellowish-green with some brown striations, labellum green, mauve or pink (Backhouse & Jeanes, 1995).

Conservation Status:

ROTAP: endangered

VROTS: endangered

FFG: listed; Action Statement

ESP: listed

RESERVATION STATUS			RARITY
% of CRA population in biological conservation reserve	% of CRA population in other public land	% of CRA population on private land	% Australian population within RFA Region
0	0	100	75-100

Distribution in Gippsland RFA Region: Endemic to Victoria. Once found throughout lowland Gippsland, but now restricted to the railway line between Stratford and Bairnsdale (Hoey & Lunt, 1995).

Habitat: Remnants of Kangaroo Grass (*Themeda triandra*) grassland and Black Sheoak (*Allocasuarina littoralis*) grassy woodlands (Hoey & Lunt, 1995).

Life History: Perennial that dies back annually to underground tuberoids. These are dormant during the hotter summer months and begin to shoot in response to late autumn rains. Flowers in October and November, more prolifically following hot summer fires (Backhouse & Jeanes, 1995). Species of *Prasophyllum* are mainly pollinated by bees and wasps, which are attracted to the flower by perfumes and nectar released from the labellum. Many other insects are also attracted to the flowers and some of these probably contribute to pollination of the flowers (Jones, 1988). Sexual reproduction, with establishment from seeds, occurs only occasionally. It may be limited to a few seasons because of dormancy within the propagules, habitat requirements or because establishment needs the temporary removal of competitors. Asexual reproduction is unknown. Regeneration is not dependent on particular rare or unpredictable events, but natural disturbances are tolerated. After fire, the species is a facultative root resprouter; most plants survive fire and resprout from dormant buds, but there is also a significant re-establishment from seed germination (Cheal, RFA database).

Threatening Processes operating in GIPPSLAND RFA Region:

- The species has declined because a lot of its former habitat has been converted to farmland (SAC, 1992, final rec.) and the grasslands and grassy woodlands which support the species which were once widespread across the plains are now confined to a few small remnants (Hoey & Lunt, 1995). It is at risk of disappearing from the wild because of destruction and degradation of its habitat.
- The species is threatened by regular slashing of rail line grasslands (SAC, 1992, final rec.).
- It is also threatened by the control methods of bulldozing and burning of saplings by V-Line (SAC, 1992, final rec.).
- Access tracks are regularly slashed, rotary-hoed or graded for fire prevention, which causes soil disturbance and subsequent weed invasion (Hoey & Lunt, 1995).
- The sites are being invaded by trees and shrubs, which will eventually shade out the grassland habitat of the orchid (Hoey & Lunt, 1995).
- Rail sites have been regularly burnt in Spring and Autumn for fire prevention purposes, whereas Autumn burning would be preferable for ecological purposes (Hoey & Lunt, 1995, SAC, 1992, final rec.).
- Grazing stock are a potential threat, because they selectively remove palatable herbs, introduce weed seeds and trample vegetation and soil (Hoey & Lunt, 1995, SAC, 1992, final rec.).
- The rail line sites are long and narrow and are surrounded by cleared agricultural land, which increases weed invasion (Hoey & Lunt, 1995).

Rating of Threats:

Disturbance	Rating	Source
Clearing of native vegetation	3	Hoey & Lunt, 1995
Fragmentation of native veg.	3	Hoey & Lunt, 1995
Unplanned fire	2	Hoey & Lunt, 1995, SAC, 1992, final rec.
Introduced plants	3	Hoey & Lunt, 1995
Grazing/trampling	2	Hoey & Lunt, 1995, SAC, 1992, final rec.
Road construction/maintenance	3	Hoey & Lunt, 1995

Other: woody native plant invasion slashing	2 2	Hoey & Lunt, 1995, SAC, 1992, final rec. SAC, 1992, final rec.
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Current Management:

Hoey and Lunt (1995) Action Statement, Bramwell (1998) Action Statement Monitoring:

- Past management actions: sites were recognised in Railway Reserve Vegetation Management Plan and signposted; sites have been fenced to protect known plants and potential habitat; neighbouring landholders, Wellington Shire and Country Fire Authority have been advised of the significance of the site; parts of the rail line have been searched for the orchid; some potential replanting sites have been fenced; Adelaide Herbarium has propagated *Prasophyllum correctum* from seed; draft management statement for the site has been prepared; draft critical habitat determination is being prepared; part of the site was burnt as the start of an environmental burning program; a pamphlet and poster describing the significance of the rail line vegetation has been distributed through railway stations. Management prescriptions at Lindenow and Munro sites are being implemented. Sites are monitored annually. Ecological research being carried out at La Trobe University. Liaison with adjacent landholders, CFA and V/Line. Blackberry control carried out. Burning program is reducing the number of small trees. Pamphlet about Gippsland grasslands has been produced and distributed.
- Intended management actions: develop and implement management prescriptions for the known site of *Prasophyllum correctum* in conjunction with V/Line; search other grassland sites on railway reserves for the orchid; monitor all known populations at flowering time; upgrade signposting at the site; fence and signpost re-establishment sites; encourage research into ecological requirements of the orchid including appropriate fire regimes, pollinators, methods of enhancing recruitment, propagation and previous distribution of the orchid; increase existing population by replanting; establish new populations at five other sites; monitor success of re-establishment; maintain plants *ex situ* by Botanic Gardens; support volunteers in managing the habitat of the orchid; liaise with V/Line to ensure awareness of the conservation values of the rail line and the location and management of the site; develop a Public Authority Management Agreement with V/Line; ensure Wellington Shire and CFA are involved in management and that works affecting the orchid are approved by NRE; liaise with neighbouring landholders; control and eradicate environmental weeds using ecologically sensitive methods, with high priority to controlling Blackberry and St Johns Wort; remove selected native saplings which have invaded the grassland; exclude domestic grazing animals from known and potential sites of the orchid; burn the site every 2 to 3 years preferably in Autumn to ensure the orchid is not outcompeted by Kangaroo Grass; rationalise firebreaks along rail line; maintain native vegetation links between current and potential sites; declare known and proposed replanting sites as critical habitat.

Maroon Leek-orchid

Prasophyllum frenchii

Family: Orchidaceae

Species Characteristics: Terrestrial geophyte. Leaf single, terete, to 60 cm long, erect, slender to stout, green with a purplish base. Flower stem to 60 cm tall, slender to stout, green to reddish-green. Flowers 20-60, sub-sessile, to 8 mm across, fragrant, arranged in a relatively dense spike; colour variable, usually greenish with reddish tonings to almost entirely reddish (Backhouse & Jeanes, 1995).

Conservation Status:

ROTAP: vulnerable

VROTS: endangered

FFG: listed

ESP: listed

RESERVATION STATUS			RARITY
% of CRA population in biological conservation reserve	% of CRA population in other public land	% of CRA population on private land	% Australian population within RFA Region
20	0	80	25-50

Distribution in Gippsland RFA Region: Found on the lowland Gippsland plains at Woodside Aerodrome (SAC, 1996, nom.), Golden Beach, Briagolong, Lindenow and in Wilsons Promontory National Park (J. Jeanes). Widespread, disjunct occurrence across southern Victoria. It is also found in South Australia (Backhouse & Jeanes, 1995; Willis, 1970).

Habitat: Scattered through cooler parts of Victoria both in sandy coastal heathlands and more open inland forest tracts, ascending to the sub-alps (Willis, 1970). Found mostly as loose colonies in grasslands, heathlands and grassy woodlands on moderately rich sandy and black clay loams (Backhouse & Jeanes, 1995).

Life History: All species of *Prasophyllum* are deciduous. Plants are dormant during summer and sprout after good autumn rains to form a short, filiform leaf. *P. frenchii* flowers from October to December. Species of *Prasophyllum* are mainly pollinated by bees and wasps, which are attracted to the flower by perfumes and nectar released from the labellum. Many other insects are also attracted to the flowers and some of these probably contribute to pollination of the flowers (Jones, 1988). Asexual reproduction in this species is unknown. *P. frenchii* requires occasional ('natural') disturbance for regeneration, establishment and spread. Between such events the plants may appear to be absent. In response to fire this species is an optional root resprouter where most plants survive fire and resprout from underground tubers, in addition to a significant re-establishment from seed germination (Cheal, RFA database).

Threatening Processes operating in GIPPSLAND RFA Region:

- Historically, *Prasophyllum frenchii* has declined in abundance and distribution because of habitat destruction and grazing. Most of its former habitat, especially native grasslands and grassy woodlands on fertile plains has been affected by agricultural uses (SAC, 1996, nom.).
- Weed invasion from surrounding agricultural land and grazing are threats to the species (SAC, 1997, final rec., SAC, 1996, nom.).
- Sites are prone to soil disturbance caused by maintenance work and ploughing for fire hazard management (SAC, 1997, final rec., SAC, 1996, nom.).
- Changes in fire hazard management on road and rail reserves from controlled burning to spraying has contributed to the decline of the species (SAC, 1996, nom.).
- It occurs on road and rail reserves and rural airfields, which are insecure for nature conservation (SAC, 1996, nom.).

Rating of Threats:

Disturbance	Rating	Source
Clearing of native vegetation	2	SAC, 1996, nom.
Fragmentation of native veg.	3	SAC, 1996, nom.
Lack of fire	2	SAC, 1996, nom.
Introduced plants	3	SAC, 1997, final rec.
Grazing/trampling	2	SAC, 1996, nom.
Weed control	3	SAC, 1997, final rec.
Road construction/maintenance	3	SAC, 1997, final rec.
Other: ploughing for fire hazard management	3	SAC, 1997, final rec.

Current Management:

Parks Victoria (1998) The Lakes National Park & Gippsland Lakes Coastal Park Management Plan

- Actively manage significant species where required
- Include sites of flora significance on a Sites of Significance register
- Encourage flora surveys and investigation of the ecology of significant communities

Parks Victoria (1997) Wilsons Promontory National Park Management Plan

- Rare and threatened flora will be protected through appropriate fire management and control programs for pest plant and animals.
- Environmental research and monitoring will be promoted.
- A comprehensive Environmental Management Plan for the Park will be developed and implemented.

Mignonette Leek-orchid

Prasophyllum morganii

Family: Orchidaceae

Species Characteristics: Terrestrial geophyte. Leaf single, terete, to 25 cm long, erect, stout, green, reddish at base. Flower stem to 25 cm tall, stout, green to reddish. Flowers 20-80, to 8 mm across, fragrant, in dense, crowded spike; green with purplish stripes and tonings, labellum lamina white, pink or purple, callus green (Backhouse & Jeanes, 1995).

Conservation Status:

ROTAP: vulnerable

VROTS: endangered

FFG: not listed

ESP: listed

RESERVATION STATUS			RARITY
% of CRA population in biological conservation reserve	% of CRA population in other public land	% of CRA population on private land	% Australian population within RFA Region
100	0	0	0-25

Distribution in GIPPSLAND RFA Region: Until recently presumed extinct in Victoria as it was last collected at the type locality near Cobungra in 1933 and numerous subsequent searches had failed to find the species. A single small colony was rediscovered in Victoria in 1990 near Mt Cobberas. Also occurs in the Kosciuszko National Park in New South Wales (Backhouse & Jeanes, 1995).

Habitat: The Cobungra site is at 1000m altitude, on a slope above a creek. The vegetation is an open forest of Snow Gum (*Eucalyptus pauciflora*), with an understorey of Mountain Mirbelia (*Mirbelia oxylobioides*) and Kangaroo Grass (*Themeda triandra*) (VROTPOP).

Life History: Perennial that dies back annually to underground tuberoles. These are dormant during the hotter summer months and begin to shoot in response to late autumn rains. Flowers in November and December, more prolifically following hot summer fires (Backhouse & Jeanes, 1995). Species of *Prasophyllum* are mainly pollinated by bees and wasps, which are attracted to the flower by perfumes and nectar released from the labellum. Many other insects are also attracted to the flowers and some of these probably contribute to pollination of the flowers (Jones, 1988). Sexual reproduction, and subsequent establishment from seeds. Asexual reproduction and establishment occurs occasionally. Regeneration is not dependent on particular rare or unpredictable events, but natural disturbances are tolerated. In response to fire, the species is a facultative root resprouter; most plants survive fire and resprout from dormant buds, but there is also a significant re-establishment from seed germination (Cheal, RFA database).

Threatening Processes operating in GIPPSLAND RFA Region:

- The reasons for its decline may be that a small amount of clearing was carried out, the 1939 bushfire which changed the vegetation structure from an open understorey, and rabbits overran the area in the 1940's (VROTPOP).

Rating of Threats:

Disturbance	Rating	Source
Clearing of native vegetation	1	VROTPOP
Unplanned fire	2	VROTPOP
Introduced animals	2	VROTPOP

Current Management:

DCE (1992d) Alpine National Park Cobbers-Tingaringy Unit Management Plan

- Planned management for all nationally threatened plant species: sites are to be included in the Special Protection Zone and will be managed with the aim of ensuring the survival of the significant species; a 'management statement' will be prepared, which will define the precise boundary of each site/area, and will provide management prescriptions covering conservation, monitoring, recreation, productive uses and other management activities; fire suppression, fuel reduction burning and the control of pest plants and animals will take into account the presence of significant species; efforts will be made to collate information on species distribution, ecology and threats, and known populations of significant species will be monitored.

Slender Mud Grass

Pseudoraphis paradoxa

Family: Poaceae

Species Characteristics: Rhizomatous and stoloniferous annual or perennial. Stems decumbent, culms weakly ascending, to 50 cm high; nodes glabrous. Leaves glabrous to sparsely ciliate; blade flat, 3-8 cm long, 2-8 mm wide, 3-5 nerves; ligule membranous. Panicle or raceme linear, 2-8 cm long, lower branches appressed to main axis. Spikelets shortly pedicellate, narrow-lanceolate, mostly 6-10 mm long, most subtended by scabrous bristle to c. 2 cm long (Walsh, 1994).

Conservation Status:

ROTAP:

VROTS: endangered

FFG: final recommendation for listing

ESP: not listed

RESERVATION STATUS			RARITY
% of CRA population in biological conservation reserve	% of CRA population in other public land	% of CRA population on private land	% Australian population within RFA Region
	100	0	0-25

Distribution in GIPPSLAND RFA Region: South-west shore of Lake Glenmaggie near Heyfield and Colquhoun State Forest (SAC, 1996, nom.). Mostly found between Nowa Nowa and the mouth of the Snowy River. Also Queensland and New South Wales (Walsh, 1994).

Habitat: The species is found in near-coastal, sometimes slightly brackish, creeks and swamps with sandy, peaty or silty substrates. It grows prostrate on mud associated with perennial aquatics such as Tall Spike-sedge (*Eleocharis sphacelata*), Yellow Bladderwort (*Utricularia australis*), Milfoil (*Myriophyllum* spp.) and Pondweed (*Potamogeton* spp.) (SAC, 1996, nom.).

Life History: Facultative annuals, biennials or short-lived perennials. Sexual reproduction, and subsequent establishment from seed. Asexual reproduction and establishment occurs commonly. Regeneration is not dependent on particular rare or unpredictable events, but natural disturbances are tolerated. The species occurs in habitat not normally subject to fire (Cheal, RFA database).

Threatening Processes operating in GIPPSLAND RFA Region:

- Very little is known about the ecology of the species, and therefore whether it is susceptible to threats such as grazing or weed invasion (SAC, 1996,nom).
- As it relies on wetland habitats it is susceptible to alteration of this environment caused by changes to hydrology, salinity and nutrient levels or trampling by introduced stock (SAC, 1996, nom).
- Potential threats to the Colquhoun State Forest population are damage from four-wheel-drive vehicles and trail bikes, road widening and alteration to creek flow (VROTPOP).

Rating of Threats:

Disturbance	Rating	Source
Grazing/trampling	2	SAC, 1996, nom.
Road construction/maintenance	1	VROTPOP
Recreation	1	VROTPOP
Dams/alteration to water regimes	2	SAC, 1996, nom.

Current Management:

No active management

Leafy Greenhood

Pterostylis cucullata

Family: Orchidaceae

Species Characteristics: Terrestrial geophyte. Leaves 3-7 in a ground-hugging, stem-encircling basal rosette, ovate to elliptic, 4-10 cm long, 1.5-2 cm wide, dark green, petiole short. Flower stem to 20 cm tall, stout, fleshy, with several large, elliptical stem leaves, the uppermost often ensheathing base of flower. Flower solitary, to 40 mm long, white and green, heavily suffused with red-brown (Jones, 1994; Backhouse & Jeanes, 1995).

Conservation Status:

ROTAP: vulnerable

VROTS: vulnerable

FFG: listed; Action Statement

ESP: listed

RESERVATION STATUS			RARITY
% of CRA population in biological conservation reserve	% of CRA population in other public land	% of CRA population on private land	% Australian population within RFA Region
90	0	10	25-50

Distribution in GIPPSLAND RFA Region: The species is found in the northern part of Wilsons Promontory National Park, Moormung Flora Reserve and Crown land at Omeo (VROTPO). Elsewhere the species is widespread across southern coastal Victoria and extends into montane areas of the Eastern Highlands and East Gippsland. It also occurs in South Australia, Tasmania and New South Wales (Backhouse & Jeanes, 1995).

Habitat: The Wilsons Promontory sites are on low sand dunes, with sandy humus soils. A shrubland of Coast Tea-tree (*Leptospermum laevigatum*) and Sallow Wattle (*Acacia longifolia*) provides a damp, shady habitat for the orchid. The understorey is dominated by Upright Guinea-flower (*Hibbertia stricta*) with a sparse herb layer. At Moormung the orchid grows in an open forest of Forest Red Gum (*Eucalyptus tereticornis*) with an understorey of Blady Grass (*Imperata cylindrica*) and Spiny-headed Mat-rush (*Lomandra longifolia*) (VROTPO). Elsewhere this species grows in a variety of vegetation and soil types as it ranges from stabilised coastal sand dunes to montane areas (Bramwells, 1993).

Life History: *P. cucullata* is summer-deciduous, dying back after flowering to a fleshy rounded tuberoid. Several extra tuberoids may also be produced. It remains dormant underground for one of the longest periods of any Greenhood species. In Victoria the taxon displays two distinct behaviours associated with distribution: inland and coastal. Plants in coastal populations appear above ground from late autumn to early winter and commence flowering towards the end of winter, whilst the inland populations emerge later in winter and commence flowering in spring (Bramwells, 1993). Asexual reproduction and establishment occurs commonly. 'Natural' disturbances, such as fires, floods, or occasional browsing/grazing are tolerated but regeneration is not dependent on such disturbance. In response to fire *P. cucullata* is an obligate root resprouter where many plants survive fire and resprout from underground tubers, and there is minimal re-establishment from seed germination (Cheal, RFA database).

Threatening Processes operating in GIPPSLAND RFA Region:

- Weed invasion threatens the species (Bramwells, 1993).
- The species is regarded as having a relatively low seed production and as a consequence low reproductive rates (Bramwells, 1993).
- Grazing by rabbits at Wilsons Promontory threaten the species (Bramwells, 1993).
- It is very sensitive to competition from other plants (Bramwells, 1993).
- Plants close to a management track at Wilsons Promontory may be damaged by vehicles (Bramwells, 1993).
- Collection and trampling of habitat by enthusiasts is a threat to *P. cucullata* (Bramwells, 1993).
- Grazing by cattle, was previously considered a serious threat (SAC, 1991, final rec.).

Rating of Threats:

Disturbance	Rating	Source
Introduced animals	2	Bramwells, 1993
Introduced plants	2	Bramwells, 1993
Grazing/trampling	1	SAC, 1991, final rec.
Road construction/maintenance	1	Bramwells, 1993
Recreation	2	Bramwells, 1993
Deliberate collecting/harvesting	2	Bramwells, 1993
Reproductive problems	1	Bramwells, 1993
Other: plant competition	2	Bramwells, 1993

Current Management:

Parks Victoria (1997) Wilsons Promontory National Park Management Plan

- Rare and threatened flora will be protected through appropriate fire management and control programs for pest plant and animals.
- Environmental research and monitoring will be promoted.
- A comprehensive Environmental Management Plan for the Park will be developed and implemented.

Bramwells (1993) Action Statement, [Beecham *et al.* \(1997\)](#) Action Statement Monitoring

- Past management actions: monitoring existing populations, searching for new populations.
- Intended management actions: determine critical habitat; monitor all populations annually during flowering period; search in areas where there are historic records of the orchid; where necessary protect populations with fences; evaluate management requirements of Gippsland populations; carry out weed control where required; reduce the impact of rabbit grazing at Wilsons Promontory; encourage local conservation groups to carry out surveys; encourage research into the biology of the species.

Dwarf Kerrawang

Rulingia prostrata

Family: Sterculiaceae

Species Characteristics: Prostrate shrub with trailing branches to c. 2 m long. Leaves ovate or cordate, 1-3.5 cm long, 0.5-2.5 cm wide, stellate-hairy, margins conspicuously serrate or crenate. Inflorescence 3-12 flowered. Flowers stellate-hairy, with 5 sepals, 2.5-3.5 mm long, 5 petals, half as long. Capsule 5-valved, stellate-hairy (Short, 1996).

Conservation Status:

ROTAP: endangered

VROTS: vulnerable

FFG: listed

ESP: listed

RESERVATION STATUS			RARITY
% of CRA population in biological conservation reserve	% of CRA population in other public land	% of CRA population on private land	% Australian population within RFA Region
0	30	70	75-100

Distribution in GIPPSLAND RFA Region: Known from the Gippsland plains between Traralgon and Bairnsdale, but now surviving only in The Billabong Reserve east of Providence Ponds, and on two private land sites, adjacent to Holey Plains State Park and at Lindenow South (SAC, 1992, nom., VROTPOP). The species has recently disappeared from Blond Bay State Game Reserve and Moormung Flora Reserve (VROTPOP). Also found in New South Wales (SAC, 1992, nom.).

Habitat: Margins of lowland swamps and creeks in wet heathland or sedge-dominated vegetation, on peaty soils. Common associates include Pithy Sword-sedge (*Lepidosperma longitudinale*), Coarse Twine-rush (*Leptocarpus brownii*) and Prickly Tea-tree (*Leptospermum continentale*) (SAC, 1992, nom.).

Life History: Perennial. Flowers in October and November (Short, 1996). Sexual reproduction, with establishment from seeds, occurs only occasionally. It may be limited to a few seasons because of dormancy within the propagules, habitat requirements or because establishment needs the temporary removal of competitors. Asexual reproduction is unknown. It tolerates occasional major disturbance, and requires such disturbance for the rare opportunity to establish and spread. In response to fire, the species is an obligate seed regenerator; all or nearly all plants are killed by fire, and regeneration is solely from seed (Cheal, RFA database). The species appears to be a post-disturbance coloniser that germinates on disturbed sites and is readily outcompeted by other understorey species (VROTPOP).

Threatening Processes operating in GIPPSLAND RFA Region:

- Clearing on private land (SAC, 1992, final rec.).
- Stock grazing in a reserve (SAC, 1992, final rec.).
- Alteration to drainage patterns (SAC, 1992, final rec.).
- Fragmentation of wetland habitat (SAC, 1992, nom.).
- Erosion, macropod and rabbit grazing on Holey Plains property (VROTPOP).
- Weeds invasion and control, road maintenance and earth works on the Lindenow South property (VROTPOP).
- Weed invasion and potential competition by other native species at Billabong Reserve (VROTPOP).

Rating of Threats:

Disturbance	Rating	Source
Clearing of native vegetation	3	SAC, 1992, final rec.
Fragmentation of native veg.	2	SAC, 1992, nom.
Introduced animals	2	VROTPOP
Introduced plants	2	VROTPOP
Grazing/trampling	2	SAC, 1992, final rec., VROTPOP
Weed control	2	VROTPOP
Road construction/maintenance	2	VROTPOP
Dams/alteration to water regimes	2	SAC, 1992, final rec.
Other: plant competition	2	VROTPOP

Current Management:

Parks Victoria (1998) The Lakes National Park & Gippsland Lakes Coastal Park Management Plan

- Actively manage significant species where required
- Map the Park's vegetation and include sites of flora significance on a Sites of Significance register
- Encourage flora surveys and investigation of the ecology of significant plant communities

VROTPOP

- Fencing of the Holey Plains private land population, to restrict further damage and encourage regeneration. Some replanting.
- Collection of seed from the Lindenow South population.
- Small exclusion plot at Billabong Reserve.
- Monitoring

Metallic Sun-orchid

Thelymitra epipactoides

Family: Orchidaceae

Species Characteristics: Terrestrial geophyte. Leaf single, lanceolate, to 25 cm x 25 mm, erect, thick and fleshy, channelled, green with a reddish base. Flower stem to 50 cm tall, stout, brownish-green, with several large, loosely sheathing bracts. Flowers 5-20, to 40 mm across, bronze, pink, green, blue or reddish with a metallic lustre; column yellow-tipped, hair tufts white. Perianth segments very broadly ovate, thick textured (Backhouse & Jeanes, 1995).

Conservation Status:

ROTAP: endangered

VROTS: endangered

FFG: listed

ESP: listed

RESERVATION STATUS			RARITY
% of CRA population in biological conservation reserve	% of CRA population in other public land	% of CRA population on private land	% Australian population within RFA Region
90	10	0	0-25

Distribution in GIPPSLAND RFA Region: The species is found in the Gippsland Lakes Coastal Park and Blond Bay State Game Reserve (VROTPOP). Most populations are located in the west of Victoria (SAC, 1989, nom.). Coastal and hinterland areas west from Bairnsdale, but extending well inland in the far-western part of Victoria. Also found in South Australia (Backhouse & Jeanes, 1995)

Habitat: The species is found in open heathland communities close to the coast, with sandy loam substrates. It seems to favour more open sites, which arise from various forms of disturbance (SAC, 1989, nom.). The orchid has been recorded on ecotonal sites between tall heathland dominated by Swamp Paperbark (*Melaleuca ericifolia*) and Prickly Tea-tree (*Leptospermum continentale*) and brackish herbfields with species such as Beaded Glass-wort (*Sarcocornia quinqueflora*) or sedgeland with species such as Coarse Twine-rush (*Leptocarpus brownii*) (VROTPOP).

Life History: Facultative annuals, biennials or short-lived perennials. Plants die back annually in the warm dry weather to underground tuberoids. Shoots emerge in response to autumn rains, and flowers appear in October and November. Flowering is enhanced by fires in the preceding summer, but this is not essential (Backhouse & Jeanes, 1995). Reduction of competition appears to be crucial to the species survival, either by burning during the dormant period or other forms of vegetation removal (Calder *et al* 1989). Seeds are short-lived (VROTPOP). Sexual reproduction, with establishment from seeds, occurs only occasionally. It may be limited to a few seasons because of dormancy within the propagules, habitat requirements or because establishment needs the temporary removal of competitors. Asexual reproduction is unknown. Regeneration is habitat dependent on particular rare or unpredictable events, and between such events plants may appear to be absent. It requires occasional major natural disturbance for the rare opportunity to establish and spread. In response to fire the species is a facultative root resprouter; most plants survive fire and resprout from dormant buds, but there is also significant re-establishment from seed germination (Cheal, RFA database).

Threatening Processes operating in GIPPSLAND RFA Region:

- Extensive clearing of habitat (SAC, 1989, nom.).
- Collection by orchid enthusiasts of both flowers and entire plants (SAC, 1989, nom., VROTPOP).
- Most populations are small or surrounded by alienated land and so are vulnerable to local extinction from sudden catastrophic events, such as grazing, bacterial infections, water-logging, accidental physical damage, inappropriate fire regimes (SAC, 1989, nom.).
- Competition from shrubs and perennial grasses in the absence of fire may eliminate suitable sites for seedling establishment and reduction of adult population numbers (SAC, 1989, nom., VROTPOP).
- Grazing by cattle in the past has affected some populations (SAC, 1989, nom.).
- Rabbits are a significant threat (SAC, 1989, nom.).
- The natural pollinator for the species, a native bee, appears to be absent from some sites on the coast where diversity of plants is lacking due to elimination of fire (SAC, 1989, nom.).
- Grazing by sheep that stray from private land into the Gippsland Lakes Coastal Park may have a detrimental impact (VROTPOP).
- Drainage works at Golden Beach may lower the water table, thus reducing salinity and allowing heath invasion (VROTPOP).

- Competition from alien grasses is possible if disturbance causes them to spread from track margins at Golden Beach (VROTPOP).

Rating of Threats:

Disturbance	Rating	Source
Clearing of native vegetation	3	SAC, 1989, nom.
Fragmentation of native veg.	3	SAC, 1989, nom.
Lack of fire	2	SAC, 1989, nom.
Introduced animals	3	SAC, 1989, nom.
Introduced plants	2	VROTPOP
Grazing/trampling	2	SAC, 1989, nom.
Deliberate collecting/ harvesting	3	SAC, 1989, nom.
Vandalism/human disturbance	2	VROTPOP; SAC, 1989, nom
Dams/alteration to water regimes	2	VROTPOP
Reproductive problems	2	SAC, 1989, nom.
Other: plant competition	2	VROTPOP

Current Management:

Parks Victoria (1998) The Lakes National Park & Gippsland Lakes Coastal Park Management Plan

- Actively manage significant species where required
- Map the Park's vegetation and include sites of flora significance on a Sites of Significance register
- Encourage flora surveys and investigation of the ecology of significant plant communities

Spiral Sun-orchid

Thelymitra matthewsii

Family: Orchidaceae

Species Characteristics: Terrestrial geophyte. Leaf single, to 10 cm x 10 mm, erect, ovate, rapidly narrowing to become linear, spirally twisted, dark green with purplish base, finely hairy. Flower stem to 20 cm tall, slender, dark green, basal half often reddish. Flower solitary, to 20 mm across, petals and labellum deep bluish-purple with darker stripes; sepals reddish-purple with darker stripes, column purplish with yellow apex (Backhouse & Jeanes, 1995).

Conservation Status:

ROTAP: vulnerable

VROTS: vulnerable

FFG: listed

ESP: listed

RESERVATION STATUS			RARITY
% of CRA population in biological conservation reserve	% of CRA population in other public land	% of CRA population on private land	% Australian population within RFA Region
0	100	0	0-25

Distribution in GIPPSLAND RFA Region: Mullungdung State Forest. It is found in lowland areas of southern Victoria and extends inland to the Grampians. The species is also known to occur in South Australia and New Zealand (SAC, 1993, nom., Backhouse & Jeanes, 1995).

Habitat: The species is found in open forests and woodlands, growing in well-drained sand and clay loams. At Mullungdung it is associated with Yellow Stringybark (*Eucalyptus muelleriana*), Silver Banksia (*Banksia marginata*) and Austral Bracken (*Pteridium esculentum*). It appears to grow best in areas where there has been disturbance (Backhouse & Jeanes, 1995).

Life History: Facultative annuals, biennials or short-lived perennials. Plants die back annually in the warm dry weather to underground tuberoids. Shoots emerge in response to autumn rains, and flowers appear in August and September. Flowering is enhanced by fires in the preceding summer, but this is not essential (Backhouse & Jeanes, 1995). Sexual reproduction, with establishment from seeds, occurs only occasionally. It may be limited to a few seasons because of dormancy within the propagules, habitat requirements or because establishment needs the temporary removal of competitors. Asexual reproduction is unknown. Regeneration is habitat dependent on particular rare or unpredictable events, and between such events plants may appear to be absent. It requires occasional major natural disturbance for the rare opportunity to establish and spread. In response to fire the species is a facultative root resprouter; most plants survive fire and resprout from dormant buds, but there is also significant re-establishment from seed germination (Cheal, RFA database).

Threatening Processes operating in GIPPSLAND RFA Region:

- The species occurs in small disjunct populations and is susceptible to unpredictable environmental catastrophes (SAC, 1993, final rec.).
- Total plant recruitment is from seed and apparently can only occur in areas with recent soil disturbance, and may die out in the absence of suitable conditions (SAC, 1993, nom.).
- However if soil disturbance is too severe, seedlings could be outcompeted by environmental weeds (SAC, 1993, nom.).
- Little is known of the biology of the species and hence management strategies are difficult to formulate (SAC, 1993, nom.).
- The species takes five years to mature, flower and produce seed and so is particularly susceptible to the loss of entire colonies before plants are able to reproduce (SAC, 1993, nom.).
- Inappropriate fire regimes are a potential threat (SAC, 1993, nom.).
- Illegal collection by orchid enthusiasts threatens the species (SAC, 1993, final rec.).

Rating of Threats:

Disturbance	Rating	Source
Fragmentation of native veg.	2	SAC, 1993, nom.
Lack of fire	2	SAC, 1993, nom.
Introduced plants	2	SAC, 1993, nom.
Weed control	2	SAC, 1993, nom.
Deliberate collecting/ harvesting	2	SAC, 1993, final rec.
Reproductive problems	2	SAC, 1993, nom.
Other: lack of suitable disturbance for recruitment	2	SAC, 1993, nom.

Current Management:

No active management

Austral Toad-flax

Thesium australe

Family: Santalaceae

Species Characteristics: Erect perennial herb to 40 cm high, pale green to yellow-green, glabrous; stems one to several, little branched, wiry, striate. Leaves linear, 1-4 cm long, 0.5-1.5 mm wide, sessile, lowest leaves scale-like. Flowers solitary, axillary, green-yellow, 5-petaled, campanulate or tubular; peduncle 1-3 mm long. Drupe small, nut-like, crowned by persistent tepals (Wiecek, 1992). It is a partial parasite and has small cup-like appendages which are attached to the roots of other plants (Archer, 1984).

AVW distribution map with CRA boundary

Conservation Status:

ROTAP: vulnerable

VROTS: endangered

FFG: listed; Action Statement

ESP: listed

RESERVATION STATUS			RARITY
% of CRA population in biological conservation reserve	% of CRA population in other public land	% of CRA population on private land	% Australian population within CRA region
100	0	0	0-25

Distribution in GIPPSLAND CRA Region: It occurs at Limestone Creek near Benambra. Once widespread through Victoria, being recorded from the south-west, north of Melbourne and in East Gippsland (Willis, 1972). Its distribution in East Gippsland includes Rocky Plain, Rocky Plains Creek, Mount Wombargo, Square Flat and First Emu Flat in the Alpine National Park (Cobberas-Tingaringy unit) and on private property west of Butchers Ridge (Gillingall) (SAC, 1989, nom., Archer, 1984, DCE, 1992d). Also occurs in New South Wales, Queensland, Tasmania and east Asia (Wiecek, 1992).

Habitat: Sub-alpine herbfields surrounding patches of wet heath (SAC, 1989, nom.). Soils are dark clay or peaty loams developed on igneous rocks. Grassy heathland dominated by Coral Heath (*Epacris microphylla*), Myrtle Tea-tree (*Leptospermum myrtifolium*), Mountain Cord-rush (*Restio australis*) and Tussock-grass (*Poa* spp.) with a species-rich, dense ground layer of herbs and grasses. It is not found in adjacent Snow Gum (*Eucalyptus pauciflora*) shrubby forest or *Sphagnum* bogs or *Poa* grassland or herbfield. The lower elevation site on private land occurs in Kangaroo Grass (*Themeda triandra*) grassland (Scarlett, La Trobe, 1980).

Life History: Biennial or short-lived perennial. Little is known of the biology of the species, but it is a hemiparasite, taking water and mineral salts from the roots of other plants. The absence of the species from dense shrub or tree covered areas suggests that it requires open conditions (Scarlett, La Trobe, 1980). Flowers in spring and summer (Wiecek, 1992). Sexual reproduction, and subsequent establishment from seeds. Asexual reproduction is unknown. Regeneration is habitat dependent on particular rare and unpredictable events, and between such events plants may appear to be absent. Post-fire response is unknown (Cheal, RFA database). The species has been observed to germinate well after fire, but adequate

regeneration does occur without fire where grassland is lightly grazed. Populations are subject to extreme fluctuations from year to year (Scarlett, Bramwell & Earl, 1994).

Threatening Processes operating in GIPPSLAND CRA Region:

- Habitat fragmentation and destruction caused by the agricultural practices of heavy grazing, cultivation and fire suppression is responsible for the decline of the species and its disappearance from the lowlands (Scarlett, Bramwell and Earl, 1994).
- It is grazed severely by cattle, horses, rabbits, kangaroos and wombats, and sometimes grasshoppers (Scarlett, Bramwell and Earl, 1994). Cattle and horses have the greatest impact through the combined effects of trampling, uprooting and grazing (SAC, 1989, nom.).
- The species may be threatened by summer fires as it has a late spring-early summer flowering period and seeds may not have developed (SAC, 1989, nom.).
- The only viable stand occurs on private land (Scarlett & Parsons, 1982)
- The greenhouse effect could result in a reduction of area of suitable habitat (Busby, 1988)

Rating of Threats:

	Disturbance	Rating	Source
1	Clearing of native vegetation	2	Scarlett <i>et al</i> , 1994
2	Fragmentation of native veg.	2	Scarlett <i>et al</i> , 1994
3	Timber harvesting		
4	Firewood collection		
5	Fuel reduction burning		
6	Unplanned fire	2	SAC, 1989, nom.
7	Lack of fire		
8	Introduced animals	2	Scarlett <i>et al</i> , 1994
9	Introduced plants		
10	Grazing/trampling	3	SAC, 1989, nom., Scarlett <i>et al</i> , 1994
11	Pest control		
12	Weed control		
13	Disease		
14	Road construction/maintenance		
15	Mining/quarrying		
16	Recreation		
17	Deliberate collecting/ harvesting		
18	Vandalism/human disturbance		
19	Dams/alteration to water regimes		
20	Reproductive problems		
	Other:greenhouse effect	2	Busby, 1988

Current Management:

- Monitored for VROTPOP database in past 5 years
DCE (1992d) Alpine National Park Cobberas-Tingaringy Unit Management Plan
- Planned management for all nationally threatened plant species: sites are to be included in the Special Protection Zone and will be managed with the aim of ensuring the survival of the significant species; a 'management statement' will be prepared, which will define the precise boundary of each site/area, and will provide management prescriptions covering conservation, monitoring, recreation, productive uses and other management activities; fire suppression, fuel reduction burning and the control of pest plants and animals will take into account the presence of significant species; efforts will be made to collate information on species distribution, ecology and threats, and known populations of significant species will be monitored.

- Planned management for *T.australe*: known populations will be monitored, threats to the species will be taken into account in the assessment of carrying capacity for grazing, research will be carried out into its ecology to determine the effects of fire on maintenance of habitat.

Scarlett *et al* (1994) Action Statement, Bramwell (1997) Action Statement Monitoring

- Past management actions: partial monitoring of existing sites; NRE consultation with private landholder to determine most effective management; a small population was re-established at Lake Omeo (a former location) where an area of *Themeda* grassland was fenced from cattle and the species was introduced via transplanting from another location, plants grown from seed and direct seeding, with about 50% survival rate. Blackberry spraying at Gillingall.
- Intended management actions: confirm localities, population size, habitats, associated vegetation, grazing and fire regimes for all five known populations; conduct an experimental burn at Rocky Plain and quantify germination response to fire, and if successful implement at other sites; monitor known sites; train NRE field staff in identification and monitoring techniques to assist in location of further populations; consult with private landholder about the most appropriate management, maintain the historical grazing and burning regime and provide financial support for Blackberry control; continue *ex site* conservation at La Trobe University and Royal Botanic Gardens; establish experimental plots of the species at two other sites through replanting and direct seeding; identify additional potential establishment sites on public land; encourage the placement of a conservation covenant on the title of the private property.

Fairy Bluebell

Wahlenbergia densifolia

Family: Campanulaceae

Species Characteristics: Perennial herb; spreading rhizomes; erect stems, 7-30 cm high, mostly unbranched. Leaves irregularly opposite, alternate or whorled, crowded, oblong, 3-15 mm long, margins flat, lower leaves pubescent, upper leaves glabrous. Flowers solitary on stalks 3-12 cm long. Sepals 2-4.5 mm long. Corolla blue to purple; tube 2.5-6.5 mm long; lobes 8-15 mm long. Capsule obconic, 3.5-8 mm long (Smith, 1992).

Conservation Status:

ROTAP:

VROTS: vulnerable

FFG: listed

ESP: not listed

RESERVATION STATUS			RARITY
% of CRA population in biological conservation reserve	% of CRA population in other public land	% of CRA population on private land	% Australian population within RFA Region
80	10	10	50-75

Distribution in GIPPSLAND RFA Region: Lankey Plain, Gow Plain and Omeo Plain on the Dargo High Plains in the Alpine National Park (Bogong Unit) and Nunniong Plain on the Nunniong Plateau. It is also found in the alpine areas of New South Wales (SAC, 1991, nom., DCE, 1992a).

Habitat: The species grows in open grassland and herbfield associated with a wide variety of dicotyledonous herbs and grasses, and occasionally in shrubland. Sites have rich loamy soils developed on basalt, at altitudes over 1200 m, and receive annual precipitation of more than 1000 mm mainly as snow (Scarlett, La Trobe, 1984).

Life History: Perennial. Flowers in summer (Smith, 1992). Sexual reproduction, and subsequent establishment from seeds. Asexual reproduction and establishment occurs commonly. It requires long periods without major disturbance for survival and establishment. The species occurs in habitats that are not normally subject to fire (Cheal, RFA database).

Threatening Processes operating in GIPPSLAND RFA Region:

- Low population levels makes it vulnerable to disturbance or degradation of habitat (SAC, 1991, nom.).
- The species occurs in areas where cattle grazing is heavy, but it is unclear what effect this has had (SAC, 1991, nom.).
- Rabbit grazing has had a severe impact on the species (SAC, 1991, final rec.).
- The greenhouse effect could result in a reduction of area of suitable habitat (Busby, 1988)

Rating of Threats:

Disturbance	Rating	Source
Introduced animals	2	SAC, 1991, final rec.
Grazing/trampling	1	SAC, 1991, nom.
Other: greenhouse effect	1	Busby, 1988

Current Management:

- Monitoring for VROTPOP database in past 5 years
- DCE (1992a) Alpine National Park Bogong Unit Management Plan
- Planned management for all nationally threatened plant species: sites are to be included in the Special Protection Zone and will be managed with the aim of ensuring the survival of the significant species; a 'management statement' will be prepared, which will define the precise boundary of each site/area, and will provide management prescriptions covering conservation, monitoring, recreation, productive uses and other management activities; fire suppression, fuel reduction burning and the control of pest plants and animals will take into account the presence of significant species; efforts will be made to collate information on species distribution, ecology and threats, and known populations of significant species will be monitored.
- Planned management for *W. densifolia*: efforts will be made to reduce the effects of rabbits on the species.

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APPENDIX F: Life History Parameters - Fauna Species

Note: Under the heading THREATS, disturbances are scored for each species. Assessments were made recognising that practices on public land follow minimum prescriptions required under the Code of Forest Practices for Timber Production (NRE 1996) and various State Acts and Regulations and that practices on private land are in accord with the *Planning and Environment Act 1987* and the *Catchment and Land Protection Act 1994*. However, the assessments do not take account of additional protection afforded in various Action Statements, Park management plans, nor any additional measures that may be established in the Gippsland Forest Management Plan which is currently in preparation. Disturbances are scored for each species as follows:

- Effect unknown;
- 0 Processes not likely to be operating as a threat or there is no information to suggest that it is a threat;
- 1 Process is a minor threat, which by itself is unlikely to lead to broad scale decline of the species;
- 2 Process is a moderate threat, which is likely to lead to some decline of the species, especially if it operates in combination with other threatening processes; and
- 3 Process is a major threat, which if not checked poses a significant risk to the viability of the species in Gippsland.

B I R D S

Regent Honeyeater

Xanthomyza phrygia

linked to regional patterns of flowering of key eucalypt species.

Source: Menkhorst (1997), P. Menkhorst pers. comm.

RARITY

a) Geographic Range

- Classification of range size within the Gippsland region: Medium
- Distribution of records within the Gippsland region: Scattered, patchy distribution with the majority of records from the south-west of the region.
- Number of 5 minute grid cells recorded from: 16
Source: Atlas of Victorian Wildlife

b) Abundance

- Classification of abundance: Low, likely to be only an occasional visitor to the region.
- Population Estimate: No more than 200 birds in Victoria
- Density: Unknown, exhibits low population density throughout range and distribution is extremely patchy.
- Home Range (ha): Nomadic/migratory
Source: Franklin *et al.* (1987), Menkhorst (1997)

c) Habitat Specificity

- Classification of habitat specificity: Narrow, appears to rely on nectar from a few key eucalypt species: Mugga Ironbark *Eucalyptus sideroxylon*, White Box *E. albens*, Yellow Box *E. melliodora* Yellow Gum *E. leucoxylon* and Blakely's Red Gum *E. blakelyi*. In Gippsland, the coastal forests, particularly the species Yertchuk *E. considaniana*, Yellow Stringybark *E. muellerana*, and White Stringybark *E. globoidea* are also important.
- Vegetation types inhabited in the region: Inhabits eucalypt woodlands and dry open-forest, as well as treed farmland and urban areas.
Source: Franklin *et al.* (1989), Menkhorst (1997)

DYNAMICS

Population Trend in Last Decade

- Increasing, stable or declined: Declined
Source: Franklin *et al.* (1987), Menkhorst (1993)

Population trend since discovery by Europeans

- Increasing, stable or declined: Declined
Source: Webster and Menkhorst (1992), Garnett (1992a), Menkhorst (1997)

SPATIAL DYNAMICS

a) Population variability

- Classification of population variability: High
Source: Menkhorst (1993)

b) Dispersal

- Classification of powers of dispersal: High; nomadic
- Average distances dispersed: Unknown, two birds recorded travelling 270 km
- Maximum distance dispersed: Unknown, possibly 100s of km
- Seasonal patterns of abundance and breeding

LIFE HISTORY PARAMETERS

a) Reproductive output

- Classification of reproductive output: Low
- Age of sexual maturity (yrs): 1
- Mean clutch/litter/brood size: 2-3
- Mean no of clutches/litters/broods per year: 1, occasionally more
- Time of year young born/hatch: July-February (mainly November-January) (in north-east Victoria)
Source: Menkhorst (1993), Ley *et al.* (1996), Menkhorst (1997)

b) Longevity

- Classification of lifespan: Unknown
- Average lifespan (yrs): Unknown
- Maximum lifespan (yrs): Probably around 10 years (oldest known bird 7 years)
Source: P. Menkhorst pers. comm.

c) Morphology

Adult body size

- Weight (g): 43
- Length (mm): 225
Source: Longmore (1991)

d) Social organisation

- Colonial or non-colonial: Nest in pairs, non-breeding form loose flocks—often loose aggregations of pairs
- Territoriality: Yes, nest tree and feeding site defence
Source: Franklin and Robinson (1989), Webster and Menkhorst (1992), Davis and Recher (1993)

e) Other

- Nomadic, migratory, sedentary: Nomadic/Migratory. Movement poorly understood. May be linked to food availability and could include semi-migratory longer distance movements between regions and local wanderings.
- Diet: Nectivore, insectivore
Source: Franklin *et al.* (1989), Ley *et al.* (1996)

THREATS

1. **Clearing of Native Vegetation:**
Rating (3)
Menkhorst (1997), P. Menkhorst pers. comm.
2. **Timber harvesting:**
Rating (2)
Garnett (1992b), Robinson (1994), Menkhorst (1997), P. Menkhorst pers. comm.
3. **Fuel Reduction Burning:**
Rating (-)

4. **Firewood Collection:**
Rating (2)
Ley and Williams (1992), Garnett (1992b), Menkhorst (1993)
5. **Unplanned Fire:**
Rating (2)
P. Menkhorst pers. comm.
6. **Introduced Species:**
Rating (1)
Franklin and Robinson (1989), Franklin *et al.* (1989), Menkhorst (1997), P. Menkhorst pers. comm.
7. **Grazing/Trampling:**
Rating (2)
Landsberg *et al.* (1990), Ford (1993), Grey (1995), P. Menkhorst pers. comm.
8. **Pest Control:**
Rating (-)
9. **Road Construction and Maintenance:**
Rating (1)
P. Menkhorst pers. comm.
10. **Mining/Quarrying:**
Rating (-)
11. **Tree Dieback:**
Rating (3)
P. Menkhorst pers. comm.
12. **Recreation:**
Rating (-)
13. **Illegal Collection/Harvesting:**
Rating (0)
P. Menkhorst pers. comm.
14. **Vandalism/Disturbance by Humans:**
Rating (-)
15. **Dams/Impoundments:** Rating (0)
P. Menkhorst pers. comm.
16. **Other: Interspecific competition:**
Rating (1)
Franklin and Robinson (1989), Ford *et al.* (1993), Menkhorst (1993), Grey *et al.* (1997), P. Menkhorst pers. comm.

Current Management:

The Regent Honeyeater is classified as "critically endangered" in Victoria (NRE 1999a), and is listed under the Victorian *Flora and Fauna Guarantee Act 1988* and the Commonwealth *Endangered Species Protection Act 1992*. An Action Statement (Menkhorst 1993) and Recovery Plan (Menkhorst *et al.* 1998) have been published for this species. On public land intended management actions include the exclusion of timber harvesting, mining and grazing from all known regularly used sites. Exclusion areas include a 100m wide disturbance-free zone surrounding the site, and a further 150m wide zone within which at least 10 habitat trees per hectare should be retained. Management of all public land containing the key eucalypt species will aim to at least maintain and preferably increase the number of mature trees. Road reserves currently being grazed under license within the species distribution will be re-assessed and where one or more of the key eucalypt species are locally indigenous, licensees will be assisted in the protection of the vegetation. Protection of roadside vegetation and the development of roadside management plans by local shires should be encouraged (Menkhorst 1993). Actions specified within the Recovery Plan relate to habitat management, population monitoring, ecological research, community participation and awareness, and captive management. An information package on habitat requirements and guidelines for habitat management will be produced and promoted to land managers. Patches of suitable habitat will be identified and mapped (Menkhorst *et al.* 1998).

Species Characteristics:

The Regent Honeyeater is a highly mobile species, which feeds on nectar and insects. It is most frequently recorded from box-ironbark habitat containing key eucalypt species such as Mugga Ironbark *E. sideroxylon*, White Box *E. albens*, Yellow Box *E. melliodora*, and Yellow Gum *E. leucoxylon*. Stands of these species growing on high-quality sites where nectar production is copious and relatively predictable appear to be critical to the survival of the

Regent Honeyeater. Movements appear to be more regular than previously thought, with seasonal patterns of abundance and breeding related to the regional flowering patterns of the key eucalypt species (Franklin *et al.* 1989, Ley 1990). Little is known about the life history of the Regent Honeyeater and although the regular occurrence of the species at some sites is well known, there is a current lack of understanding of movement patterns or the whereabouts of birds when they are absent from these known regular sites (Menkhorst 1997).

Distribution within the Gippsland RFA region

There are only 10 records of the Regent Honeyeater from 1970 onwards from the region; the most recent records are from private land near Glengarry West in 1979 and a post 1979 record from Bairnsdale. Other post 1970 records are from private land near Bairnsdale and Lake Victoria, State forest north of Bruthen, State forest near Cassilis and from the southern edge of Boola Boola State Forest. The majority of records, including pre 1970 records, are from between Bairnsdale and Metung (Atlas of Victorian Wildlife). Regent Honeyeaters were once regular spring and summer visitors to Gippsland but are now rarely recorded occasional visitors (Menkhorst 1993).

Disturbances and potentially threatening processes within the Gippsland RFA region:

A large proportion of the preferred habitat of the Regent Honeyeater has been cleared for agriculture and many of the remaining stands have been heavily harvested for timber (Menkhorst 1997). Sites are now found in small isolated remnants growing in farmland as well as a few more extensive patches on public land. Threats relate to further loss and degradation of existing habitat which may be caused by disturbances where clearing, firewood collection, fence post cutting and tree dieback (Garnett 1992b, Robinson 1994, Menkhorst 1997). In Gippsland, timber harvesting is also a threat to habitat, particularly clear felling in lowland forests (P. Menkhorst pers. comm.) Larger trees appear to be selected for nectar feeding (Webster and Menkhorst 1992) and birds are often recorded in small remnants that have not experienced intensive silviculture (including loss of large trees). Grazing by stock and rabbits prevents the regeneration of habitat. The presence of stock also contribute to tree dieback by causing elevated nutrient levels leading to an abundance of defoliating insects (Landsberg *et al.* 1990). The loss of high quality sites and habitat fragmentation creates the potential for competition for nectar with other honeyeater species and from the introduced Honey Bee (Franklin *et al.* 1989, Franklin and Robinson 1989, Grey *et al.* 1997).

Swift Parrot

Lathamus discolor

RARITY

a) Geographic Range

- Classification of range size within the Gippsland region: Large
- Distribution of records within the Gippsland region: Records are patchily distributed over the study area with the majority from the central portion of the region.
- Number of 5 minute grid cells recorded from: 26
Source: Atlas of Victorian Wildlife

b) Abundance

- Classification of abundance: Low
- Population Estimate: Unknown, probably less than 2000 birds in Victoria; 1277 birds were recorded in Victoria during the 1996 over-winter survey.
- Density: Unknown
- Home Range (ha): Nomadic, migratory species.
Source: Brown (1989), Tzaros and Davidson (1996), Tzaros (1997), C. Tzaros pers. comm.

c) Habitat Specificity

- Classification of habitat specificity: Narrow
- Vegetation types inhabited in the region: Eucalypt forests and woodlands; favour habitats

containing the winter flowering eucalypt species: Grey Box *Eucalyptus microcarpa*, Red Ironbark *E. tricarpa*, Mugga Ironbark *E. sideroxylon*, Yellow Gum *E. leucoxyton* and White Box *E. albens*. Red Gum woodland is important to the species within the Gippsland RFA region. The species may also occur in wooded farmlands and suburban parks. Rarely seen in treeless areas, rainforests and wet forests. Source: Emison *et al.* (1987), Webster (in prep), C. Tzaros pers. comm.

DYNAMICS

Population Trend in Last Decade

- Increasing, stable or declined: Declined
Australia wide population census 1320 pairs (1989), 940 pairs (1995)
Source: Brereton (1996)

Population trend since discovery by Europeans

- Increasing, stable or declined: Declined
Source: SAC (1991c), Garnett (1992b)

SPATIAL DYNAMICS

a) Population variability

- Classification of population variability: High
Presence linked to flowering patterns of eucalypts and presence/absence of lerp or other alternative food sources.
Source: Robinson (1994), Tzaros and Davidson (1996), Tzaros (1997)

b) Dispersal

- Classification of powers of dispersal: High
- Average distances dispersed: Birds migrate from Tasmania to south eastern Australia each winter
- Maximum distance dispersed: 100s km
Source: Brereton (1996)

LIFE HISTORY PARAMETERS

a) Reproductive output

- Classification of reproductive output: High.
Breeding success is variable as it is dependent on Blue Gum flowering at Tasmanian breeding sites
- Age of sexual maturity (yrs): Possibly 2 years
- Mean clutch/litter/brood size: 4-5 eggs
- Mean no of clutches/litters/broods per year: 1
- Time of year young born/hatch: October-December
Source: Forshaw and Cooper (1981), Brereton (1996)

b) Longevity

- Classification of lifespan: Unknown, possibly long-lived
- Average lifespan (yrs): 6-7 years
- Maximum lifespan (yrs): Unknown
Source: R. Brereton in Tasmanian-Commonwealth RFA (1996)

c) Morphology

Adult body size

- Weight (g): 77
- Length (mm): 236
- Source: Brereton (1996)

d) Social organisation

- Colonial or non-colonial: Non-colonial; nesting pairs, also gregarious and occasionally flock at rich over-wintering food sources.
- Territoriality: No
Source: Brereton (1996), C. Tzaros pers. comm.

e) Other

- Nomadic, migratory, sedentary: Non-breeding winter migrant to Victoria
- Diet: Primarily nectivore, psyllids and lerps are also important components of the diet. Wattle racemes and eucalypt fruits, buds and shoots are also eaten.
Source: Brereton (1996), Tzaros and Davidson (1996), Tzaros (1997)

THREATS

1. Clearing of Native Vegetation:

Rating (3)

Brown (1989), Garnett (1992b), C. Tzaros pers. comm.

2. Timber harvesting:

Rating (2)

Garnett (1992b), C. Tzaros pers. comm.

3. Fuel Reduction Burning:

Rating (-)

4. Firewood Collection:

Rating (2)

Robinson (1994), Garnett (1992b), C. Tzaros pers. comm.

5. Unplanned Fire:

Rating (-)

6. Introduced Species:

Rating (1)

C. Tzaros pers. comm.

7. Grazing/Trampling:

Rating (2)

Landsberg *et al.* (1990), Robinson (1994), C. Tzaros pers. comm.

8. Pest Control:

Rating (-)

9. Road Construction and Maintenance:

Rating (1)

C. Tzaros pers. comm.

10. Mining/Quarrying:

Rating (-)

Webster (in prep)

11. Tree Dieback:

Rating (2)

Landsberg *et al.* (1990), Webster (in prep), C. Tzaros pers. comm.

12. Recreation:

Rating (-)

13. Illegal Collection/Harvesting:

Rating (-)

14. Vandalism/Disturbance by Humans:

Rating (-)

15. Dams/Impoundments:

Rating (0)

C. Tzaros pers. comm.

16. Other: Interspecific Competition:

Rating (-)

Brown (1989), Tzaros and Davidson (1996), C. Tzaros pers. comm.

Current Management:

The Swift Parrot is classified as "endangered" in Victoria (NRE 1999a), and is listed under the Victorian *Flora and Fauna Guarantee Act 1988*. An Action Statement is currently being prepared (Webster in prep). The species is also listed under the Commonwealth *Endangered Species Protection Act 1992* and an Australia wide Recovery Plan has been published (Brereton 1996). Recovery objectives for the overwintering population include the identification, mapping and management of foraging habitat, and population monitoring. In Victoria, annual overwinter surveys commenced in 1995 (Tzaros and Davidson 1996, Tzaros 1997). Surveys concentrate on sites where Swift Parrots had been regularly recorded as well as sites that contain the preferred winter flowering eucalypts and included part of the Gippsland RFA region.

Species characteristics:

The Swift Parrot is a gregarious arboreal nectivore that breeds in Tasmania and overwinters on the mainland. The species is generally recorded in Victoria from March to October (Tzaros and Davidson 1996). Its distribution is restricted to areas of autumn and winter flowering eucalypts particularly Grey Box *Eucalyptus microcarpa*, Red Ironbark *E. tricarpa*, Mugga Ironbark *E. sideroxylon*, Yellow Gum *E. leucoxyton* and White Box *E. albens* (Hindwood and Sharland 1964, Brown 1989, Robinson 1994). The movements and presence of birds in an area is variable and appears related to the flowering of these key eucalypt species. Within Victoria, the greatest concentrations of Swift Parrots are from the north-east and central regions of the state, centred on the box-ironbark forests (Blakers *et al.* 1984, Emison *et al.* 1987, Tzaros and Davidson 1996).

Distribution within the Gippsland RFA region:

Swift Parrots are infrequently recorded within the Gippsland RFA region. Most records are in the vicinity of Bairnsdale, Paynesville, Kalimna West and Metung where Red Ironbark is well represented (Emison *et al.* 1987). The most western record of the species within the region is from near Burndale. It has also been recorded from the Wilsons Promontory National Park in the south and from near Porphyry

Hill in the north east of the region. Other records are from State forest and private land generally north of the Princes Highway between Stockdale, Glenaladale and Hillside. Swift Parrots have also been recorded from Mitchell River National Park (Atlas of Victorian Wildlife). It is possible the Tambo and Snowy River valleys may be corridors for birds moving to and from wintering habitat in New South Wales (Emison *et al.* 1987).

Disturbances and potentially threatening processes operating within the Gippsland RFA region:

There has been a substantial loss of overwintering habitat within Victoria as a result of past clearing for agriculture and the survival of Swift Parrots is now largely dependent on the habitat quality of the remaining stands (Webster in prep). Large old trees which produce high nectar yields in winter are a significant food resource in Victoria (Brereton 1996). Disturbances such as clearing of native vegetation, and forest management activities where post cutting and firewood collection result in habitat loss, particularly of large old trees are significant threats to the species in Gippsland. Red Gum woodland provides important habitat for Swift Parrots in Gippsland. Firewood collection in this habitat is potentially a moderate threat to the species in the region. Disturbances that contribute to the degradation of habitat remnants such as inappropriate fire regimes, salinity, Tree Dieback and grazing (Landsberg *et al.* 1990), also constitute significant threats to the species. Drainage lines may constitute important habitat for Swift Parrots, and gold mining activities, which often focus on drainage lines, may result in loss of habitat (Tzaros 1997, Webster in prep). Illegal harvesting and displacement by aggressive nectar feeding birds may also constitute threats to the species although the significance of these disturbances is unknown (C. Tzaros pers. comm.).

Square-tailed Kite

Lophoictinia isura

RARITY

a) Geographic Range

- Classification of range size within the Gippsland region: Small
- Distribution of records within the Gippsland region: Two records from the south-west of the region near Lakes Entrance and Colquhoun, and one record from Holey Plains State Park
- Number of 5 minute grid cells recorded from: 3
Source: Atlas of Victorian Wildlife

b) Abundance

- Classification of abundance: Low
- Population Estimate: Estimated 20-50 breeding pairs in Victoria
- Density: Approximately 1 pair/1200 km²
- Home Range (ha): 7000 ha for one pair in Queensland during a one year period
Source: Debus and Silveira (1989), Baker-Gabb pers. comm. in Garnett (1992a), G. Czechura pers. comm. in Garnett (1992a), C. Silveira pers. comm.

c) Habitat Specificity

- Classification of habitat specificity: Wide
- Vegetation types used in the region: Tall open-forest, open-forest and woodland (recorded from the Heathy Woodland EVC). In Victoria generally not recorded from extensively cleared areas, extensive naturally treeless areas, alpine areas, nor from small southerly remnant forests isolated by extensive treeless areas. Nested in Manna Gum *Eucalyptus viminalis* and Blue Gum *E. bicostata* in Victoria.
Source: Debus and Silveira (1989), Borella and Borella (1997)

DYNAMICS

Population Trend in Last Decade

- Increasing, stable or declined: Unknown
Source: C. Silveira pers. comm.

Population trend since discovery by Europeans

- Increasing, stable or declined: Likely decline in southern Australia commensurate with broad-scale habitat clearance for agriculture and urban development
Source: Debus and Silveira (1989), Garnett (1992a)

SPATIAL DYNAMICS

a) Population variability

- Classification of population variability: Unknown
Source: R. Loyn pers. comm.

b) Dispersal

- Classification of powers of dispersal: High
- Average distances dispersed: No banding records, but absence from Victoria during winter suggests movements of many hundreds of kilometres.
- Maximum distance dispersed: 14 km by a juvenile, about eight weeks after fledging.
Source: Debus and Silveira (1989), Debus and Czechura (1989), Marchant and Higgins (1993)

LIFE HISTORY PARAMETERS

a) Reproductive output

- Classification of reproductive output: Low
- Age of sexual maturity (yrs): 2-3
- Mean clutch/litter/brood size: 2.2 eggs (n=79)
- Mean no. of clutches/litters/broods per year: 1
- Time of year young born/hatch: Spring
Source: Schodde and Tidemann (1986), Debus and Czechura (1989), Fraser (1993), Marchant and Higgins (1993), Olsen and Marples (1993), Borella and Borella (1997)

b) Longevity

- Classification of lifespan: Probably long-lived
- Average lifespan (yrs): Unknown
- Maximum lifespan (yrs): >15
Source: Marchant and Higgins (1993)

c) Morphology Adult body size

- Weight (g): Female 590-680 (n=4), male 501 (n=1)
- Length (mm): Female 550-560, male 500-510
Source: Marchant and Higgins (1993), Olsen *et al.* (1993a)

d) Social organisation

- Colonial or non-colonial: Non-colonial; usually solitary, but well dispersed monogamous pairs when nesting, and sometimes small family groups after fledging.
- Territoriality: Territorial when breeding
Source: Schodde and Tidemann (1986), Debus and Czechura (1989), Debus and Silveira (1989), Debus *et al.* (1992)

e) Other

- Nomadic, migratory, sedentary: Migratory in Victoria
- Diet: Mainly carnivore (mostly nestling passerines)
Source: Schodde and Tidemann (1986), Debus and Czechura (1989), Debus and Silveira (1989)

THREATS

1. Clearing of Native Vegetation:

Rating (2)

Debus and Czechura (1989), Debus *et al.* (1992), Garnett (1992a), C. Silveira pers. comm.

2. Timber harvesting:

Rating (2)

Debus and Czechura (1989), Debus and Silveira (1989), C. Silveira pers. comm.

3. Fuel Reduction Burning:

Rating (2)

Christensen and Kimber (1975), Wooler and Brooker (1980), Debus and Czechura (1989), C. Silveira pers. comm.

4. Firewood Collection:

Rating (1)

C. Silveira pers. comm.

5. Unplanned Fire:

Rating (2)

Recher *et al.* (1985), C. Silveira pers. comm.

6. Introduced Species:

Rating (0)

C. Silveira pers. comm.

7. Grazing/Trampling:

Rating (1)

- C. Silveira pers. comm.
8. Pest Control:
Rating (-)
Olsen *et al.* (1993b), C. Silveira pers. comm.
 9. **Road Construction and Maintenance:**
Rating (1)
C. Silveira pers. comm.
 10. Mining/Quarrying:
Rating (-)
C. Silveira pers. comm.
 11. **Tree Dieback:**
Rating (1)
C. Silveira pers. comm.
 12. Recreation:
Rating (-)
C. Silveira pers. comm.
 13. **Illegal Collection/Harvesting:**
Rating (2)
Jolly (1989), Garnett (1992a), Marchant and Higgins (1993), C. Silveira pers. comm.
 14. **Vandalism/Disturbance by Humans:**
Rating (2)
Jolly (1989), Garnett (1992a), C. Silveira pers. comm.
 15. Dams/Impoundments:
Rating (0)
C. Silveira pers. comm.

Current Management:

The Square-tailed Kite is classified as "endangered" in Victoria (NRE 1999a). Forest management plans for the forest management areas (Tambo and Central Gippsland) included in the Gippsland RFA region are in preparation. There are no species-specific threat-ameliorating management prescriptions for this species within the Gippsland RFA region.

Species characteristics:

The Square-tailed Kite is a medium-sized, long-winged bird of prey, which occurs in low densities in Victoria; it arrives in spring, breeds, then departs northward in autumn (Debus and Czechura 1989, Debus and Silveira 1989). The Square-tailed Kite uses traditional nest sites and constructs nests in eucalypts, usually near water (Debus and Czechura 1989, Debus and Silveira 1989, Debus *et al.* 1992, Marchant and Higgins 1993, Borella and Borella 1997). It has a specialised diet consisting mainly of passerine nestlings and eggs taken from nests in the outer foliage of the canopies of eucalypts in tall open-forest, open-forest and woodland (Debus and Czechura 1989). Ecotones are important foraging habitat for the Square-tailed Kite because they provide tree cover while allowing access to nests of prey located laterally in trees (Debus and Czechura 1989, Marchant and Higgins 1993).

Distribution in the Gippsland region:

The Square-tailed Kite has been recorded from three localities within the region: from State forest near Lakes Entrance, State forest north of Colquhoun and from Holey Plains State Park (Atlas of Victorian Wildlife).

Disturbances and potentially threatening processes operating in the Gippsland region:

For successful breeding, the Square-tailed Kite relies on both an adequate supply of prey, particularly nestling passerines, and tall trees in traditional nesting areas (Debus and Czechura 1989, Fraser 1993, Borella and Borella 1997). Most threats to the Square-tailed Kite relate to the loss or disturbance of those critical resources (Debus and Czechura 1989, Debus and Czechura 1992). Habitat clearance is a significant threat to the Square-tailed Kite as it results in habitat loss and fragmentation and a consequent loss of prey. Similarly, timber harvesting where it severely modifies habitat and affects prey densities is also a threat. Wildfire is known to reduce species richness and number of birds (Recher *et al.* 1985) consequently affecting prey availability as well as hunting and nesting habitat. Similarly, annual fuel reduction burns may have an adverse effect on forest

and woodland bird communities and may cause prey shortages (Debus and Czechura 1992). Due to the small size of the Square-tailed Kite population, its low recruitment rate and its use of traditional nest sites (Copper and Copper 1981, Debus and Czechura 1989, Fraser 1993, Borella and Borella 1997), egg-collection is potentially a significant threat (Garnett 1992a, Marchant and Higgins 1993), as is illegal shooting (Jolly 1989).

Grey Goshawk

Accipiter novaehollandiae

RARITY

a) Geographic Range

- Classification of range size within the Gippsland region: Medium
- Distribution of records within the Gippsland region: Scattered records from the south-west of the study area and a small concentration of records in the south-east corner of the region.
- Number of 5 minute grid cells recorded from: 23
Source: Atlas of Victorian Wildlife

b) Abundance

- Classification of abundance: Low
- Population Estimate: Fewer than 200 breeding pairs in Victoria.
- Density: Estimated at 2-3 pairs/100 km² in Tasmania in optimum habitat with little disturbance.
- Home Range (ha): Unknown, possibly core areas of about 1000 ha.
Source: Mooney and Holdsworth (1988), C. Silveira pers. comm.

c) Habitat Specificity

- Classification of habitat specificity: Generally narrow for breeding, but wide for those individuals that occasionally disperse great distances. In Victoria, breeding is largely limited to gullies in southern tall-open forest (eg. Otway Ranges and Gippsland Plains).
- Vegetation types inhabited in the region: wet forests and gullies (including those containing Mountain Grey Gum *E. cypellocarpa*), riparian forest, occasionally woodlands, dry forest, suburban parks and wooded farmlands. Nested in a Blue Gum in Gippsland.
Source: Hollands (1984), Olsen and Olsen (1985), Emison *et al.* (1987)

DYNAMICS

Population Trend in Last Decade

- Increasing, stable or declined: Unknown
Source: R. Loyn pers. comm.

Population trend since discovery by Europeans

- Increasing, stable or declined: Likely decline in southern Australia commensurate with large-scale habitat clearance.
Source: Lumsden *et al.* (1991), C. Silveira pers. comm.

SPATIAL DYNAMICS

a) Population variability

- Classification of population variability: Unknown
Source: R. Loyn pers. comm.

b) Dispersal

- Classification of powers of dispersal: High
- Average distances dispersed: Unknown, but vagrants routinely appear hundreds of km from the "normal" range (eg. Robinvale area, Victoria).
- Maximum distance dispersed: 79 km by a banded individual.
Source: Emison *et al.* (1987), Baker *et al.* (1997)

LIFE HISTORY PARAMETERS

a) Reproductive output

- Classification of reproductive output: Low
- Age of sexual maturity (yrs): 2-3
- Mean clutch/litter/brood size: 2.4 eggs (n=104)
- Mean no. of clutches/litters/broods per year: 1 (Mooney and Holdsworth (1988) suggest one third of adults may not breed in any one year).
- Time of year young born/hatch: September-December

Source: Hollands (1984), Schodde and Tidemann (1986), Olsen and Marples (1993), Marchant and Higgins (1993), Burton *et al.* (1994)

b) Longevity

- Classification of lifespan: Probably long-lived
- Average lifespan (yrs): Unknown
- Maximum lifespan (yrs): At least 12
Source: Hollands (1984)

c) Morphology Adult body size

- Weight (g): Female 530-894 (n=11), male 283-422 (n=5)
- Length (mm): Female 500-550, male 380-420
Source: Marchant and Higgins (1993), Olsen *et al.* (1993a)

d) Social organisation

- Colonial or non-colonial: Non-colonial; monogamous pairs
- Territoriality: Territorial when breeding
Source: Marchant and Higgins (1993)

e) Other

- Nomadic, migratory, sedentary: Established pairs sedentary; other individuals disperse widely.
- Diet: Carnivorous, occasional necrophagus and insectivorous.
Source: Hollands (1984), Mooney (1987), Marchant and Higgins (1993)

THREATS

1. Clearing of Native Vegetation:

Rating (2)

Olsen and Olsen (1985), C. Silveira pers. comm.

2. Timber harvesting:

Rating (2)

C. Silveira pers. comm.

3. Fuel Reduction Burning:

Rating (2)

C. Silveira pers. comm.

4. Firewood Collection:

Rating (1)

C. Silveira pers. comm.

5. Unplanned Fire:

Rating (2)

C. Silveira pers. comm.

6. Introduced Species:

Rating (0)

C. Silveira pers. comm.

7. Grazing/Trampling:

Rating (1)

C. Silveira pers. comm.

8. Pest Control:

Rating (2)

Mooney (1988), C. Silveira and R. Loyn pers. comm.

9. Road Construction and Maintenance:

Rating (1)

Mooney and Hunt (1983), Mooney (1988), C. Silveira pers. comm.

10. Mining/Quarrying:

Rating (-)

C. Silveira pers. comm.

11. Tree Dieback:

Rating (1)

C. Silveira pers. comm.

12. Recreation:

Rating (1)

C. Silveira pers. comm.

13. Illegal Collection/Harvesting:

Rating (-)

C. Silveira pers. comm.

14. Vandalism/Disturbance by Humans:

Rating (2)

Mooney and Hunt (1983), Mooney (1987), C. Silveira pers. comm.

15. Dams/Impoundments:

Rating (0)

C. Silveira pers. comm.

Current Management:

The Grey Goshawk is classified as "lower risk - near threatened" in Victoria (NRE 1999a). Forest management plans for the forest management areas (Tambo and Central Gippsland) included in the Gippsland RFA region are in preparation. There are no species-specific threat-ameliorating management

prescriptions for this species within the Gippsland RFA region.

Species Characteristics:

The Grey Goshawk is generally uncommon throughout its range and its population comprises two colour forms, one white and the other grey (Schodde and Tidemann 1986). It is adapted for life in closed forest where it hunts within or just above the canopy by making short flights from perches; it may also hunt in nearby open country (Olsen and Olsen 1985, Mooney and Holdsworth 1988, Olsen *et al.* 1990). In Tasmania, adult Grey Goshawks are known to primarily use old-growth wet forests for hunting and nesting. Some individuals may also nest in mixed-age or young regrowth forest if old-growth trees are present. In Victoria, successful nests are known from remnant patches of forest in the Otway Ranges (Mooney 1987). Nest sites are often near water (Mooney and Holdsworth 1988, Brereton and Mooney 1994). The Grey Goshawk has a generalised diet which includes mainly mammals, such as rabbits, possums and bats, as well as birds, reptiles, amphibians and insects; it occasionally takes carrion (Hollands 1984, Marchant and Higgins 1993).

Distribution in the Gippsland RFA Region:

The majority of records are scattered south of the Princes Highway in the south-east of the region in the Strzelecki Ranges and the Gippsland Plains where breeding has been recorded (Emison *et al.* 1987). There is a small concentration of records in the south-east corner of the region between Bairnsdale and Lakes Entrance. Other records are in the vicinity of Cheyn's Bridge and Glenmaggie. The species has been recorded from State forest and from private land, often close to State forest (Atlas of Victorian Wildlife).

Disturbances and potentially threatening processes operating in the Gippsland RFA Region:

The Grey Goshawk predominantly utilises older age-classes of forest for nesting and foraging. Habitat clearance, in addition to leading to a loss of nesting and foraging habitat, may also increase the incidence of hybridisation between the Grey Goshawk and the Brown Goshawk *A. fasciatus* (Hollands 1984, Olsen and Olsen 1985). Timber harvesting can convert older age-classes of forest to young regrowth stands causing the loss of both nesting and foraging habitat (Mooney 1987, Mooney 1988, Mooney and Holdsworth 1988). Wildfire may also result in a loss of nesting and foraging habitat. Given that the Grey Goshawk sometimes nests in forest remnants (Mooney 1987, Brereton and Mooney 1994); clearance of those remnants for agriculture may reduce nesting and foraging habitat. Frequent cool prescribed burns reduce habitat quality by simplifying the structure and removing the resources used by prey species (Catling 1991). In Victoria, where the Grey Goshawk is known to take rabbits from farmland near forest edges, culling of rabbits through pest control measures may have an adverse effect on the Grey Goshawk population (R. Loyn pers. comm.). Illegal shooting of birds is considered a significant threat in Tasmania (Brereton and Mooney 1994) and although the extent of this threatening process in the Gippsland region is unknown, it could constitute a significant threat given the small population size within the region. Other threats include secondary poisoning through consumption of baited prey and contamination by pesticides (Mooney 1988, Mooney and Holdsworth 1988). While the Grey Goshawk may tolerate some level of disturbance near nest sites (e.g. selective logging, limited road building), nests are deserted following intense/direct disturbance (Mooney and Holdsworth 1988).

White-bellied Sea-Eagle

Haliaeetus leucogaster

RARITY

a) Geographic Range

- Classification of range size within region: Medium
- Distribution of records within region: The majority of records are from the south of the region running along the coast, with a cluster of records in the south-east corner of the study area (Gippsland Lakes area).
- Number of 5 minute grid cells recorded from: 75
Source: Atlas of Victorian Wildlife

b) Abundance

- Classification of abundance: Low
- Population Estimate: Unknown, possibly 100 breeding pairs or less in Victoria; 54 territories including 35 nest sites known for East Gippsland and Gippsland RFA regions. Of these, 25 active nests were recorded within the Gippsland region between Gippsland lakes and Corner Inlet.
- Density: In the Gippsland Lakes area, active nests are on average 7.5 km apart. In Mallacoota Inlet (East Gippsland RFA region), active nests are on average 3.4 km apart.
- Home Range (ha): Unknown in Victoria, in Tasmania adult home range approximately 100 km², defends a smaller nesting territory of approximately 5 km².
Source: Mooney (1986), R. Bilney pers. comm. in Clunie (1994), Williams (1998)

c) Habitat Specificity

- Classification of habitat specificity: Wide
- Vegetation types inhabited in the region: Usually nests near water, in tall live or dead trees (including Forest Red Gum *E. tereticornis*, Southern Mahogany *E. botryooides*, Mountain Grey Gum *E. cypellocarpa*, Blue Gum *E. globulus*, Coast Grey Gum and Stringybark). Usually tall open-forest and woodland, may occur in open areas (grassland, heath) and urban areas, rarely within dense vegetation. Active nests have been recorded from: Lowland Forest, Coast Banksia Woodland, Coastal Grassy Woodland, Poa Grassland, Damp Forest, Riparian Forest, Limestone Box Forest, Melaleuca scrub, remnant trees in largely cleared paddocks and rocky outcrops.
Source: Emison and Bilney (1982), Marchant and Higgins (1993), Williams (1998)

DYNAMICS

Population Trend in Last Decade

- Increasing, stable or declined: Unknown
- Source: P. Clunie pers. comm.

Population trend since discovery by Europeans

- Increasing, stable or declined: Declined
Source: Mooney (1986), Marchant and Higgins (1993)

SPATIAL DYNAMICS

a) Population variability

- Classification of population variability: Low
Source: Dennis and Lashmar (1996)

b) Dispersal

- Classification of powers of dispersal: High
- Immature birds may disperse widely
- Average distances dispersed: Unknown
- Maximum distance dispersed: One bird has been recorded moving 1824 km over a six-year period.
Source: Emison *et al.* (1987), Baker *et al.* (1997)

LIFE HISTORY PARAMETERS

a) Reproductive output

- Classification of reproductive output: Low
- Age of sexual maturity (yrs): 4-5 years
- Mean clutch/litter/brood size: 1-2 eggs
- Mean no of clutches/litters/broods per year: 1
- Time of year young born/hatch: July-October (in Gippsland Lakes area)
Source: Bilney and Emison (1983), Mooney (1986)

b) Longevity

- Classification of lifespan: Long-lived
- Average lifespan (yrs): Unknown
- Maximum lifespan (yrs): Unknown, possibly 17 years

Source: Mooney (1986)

c) Morphology Adult body size

- Weight (g): Female 3100-3900g, male 2000-2420g
- Length (mm): Female 800-850 mm, male 750-770 mm
Source: Olsen *et al.* (1993a)

d) Social organisation

- Colonial or non-colonial: Generally alone or in pairs
- Territoriality: Defend small territory around nest during breeding season
- Source: Marchant and Higgins (1993)

e) Other

- Nomadic, migratory, sedentary: Sedentary, established pairs
- Diet: Carnivore, opportunistic
Source: Marchant and Higgins (1993)

THREATS

1. Clearing of Native Vegetation:

Rating (3)

Bilney and Emison (1983), Mooney (1986), Williams (1998), A. Williams pers. comm.

2. Timber harvesting:

Rating (2)

Marchant and Higgins (1993), Olsen *et al.* (1993a), A. Williams pers. comm.

3. Fuel Reduction Burning:

Rating (-)

4. Firewood Collection:

Rating (2)

A. Williams pers. comm.

5. Unplanned Fire:

Rating (-)

6. Introduced Species:

Rating (0)

Clunie (1994)

7. Grazing/Trampling:

Rating (2)

P. Clunie pers. comm.

8. Pest Control:

Rating (2)

Mooney and Hunt (1982), Olsen *et al.* (1993b), Clunie (1994), Falkenberg (1994), Williams (1997), A. Williams pers. comm.

9. Road Construction and Maintenance:

Rating (2)

Williams (1997), A. Williams pers. comm.

10. Mining/Quarrying:

Rating (2)

A. Williams pers. comm.

11. Tree Dieback:

Rating (2)

Williams (1998)

12. Recreation:

Rating (3)

Mooney (1986), Dennis and Lashmar (1996), A. Williams pers. comm.

13. Illegal Collection/Harvesting:

Rating (-)

14. Vandalism/Disturbance by Humans:

Rating (2)

Mooney and Hunt (1982), Bilney and Emison (1983), Mooney (1986), Hunt and Mooney (1993), Nermut *et al.* (1995), Dennis and Lashmar (1996), A. Williams pers. comm.

15. Dams/Impoundments:

Rating (0)

16. Other: Interspecific Competition:

Rating (-)

Clunie (1994), Wiersma (1996)

Current Management:

The White-bellied Sea-Eagle is classified as "endangered" in Victoria (NRE 1999a) and is listed under the *Flora and Fauna Guarantee Act 1988*. An Action Statement for the species has been prepared (Clunie 1994). Intended management actions include: annual surveys of known breeding sites to determine breeding success over time, identify population trends, determine critical habitat, encourage research particularly in relation to heavy metal levels in the species and the effect of food chain contamination on survival and reproduction, undertake a population

viability analysis once more information is known about dispersal activity, protect known nest sites including buffer zones which will be incorporated into Forest Management Plans and encourage protection of breeding sites on private land through extension programs or conservation covenants. Nest trees are currently protected within the region by a 500 m exclusion zone (A. Williams pers. comm.). Forest management plans are in preparation for the Forest Management Areas (Tambo and Central Gippsland) incorporated in the Gippsland RFA region.

Species Characteristics:

White-bellied Sea-Eagles occur in low densities over much of Victoria, the majority of records are from the Gippsland area and the Murray River (Atlas of Victorian Wildlife). Preferred inland habitats include large open terrestrial wetlands, deep freshwater swamps, lakes, reservoirs and billabongs (Marchant and Higgins 1993). Breeding pairs are mostly sedentary and defend a breeding territory within a much larger home range. Traditional nest sites are used although territories usually contain several alternative sites (Mooney 1986). Nests are usually found near water, in tall live or dead trees. However, in areas where there is no suitable habitat near water, active nests have been recorded up to 3.5 km from feeding areas (Williams 1998). White-bellied Sea-Eagles are opportunistic carnivores that hunt over open terrestrial habitats as well as over water; prey includes birds, reptiles, fish, mammals, crustaceans and carrion (Marchant and Higgins 1993).

Distribution in the Gippsland RFA Region:

The Gippsland coast is a stronghold of the White-bellied Sea-Eagle (Williams 1997). Within the Gippsland RFA region, the majority of records of the species are from the Gippsland Lakes in the vicinities of Paynesville, Bairnsdale, Metung and Lakes Entrance and from near Lake Wellington. Other coastal records include Wilsons Promontory National Park, Waratah Bay and Corner Inlet, Snake Island, Little Snake Island, Jack Smith Lake, Griffard, Seaspray and Lake Reeve, Seacombe and Loch Sport. The species has also been recorded from several major rivers including the Tambo, Latrobe, Mitta Mitta, Perry and Mitchell Rivers and from the Moondarra Reservoir. There are also isolated records from the Mitta Mitta River upstream from the Dartmouth Dam. White-bellied Sea-Eagles have been recorded from several State Game Reserves including Dowds Morass, Blond Bay, Sale Common, and Heart Morass as well as from State forest (eg. Colquhoun State Forest) (Atlas of Victorian Wildlife). Active nest sites have been located in the Gippsland Lakes area (14 nests), South Gippsland area (2 nests), Corner Inlet area (3 nests) and Wilsons Promontory area (4 nests). A number of the nests are on private land; approximately 40% of active nest sites within the Gippsland Lakes region located during the 1996 monitoring period were on private property (Williams 1997, 1998).

Disturbances and potentially threatening process operating in the Gippsland RFA Region:

White-bellied Sea-Eagles are sensitive to disturbance, particularly during the breeding season when disturbance can lead to abandonment of nests and reduced breeding success (Dennis and Lashmar 1996, Williams 1997). Any activities including recreation activities (e.g. four-wheel driving, hiking, and fishing), timber harvesting, mining/quarrying, road construction and maintenance and clearing within 200-300 m of nest trees during the breeding season are highly likely to cause nest abandonment. Sea-Eagles have been known to abandon nests and young during a photographic session. The proximity of humans during monitoring of nests is also known to have adverse effects (A. Williams pers. comm.). Breeding pairs are sedentary and are also sensitive to disturbances including timber harvesting and clearing which reduce important habitat components such as nest trees (Mooney 1986). A significant proportion of active nests known from the region are on private land (Williams 1997, 1998) and loss of

habitat as a result of clearing is a major threat to the species (A. Williams pers. comm.). Increased agricultural activity subsequent to clearing of native vegetation near nests may also result in abandonment (Dennis and Lashmar 1996). Clearing of forests from the shores of Lakes King, Victoria and Wellington has resulted in loss of nest sites or in some pairs attempting to nest in sub-optimal habitats. Under these conditions breeding success can be reduced (Emison and Bilney 1982, Bilney and Emison 1983, Williams 1997). In addition, loss of potential nest sites as a result of tree dieback and lack of regeneration of future habitat due to grazing are potentially significant issues for the species on private land (Williams 1998). Eggshell thinning has been recorded due to past DDT use; while this may not have caused significant population declines (Olsen *et al.* 1993b), it is an issue to be considered. Deliberate shooting has been recorded (Mooney 1986) although the significance of this threat within Gippsland is unknown. The significance of poisoning (direct or secondary), and food chain contamination by heavy metals are unknown although they may contribute to the decline of the species. A pair of poisoned White-bellied Sea-Eagles, most likely a result of eating a baited carcass, have been recorded from the region (Bilney and Emison 1983, Clunie 1994). Competition with Wedge-tailed Eagles for nest sites and food has been recorded although its significance is not known. However, it may be an indication that suitable nest sites are a limiting resource (Clunie 1994, Wiersma 1996, P. Clunie pers. comm.).

Barking Owl

Ninox connivens

RARITY

a) Geographic Range

- Classification of range size within the Gippsland region: Unknown
- Distribution of records within the Gippsland region: Scattered records from the central and southern areas of the region.
- Number of 5 minute grid cells recorded from: 13
Source: Atlas of Victorian Wildlife

b) Abundance

- Classification of abundance: Low
- Population Estimate: Unknown, fewer than 50 breeding pairs in Victoria.
- Density: Unknown, sparsely distributed and possibly <1 pair/100 km²
- Home Range (ha): Defends a small territory (30-200 ha) in which they nest and roost within a much larger home range (foraging range), which may be greater than 1000 ha; known individuals have been observed hunting up to 5 km from their roosts.
Source: Schodde and Mason (1980), Silveira (1997a)

c) Habitat Specificity

- Classification of habitat specificity: Narrow
- Vegetation types inhabited in the region: The majority of Gippsland records are close to forest/farmland ecotones. Across the state the species has been recorded mainly from drier Box Ironbark habitats as well as riparian River Red Gum habitats and woodlands, open forest and wooded farmlands. Rarely recorded from wet forest and then usually only near clearings.
Source: Schodde and Mason (1980), Emison *et al.* (1987), P. Peake in Robinson (1994)

DYNAMICS

Population Trend in Last Decade

- Increasing, stable or declined: Unknown
Source: C. Silveira pers. comm.

Population trend since discovery by Europeans

- Increasing, stable or declined: Declined
Source: Bridley (1991), Robinson (1994)

SPATIAL DYNAMICS

a) Population variability

- Classification of population variability: Low
Source: R. Loyn and E. McNabb pers. comm.

b) Dispersal

- Classification of powers of dispersal: High

- Average distances dispersed: Unknown
- Maximum distance dispersed: Unknown
Some may be dispersive, linked to fluctuations in food

Source: Robinson (1994), R. Loyn pers. comm.

LIFE HISTORY PARAMETERS

a) Reproductive output

- Classification of reproductive output: Low
- Age of sexual maturity (yrs): >2 years
- Mean clutch/litter/brood size: 1-3 eggs
- Mean no of clutches/litters/broods per year: 1
- Time of year young born/hatch: July-November
Source: Schodde and Mason (1980), Robinson (1994)

b) Longevity

- Classification of lifespan: Probably long-lived
- Average lifespan (yrs): Unknown
- Maximum lifespan (yrs): Captive individual known to live for 20 years
Source: E. McNabb pers. comm.

c) Morphology

Adult body size

- Weight (g): 425-485 females, 425-510 males
- Length (mm): 370-440 females, 350-450 males
Source: Schodde and Mason (1980)

d) Social organisation

- Colonial or non-colonial: Non-colonial; breeding pairs
- Territoriality: Yes
Source: Schodde and Mason (1980)

e) Other

- Nomadic, migratory, sedentary: Sedentary
- Diet: Carnivore, insectivore
Source: Schodde and Mason (1980)

THREATS

1. Clearing of Native Vegetation:
Rating (-)
Schodde and Mason (1980), Robinson (1994),
E. McNabb pers. comm.
2. Timber harvesting:
Rating (-)
3. Fuel Reduction Burning:
Rating (-)
4. Firewood Collection:
Rating (-) Robinson (1994)
5. Unplanned Fire:
Rating (-)
6. Introduced Species:
Rating (-)
7. Grazing/Trampling:
Rating (-)
8. Pest Control:
Rating (-)
9. Road Construction and Maintenance:
Rating (-)
10. Mining/Quarrying:
Rating (-)
11. Tree Dieback:
Rating (-)
12. Recreation:
Rating (0)
E. McNabb pers. comm.
13. Illegal Collection/Harvesting:
Rating (0)
14. Vandalism/Other Human Disturbance:
Rating (0)
15. Dams/Impoundments:
Rating (0)

Current Management:

The Barking Owl is classified as "endangered" in Victoria (NRE 1999) and has received a final recommendation for listing under the Victorian *Flora and Fauna Guarantee Act* 1988. There is currently no Action Statement for this species and a forest management plan for the forest management areas (FMAs) incorporated in the Gippsland RFA region (Central Gippsland, Tambo). Is currently in preparation. Recent systematic surveys for large owls within the Central Gippsland and Tambo failed to record Barking Owl (R. Loyn pers. comm.).

Species characteristics:

The Barking Owl is mainly recorded in dry, open forest and woodlands and wooded farmlands; frequently in habitat with moderate tree cover including wooded farmland near forests or along ecotones of large forest blocks (Emison *et al.* 1987, P. Peake pers. comm. in Robinson 1994). The species appears to have a preference for hunting in open habitat (Robinson 1994) but roosts among dense vegetation. The Barking Owl exhibits a wide dietary flexibility, medium-sized mammals and birds including rabbits, gliders, kookaburras, magpies and parrots are commonly taken. Small mammals such as bats, and lizards, frogs and insects are also eaten (Schodde and Mason 1980, Conole 1985). Mammals and/or birds appear to dominate the diet during the breeding season, while a relatively greater proportion of insects are taken during the non-breeding season (Kavanagh *et al.* 1995, Debus 1997, Debus *et al.* 1998). The Barking Owl is a sedentary species and pairs occupy large home ranges. Birds primarily nest in large, hollow-bearing trees (Schodde and Mason 1980). Recent studies on the abundance and distribution of large owls within Victoria have confirmed the extreme rarity of the Barking Owl (R. Loyn pers. comm.).

Distribution within the Gippsland RFA region:

There are a small number of scattered Barking Owl records from the Gippsland RFA region. The species has been recorded from Mullungdung, Camp, Flynn and Culloden State Forests and from Tom's Cap in State forest near Willig, as well as private land near Boisdale, Metung, Allambiee, The Finger Boards and Tarwin Lower. The majority of records are close to forest/farmland ecotones (Atlas of Victorian Wildlife). However, it is likely that a proportion of these records are mis-identifications. A recent survey of the Central Gippsland and Tambo FMAs did not detect Barking Owl and although there may be a population within the region it is likely to be very small (R. Loyn and C. Silveira pers. comm.).

Disturbances and potentially threatening process operating in the Gippsland RFA Region:

Due to the uncertainty associated with Barking Owl records within the region and the lack of information on habitat use, the significance of disturbances on the population within the region are largely unknown. In other regions loss and fragmentation of habitat through clearing was identified as a potentially significant threat as was a reduced availability large hollow-bearing trees, used by the species for nesting, as a result of timber harvesting and firewood collection. Other identified threats included: grazing, loss of rabbits as a food source as a result of pest control, competition for prey from introduced predators such as foxes and fire prevention activities that prevent habitat regeneration and result in loss of habitat of the owl's prey and consequently prey (see East Gippsland, Central Highlands and North East CRA Biodiversity reports).

Powerful Owl

Ninox strenua

RARITY

a) Geographic Range

- Classification of range size within the Gippsland region: Large
- Distribution of records within the Gippsland region: Widespread
- Number of 5 minute grid cells recorded from: 87
Source: Atlas of Victorian Wildlife

b) Abundance

- Classification of abundance: Low
- Population Estimate: Unknown, less than 500 pairs within Victoria, possibly less than 100 pairs in the Gippsland RFA region.
- Density: Unknown, between 1 pair per 103 km² and one pair per 58 km² estimated for public land in the East Gippsland FMA. Recorded from 95 of 516 survey sites within the Tambo and Central Gippsland FMAs in the mid-late 1990s.

- Home Range (ha): 300 - >1000, dependent on habitat and availability of prey. Radiotracking studies in box ironbark forests near Bendigo found a home range of at least 1000 ha. Source: Seebeck (1976), Garnett (1992b), McNabb (1996), McIntyre and Henry (in prep.), E. McNabb and T. Soderquist pers. comm.

c) Habitat Specificity

- Classification of habitat specificity: Wide, but requires tree hollows for nesting.
- Vegetation types inhabited in the region: Recorded from a wide range of forest types including tall open-forests, open-forests and woodlands across a range of EVCs. Has also been recorded from the drier Box Ironbark habitats and from riparian River Red Gum habitat in other regions. Source: Traill (1993), Gibbons (1995), Silveira (1997b), Loyn *et al.* (in prep.)

DYNAMICS

Population Trend in Last Decade

- Increasing, stable or declined: Stable
Source: E. McNabb pers. comm.

Population trend since discovery by Europeans

- Increasing, stable or declined: Declined
Source: Garnett (1992a)

SPATIAL DYNAMICS

a) Population variability

- Classification of population variability: Low
Source: R. Loyn pers. comm.

b) Dispersal

- Classification of powers of dispersal: High
- Average distances dispersed: Unknown
- Maximum distance dispersed: Unknown
Source: Schodde and Mason (1980)

LIFE HISTORY PARAMETERS

a) Reproductive output

- Classification of reproductive output: Low
- Age of sexual maturity (yrs): 2 in captivity, in the wild age at first breeding may be later due to the hunting skills required by the male to provide for the female and offspring.
- Mean clutch/litter/brood size: 1.4
- Mean no of clutches/litters/broods per year: 1
- Time of year young born/hatch: July-September
Source: Fleay (1968), Schodde and Mason (1980), Debus and Chafer (1994), McNabb (1996), E. McNabb pers. comm.

b) Longevity

- Classification of lifespan: Long-lived
- Average lifespan (yrs): Unknown
- Maximum lifespan (yrs): >20
Source: Brouwer and Garnett (1990)

c) Morphology

Adult body size

- Weight (g): 1050-1600 females, 1130-1700 males
- Length (mm): 450-540 females, 480-650 males
Source: Schodde and Mason (1980)

d) Social organisation

- Colonial or non-colonial: Non-colonial
- Territoriality: Territorial
Source: Schodde and Mason (1980)

e) Other

- Nomadic, migratory, sedentary: Sedentary
- Diet: Carnivore (predominantly arboreal mammals)
Source: Tilley (1982), Lavazanian *et al.* (1994)

THREATS

1. Clearing of Native Vegetation:

Rating (1)

Schodde and Mason (1980), E. McNabb pers. comm.

2. Timber harvesting:

Rating (3)

Garnett (1992a), Davey (1993), Collar *et al.* (1994), Debus and Chafer (1994), Kavanagh and Bamkin (1995), E. McNabb pers. comm.

3. Fuel Reduction Burning:

Rating (2)

Debus and Chafer (1994), E. McNabb pers. comm.

4. Firewood Collection:

Rating (1)

Robinson (1994), E. McNabb pers. comm.

5. Unplanned Fire:

Rating (2)

E. McNabb pers. comm.

6. Introduced Species:

Rating (0)

E. McNabb pers. comm.

7. Grazing/Trampling:

Rating (-)

8. Pest Control:

Rating (1)

R. Loyn pers. comm.

9. Road Construction and Maintenance:

Rating (1)

E. McNabb pers. comm.

10. Mining/Quarrying:

Rating (-)

11. Tree Dieback:

Rating (1)

Landsberg *et al.* (1990), E. McNabb pers. comm.

12. Recreation:

Rating (0)

E. McNabb pers. comm.

13. Illegal Collection/Harvesting:

Rating (0)

E. McNabb pers. comm.

14. Vandalism/Disturbance by Humans:

Rating (0)

E. McNabb pers. comm.

15. Dams/Impoundments:

Rating (0)

E. McNabb pers. comm.

Current Management:

The Powerful Owl is classified as "endangered" in Victoria (NRE 1999a) and is listed under the Victorian *Flora and Fauna Guarantee Act* 1988. An Action Statement for the species is currently being prepared (Webster and Humphries in prep). A forest management plan for the forest management areas (FMAs) incorporated in the Gippsland RFA region (Central Gippsland, Tambo). Is currently in preparation. Systematic surveys of the Gippsland region for large forest owls including Powerful Owl have recently been completed. Site data collected from survey sites will be used in conjunction with mapped variables to develop predictive models for the species (Loyn *et al.* in prep). Results from this study will facilitate the development of appropriate management prescriptions for abating forestry-related threatening processes.

Species characteristics:

The Powerful Owl is Australia's largest owl species. Arboreal mammals compose the bulk of the diet. It is an opportunistic predator, and birds, insects and some terrestrial mammals may also be eaten (Lavazanian *et al.* 1994, Traill 1993, Tilley 1982). The Powerful Owl roosts in the tree canopy and utilises large tree hollows for nesting. Powerful Owls are a sedentary species and breeding pairs occupy large permanent territories (300-1000 ha) that contain a number of roost sites and nest trees (McNabb 1996).

Distribution within the Gippsland RFA region:

Powerful Owl records are widespread within the region. The majority of records are from large blocks of State forest although the species has also been recorded from forested private land and from farmland close to State forest. Powerful Owls have been recorded from a number of conservation reserves including the Alpine National Park, Morwell National Park, Avon Wilderness Park, Mitchell River National Park, Toora Gunyah Rainforest Reserve, as well as Moondarra State Park and Mount Alfred State Park (Atlas of Victorian Wildlife). Recent systematic surveys of the Tambo and Central Gippsland FMAs recorded Powerful Owl from 95 of 516 sites (E. McNabb pers. comm.).

Disturbances and potentially threatening process operating in the Gippsland RFA Region:

Significant threats to the Powerful Owl include disturbances that reduce the availability of nest sites,

roosting habitat and/or prey availability. The majority of Gippsland records are from State forest, and forest management activities have the potential to significantly impact on this sedentary species. Timber harvesting and wildfire reduce available nesting and roosting habitat, and prey (Debus and Chafer 1994, E. McNabb pers. comm.). Road construction and maintenance associated with timber harvesting also results in habitat loss (E. McNabb pers. comm.). A dense shrub layer provides essential shelter for pre-fledged owlets, which, after falling to the ground, avoid predators by climbing shrubs (McNabb 1996, Hollands 1991). Fuel reduction burns around nest trees may reduce or eliminate the shrub layer and leave no avenue of escape for fallen owlets. Frequent cool, prescribed burns reduce habitat quality by simplifying the structure and removing the resources used by prey species (Catling 1991, E. McNabb pers. comm.).

Masked Owl

Tyto novaehollandiae

RARITY

a) Geographic Range

- Classification of range size within the Gippsland region: Medium
- Distribution of records within the Gippsland region: Predominantly in the centre of the region
- Number of 5 minute grid cells recorded from: 18
Source: Atlas of Victorian Wildlife

b) Abundance

- Classification of abundance: Low
- Population Estimate: Victorian estimate 300-400 breeding pairs, Gippsland and East Gippsland plains, may be approximately 60 breeding pairs.
- Density: Unknown, but territories most likely well-spaced, 5-10 km² per pair been postulated.
- Home Range (ha): 1017-1178, from radiotracking one female
Source: Peake *et al.* (1993), Kavanagh and Murray (1996), Schodde and Mason (1997), E. McNabb pers. comm.

c) Habitat Specificity

- Classification of habitat specificity: Medium; requires tree hollows and occasionally caves for nesting.
- Vegetation types inhabited in the region: Generally found in lowland forests, has been recorded in lowland forest and limestone box forest (Blue Box *Eucalyptus bauerana*) and from farmland between Bairnsdale and Nowa Nowa. Been recorded from sites dominated by River Red Gum *Eucalyptus camaldulensis* or Grey Box *E. microcarpa* and from plains grassy woodland/box woodland; has been recorded from Forest Red Gum *E. tereticornis* woodland near Bairnsdale. In Tambo FMA species recorded from low-lying flat sites with gum and peppermint overstorey and from valley-floor forest in the Strzelecki Ranges. Been recorded roosting in creekside Mountain Grey Gum *E. cypellocarpa*, surrounded by dry forest at Neerim South. Records often from ecotones between two vegetation types.
Source: Peake *et al.* (1993), Loyn *et al.* (in prep.), E. McNabb pers. comm.

DYNAMICS

Population Trend in Last Decade

- Increasing, stable or declined: Unknown, probably declined
Source: Peake *et al.* (1993), E. McNabb pers. comm.

Population trend since discovery by Europeans

- Increasing, stable or declined: Unknown, probably declined as a result of broad-scale clearing for agriculture and urban development
Source: Peake *et al.* (1993), R. Loyn and E. McNabb pers. comm.

SPATIAL DYNAMICS

a) Population variability

- Classification of population variability: Unknown
Source: R. Loyn and E. McNabb pers. comm.

b) Dispersal

- Classification of powers of dispersal: High
- Average distances dispersed: Unknown

- Maximum distance dispersed: Unknown
Source: Schodde and Mason (1980)

LIFE HISTORY PARAMETERS

a) Reproductive output

- Classification of reproductive output: Low
- Age of sexual maturity (yrs): Female 2, Male 3
- Mean clutch/litter/brood size: 1-3 typically survive to fledge (2-4 eggs laid)
- Mean no of clutches/litters/broods per year: <1
- Time of year young born/hatch: April - November

Source: Schodde and Mason (1980), Hollands (1991), Debus (1993), Olsen and Marples (1993), Peake *et al.* (1993), Kavanagh (1996)

b) Longevity

- Classification of lifespan: Long-lived
- Average lifespan (yrs): Unknown
- Maximum lifespan (yrs): Barn Owl *Tyto alba* have been recorded living over 17 years in the wild.

Source: Bunn *et al.* (1982), R. Loyn pers. comm.

c) Morphology

Adult body size

- Weight (g): 545-800 females, 420-670 males
- Length (mm): 380-460 females, 330-410 males
Source: Schodde and Mason (1980)

d) Social organisation

- Colonial or non-colonial: Non-colonial
- Territoriality: Territorial
Source: Schodde and Mason (1980), Hollands (1991)

e) Other

- Nomadic, migratory, sedentary: Sedentary
- Diet: Carnivore (terrestrial prey dominant)
Source: Schodde and Mason (1980), Kavanagh and Murray (1996)

THREATS

1. **Clearing of Native Vegetation:**
Rating (2)
Garnett (1992a), Debus (1993), E. McNabb pers. comm.
2. **Timber harvesting:**
Rating (2)
Debus and Rose (1994), E. McNabb pers. comm.
3. **Fuel Reduction Burning:**
Rating (3)
Debus and Rose (1994), E. McNabb pers. comm.
4. **Firewood Collection:**
Rating (2)
E. McNabb pers. comm.
5. **Unplanned Fire:**
Rating (2)
E. McNabb pers. comm.
6. **Introduced Species:**
Rating (1)
R. Loyn pers. comm.
7. **Grazing/Trampling:**
Rating (1)
Debus and Rose (1994), E. McNabb pers. comm.
8. **Pest Control:**
Rating (3)
Garnett (1992a), E. McNabb pers. comm.
9. **Road Construction and Maintenance:**
Rating (1)
E. McNabb pers. comm.
10. **Mining/Quarrying:**
Rating (-)
11. **Tree Dieback:**
Rating (1)
Landsberg *et al.* (1990), Debus and Rose (1994), E. McNabb pers. comm.
12. **Recreation:**
Rating (0)
E. McNabb pers. comm.
13. **Illegal Collection/Harvesting:**
Rating (0)
E. McNabb pers. comm.
14. **Vandalism/Disturbance by Humans:**
Rating (0)
E. McNabb pers. comm.

15. Dams/Impoundments:
Rating (0)
E. McNabb pers. comm.

Current Management:

The Masked Owl is classified as "endangered" in Victoria (NRE 1999a) and is listed under the Victorian *Flora and Fauna Guarantee Act 1988* although there is currently no Action Statement for this species. Systematic surveys for large forest owls have recently been conducted in the Gippsland RFA region. Data collected at survey sites was to be used in conjunction with mapped data to develop predictive models for the species to facilitate the development of appropriate management prescriptions for abating forestry-related threatening processes (Loyn *et al.* in prep). However, due to the small number of sites where Masked Owls were recorded by this survey, predictive models could not be developed for this species (E. McNabb pers. comm.). There are currently no management prescriptions for this species in the Forest Management Areas which are incorporated in the Gippsland region.

Species characteristics:

The Masked Owl is a rarely recorded species that requires trees with large hollows for daytime roosting and nesting. Caves can also provide nest and roost sites if present, and dense foliage may be used for roosting. Breeding pairs occupy large permanent territories (>1000 ha) (Kavanagh and Murray 1996). Important habitat components include eucalypt forest for roosting and nesting, and forest edge and open woodland for hunting; the species is most often recorded near the boundary between two vegetation types (Peake *et al.* 1993, Debus and Rose 1994). On the Gippsland plains, lowland sclerophyll forest provides hollows for nesting and prey, and roads and/or farmland boundaries provide openings that facilitate prey capture (Peake *et al.* 1993). Terrestrial mammals form the greater part of the Masked Owl's diet, but arboreal mammals are also eaten. Introduced species including rabbits and rodents are included in the diet and may partly compensate for the loss of small native mammals from agricultural and pastoral areas (Schodde and Mason 1980, Peake *et al.* 1993).

Distribution within the Gippsland RFA region:

Records of the Masked Owl within the region are mainly from between Kalimna, Bairnsdale, Bruthen and the Colquhoun State Forest. There are a small number of records to the north from the Fainting Range, Nunniong Forest Block, Swifts Creek and south-west of Mt. Bindi. There are also a small number of records to the west as far as Glenmaggie, including a recent record from Freestone Creek, North of Briagolong (E. McNabb pers. comm.) and records from between 1908 and 1930 from near Warragul. To the south there is a single isolated record from near Koornalla (Atlas of Victorian Wildlife). Recent surveys by the Department of Natural Resources and Environment recorded Masked Owl from 4 of 207 sites surveyed within the Tambo FMA and 3 of 309 sites surveyed within the Central Gippsland FMA (R. Loyn pers. comm.). Although Masked Owls are cryptic and do not readily respond to playback (Debus 1995), the results of this survey indicate the species is rare in the Gippsland RFA region. The majority of Masked Owl records are from State forest, often close to the edge of farmland (Atlas of Victorian Wildlife).

Disturbances and potentially threatening process operating in the Gippsland RFA Region:

Within the Gippsland region the majority of Masked Owl records are from State forest subject to a number of forest management activities. Loss of standing trees with hollows for nest and roost sites is a threat in forests managed for timber production. Masked Owls require open forest for foraging, and dense logging regeneration may not be suitable foraging habitat (Peake *et al.* 1993). Wildfires also result in a loss of habitat and prey and are a threat to the species. Frequent fuel reduction burns are

known to cause the death of young trees and shrubs (Adams and Robinson 1996) and may result in the loss of roosting habitat and may negatively affect the abundance of suitable prey (Debus and Rose 1994, E. McNabb pers. comm.). Loss of habitat through clearance of native vegetation is a significant threat to the Masked Owl in Gippsland. The species is known to nest in disturbed areas such as isolated stands of trees in paddocks (Hollands 1991). However, habitat is being lost through continued clearing and tree dieback and is not being replaced by natural regeneration as a result of grazing (Debus and Rose 1994). Masked Owls are known to hunt along roads and road widening and maintenance activities may result in a loss of habitat. Road-killed Masked Owls have been recorded in the past and upgraded roads carrying faster traffic increase the likelihood of road-kill deaths. Introduced species, particularly foxes, may be competing for prey with the Masked Owl affecting availability of prey such as rabbits (R. Loyn pers. comm.). In agricultural areas, introduced mammals are important components of the Masked Owl's diet (Debus and Rose 1994). Pest control results in a reduction in the availability of prey, particularly rabbits, and the potential for secondary poisoning following rabbit control programs and rat baiting (Peak *et al.* 1993, R. Loyn pers. comm.). The potential threat to this species from pesticide residues found in prey species is unknown and requires investigation.

Sooty Owl
Tyto tenebricosa

RARITY

a) Geographic Range

- Classification of range size within region: Medium
- Distribution of records within region: Widespread in the forested central and northern areas; few scattered records in the southern part of the region.
- Number of 5 minute grid cells recorded from: 54
Source: Atlas of Victorian Wildlife

b) Abundance

- Classification of abundance: Low
- Population Estimate: 50-150 pairs (NE)
- Density: East Gippsland estimate for public land of between 1 pair/50 km² (McIntyre and Bramwell in prep) and 1pair/96 km² (McIntyre and Henry in prep). Using data from across Victoria 1-9 individuals/100 km² in most of the forested land east of Melbourne (Silveira 1997c).
- Home Range (ha): 200-800+. Estimates have varied from 200 ha to 3000 ha and appear to vary depending on habitat quality (ie. prey density).
Source: Schodde and Mason (1980), Silveira (1997c), McIntyre and Bramwell (in prep), McIntyre and Henry (in prep), E. McNabb pers. comm.

c) Habitat Specificity

- Classification of habitat specificity: Narrow
- Vegetation types inhabited in the region: Generally recorded from closed forests (rainforests), tall open-forests and open-forests, across a range of EVCs.
Source: C. Silveira pers. comm., Loyn *et al.* (in prep)

DYNAMICS

Population Trend in Last Decade

- Increasing, stable or declined: Unknown, possibly declined
Source: E. McNabb pers. comm.

Population trend since discovery by Europeans

- Increasing, stable or declined: Declined
Source: Garnett (1992a), Debus (1994)

SPATIAL DYNAMICS

a) Population variability

- Classification of population variability: Low
Source: R. Loyn and E. McNabb pers. comm.

b) Dispersal

- Classification of powers of dispersal: High
- Average distances dispersed: Unknown

- Maximum distance dispersed: Unknown
Source: Schodde and Mason (1980)

LIFE HISTORY PARAMETERS

a) Reproductive output

- Classification of reproductive output: Low
- Age of sexual maturity (yrs): Probably 2
- Mean clutch/litter/brood size: 2
- Mean no of clutches/litters/broods per year: 1, although may not breed every year
- Time of year young born/hatch: all year round although there appear to be peaks in detections of young birds in autumn and spring
Source: Hyem (1979), Schodde and Mason (1980), R. Loyn and E. McNabb pers. comm.

b) Longevity

- Classification of lifespan: Long-lived
- Average lifespan (yrs): Unknown
- Maximum lifespan (yrs): Unknown
Source: Silveira (1997c), R. Loyn and Ed McNabb pers. comm.

c) Morphology

Adult body size

- Weight (g): 750-1000 females, 500-700 males
- Length (mm): 440-510 females, 370-430 males
Source: Schodde and Mason (1980)

d) Social organisation

- Colonial or non-colonial: Non-colonial
- Territoriality: Territorial
- Source: Schodde and Mason (1980)

e) Other

- Nomadic, migratory, sedentary: Sedentary
- Diet: Carnivore (terrestrial and arboreal mammals)
Source: Schodde and Mason (1980), Lundie-Jenkins (1992), Milledge (1996)

THREATS

1. **Clearing of Native Vegetation:**
Rating (1)
E. McNabb pers. comm.
2. **Timber harvesting:**
Rating (3)
Milledge *et al.* (1991), Garnett (1992a), Davey (1993), Debus (1994), E. McNabb pers. comm.
3. **Fuel Reduction Burning:**
Rating (2)
E. McNabb pers. comm.
4. **Firewood Collection:**
Rating (1)
E. McNabb pers. comm.
5. **Unplanned Fire:**
Rating (2)
E. McNabb pers. comm.
6. **Introduced Species:**
Rating (0)
E. McNabb pers. comm.
7. **Grazing/Trampling:**
Rating (-)
8. **Pest Control:**
Rating (1)
E. McNabb pers. comm.
9. **Road Construction and Maintenance:**
Rating (1)
E. McNabb pers. comm.
10. **Mining/Quarrying:**
Rating (1)
E. McNabb pers. comm.
11. **Tree Dieback:**
Rating (1)
E. McNabb pers. comm.
12. **Recreation:**
Rating (0)
E. McNabb pers. comm.
13. **Illegal Collection/Harvesting:**
Rating (0)
E. McNabb pers. comm.
14. **Vandalism/Disturbance by Humans:**
Rating (0)
E. McNabb pers. comm.
15. **Dams/Impoundments:**
Rating (0)
E. McNabb pers. comm.
16. **Other: Climate Change**
Rating: (2)
Bennett *et al.* (1991)

Current Management:

The Sooty Owl is classified as "vulnerable" in Victoria (NRE 1999) and is listed under the Victorian *Flora and Fauna Guarantee Act* 1988. An Action Statement for the species is currently being prepared (C. Silveira pers. comm.). Systematic surveys for large forest owls have recently been conducted in the Gippsland RFA Region. Data collected during the surveys will be used in conjunction with mapped variables to develop predictive models for the species (Loyn *et al.* in prep). A forest management plan for the forest management areas (FMAs) incorporated in the Gippsland RFA region (Central Gippsland, Tambo) is currently in preparation. Results from the survey will assist in development of appropriate management prescriptions for abating forestry-related threatening processes.

Species characteristics:

The Sooty Owl is a specialist inhabitant of nutrient rich, wet forests (Lumsden *et al.* 1991, Milledge *et al.* 1991). Large trees with hollows are required for roosting and breeding; caves may also be used if available. Pairs apparently mate for the life of a partner, are sedentary and occupy large home ranges. Sooty Owls feed on both arboreal and terrestrial mammals although in some areas terrestrial and scansorial mammals make up the bulk of the prey (Schodde and Mason 1980, E. McNabb pers. comm.).

Distribution in the Gippsland RFA region:

The majority of Sooty Owl records are from State forest in the eastern central part of the region, particularly in forest blocks north of Lakes Entrance, Weisleigh, Bruthen and Bullumwall. There are scattered records in the north-east from the Alpine National Park, and State forest near Glen Valley. Other records are generally scattered through State forest (e.g. north of Dargo and between Culloden and Castleburn) and from the Mitchell River National Park. The species has been recorded in the north-west of the region from State forest near Knockwood and as far south as State forest near Heyfield, Moondarra and Boola Boola. There is an isolated record to the south from the Strzelecki State Forest. (Atlas of Victorian Wildlife). Recent surveys for large forest owls recorded Sooty Owl from 17 of 207 sites in the Tambo FMA and 25 of 309 sites in the Central Gippsland FMA (Loyn *et al.* in prep).

Disturbances and potentially threatening processes within the Gippsland RFA region:

Because the Sooty Owl is mainly dependent on large tree hollows for nesting and partially dependent on prey which also require tree hollows, major threatening processes are those which result in a reduction in the availability of tree hollows and consequently the abundance of prey (Milledge *et al.* 1991, Garnett 1992a, Debus 1994, R. Loyn pers. comm.). The majority of records from the region are from State forest subject to forest management activities such as timber harvesting and fuel reduction burning. These disturbances and disturbances such as wildfire result in loss of habitat and prey. Road construction and maintenance associated with timber harvesting may also result in habitat loss. Sooty Owls are known to prey upon rats, and secondary poisoning following rat baiting near towns, is potentially a minor threat. Habitat alteration as a consequence of climate change associated with the Enhanced Greenhouse Effect is considered a moderate threat to Sooty Owl populations (Bennett *et al.* 1991, R. Loyn pers. comm.).

Chestnut-rumped Heathwren

Hylacola pyrrhopygia

RARITY

a) Geographic Range

- Classification of range size within the Gippsland region: Large

- Distribution of records within the Gippsland region: There are a limited number of widely distributed records, the majority are scattered in the centre of the region; other records are from the north-east and south-west corners of the region.
- Number of 5 minute grid cells recorded from: 37
 - Source: Atlas of Victorian Wildlife

b) Abundance

- Classification of abundance: Low
- Population estimate: Unknown
- Density: Unknown
- Home range: Unknown; probably <10 ha.
 - Source: Emison *et al.* (1987), R. Loyn pers. comm.

c) Habitat Specificity

- Classification of habitat specificity: Narrow
- Vegetation types inhabited in the Gippsland region: Open-forest and woodland, especially those with a heathy understorey; also low shrubs among rocky outcrops.
 - Source: Blakers *et al.* 1984, Emison *et al.* 1987

DYNAMICS

Population Trend in Last Decade

- Increasing, stable or declining: Unknown
 - Source: C. Silveira pers. comm.

Population trend since discovery by Europeans

- Increasing, stable or declining: Declined
- Source: Blakers *et al.* (1984), Robinson (1993)

SPATIAL DYNAMICS

a) Population variability

- Classification of population variability: Unknown. Local increases have been recorded in early post-fire and post-logging seral stages as the shrub layer develops.
 - Source: Loyn (1980), Ford (1989)

b) Dispersal

- Classification of powers of dispersal: Low
- Average distance dispersed: Unknown
- Maximum distance dispersed: Unknown
 - Source: C. Silveira pers. comm.

LIFE HISTORY PARAMETERS

a) Reproductive output

- Classification of reproductive output: Low
- Age of sexual maturity: Probably 1-2 years.
- Mean clutch/litter/brood size: 2-3 eggs
- Mean no. of clutches/litters/broods per year: 1, sometimes 2.
- Time of year young born/hatch: winter to spring
 - Source: Beruldsen (1980), Schodde and Tidemann (1986), C. Silveira pers. comm.

b) Longevity

- Classification of lifespan: Short-lived
- Average lifespan: Unknown
- Maximum lifespan: Two years for a banded individual.
 - Source: Baker *et al.* (1997)

c) Morphology

Adult body size

- Weight (g): 17.9, n=9 (this species is unusual among passerines in that it has marked sexual dimorphism - males are larger than females).
- Length (mm): 130-140
 - Source: Simpson and Day (1996), Baker *et al.* (1997), R. Loyn pers. comm.

d) Social organisation

- Colonial or non-colonial: Non-colonial; pairs when breeding and small loose groups after breeding.
- Territoriality: Territorial when breeding.
 - Source: Schodde and Tidemann (1986).

e) Other

- Nomadic, migratory, sedentary: Sedentary
- Mode of feeding: Insectivorous and granivorous
 - Source: Blakers *et al.* (1984), Emison *et al.* (1987)

THREATS

1. **Clearing of Native Vegetation:**
Rating (2)

2. Timber harvesting:
Rating (-)
C. Silveira pers. comm.
3. **Fuel Reduction Burning:**
Rating (2)
C. Silveira pers. comm.
4. **Firewood Collection:**
Rating (2)
C. Silveira pers. comm.
5. **Unplanned Fire:**
Rating (2)
R. Loyn pers. comm.
6. Introduced Species:
Rating (-)
7. **Grazing/Trampling:**
Rating (1)
C. Silveira pers. comm.
8. Pest Control:
Rating (-)
C. Silveira pers. comm.
9. Road Construction and Maintenance:
Rating (0)
C. Silveira pers. comm.
10. Mining/Quarrying:
Rating (-)
C. Silveira pers. comm.
11. Tree Dieback:
Rating (-)
C. Silveira pers. comm.
12. Recreation:
Rating (0)
C. Silveira pers. comm.
13. Illegal Collection/Harvesting:
Rating (0)
C. Silveira pers. comm.
14. Vandalism/Disturbance by Humans:
Rating (0)
C. Silveira pers. comm.
15. Dams/Impoundments:
Rating (1)
C. Silveira pers. comm.

Current management:

The Chestnut-rumped Heathwren is classified as "data deficient" in Victoria (NRE 1999). There are no threat-ameliorating management prescriptions for the Chestnut-rumped Heathwren within the Gippsland RFA region.

Species characteristics:

The Chestnut-rumped Heathwren is mainly recorded from heathy woodlands, and open eucalypt forests and woodlands in the lowlands and foothills. It also inhabits box-ironbark, stringybark and peppermint forests with scattered shrub layers and sparse tree cover. Although usually absent from high altitude country, it has been recorded up to 1500 m. In eucalypt forests it occurs mainly in areas where there are natural openings such as among rocky outcrops. Pairs or loose groups spend most of their time foraging for insects and seeds on the ground, especially in areas where fallen branches or rocks are present, or in low shrubs. Nests are built close to the ground in low shrubs or grass tussocks (Blakers *et al.* 1984, Emison *et al.* 1987). Although the Chestnut-rumped Heathwren is currently not considered threatened in Victoria, it is known to be declining (Robinson 1993) and is one of the least recorded resident passerine birds in the state (Emison *et al.* 1987).

Distribution in the Gippsland RFA region:

There are 58 widespread records of the Chestnut-rumped Heathwren from the region. Records stretch from Tarwin Lower, the vicinities of Buffalo and Toora and Wilsons Promontory National Park in the south-west of the region to Beloka and Pinnibar-Pendergast State Forests in the north-west of the region. Other records are scattered in the middle of the region and include Big River State Forest near Woods Point, near Aberfeldy, Boola Boola State Forest, Beardmore and South Island Thomson Dam, the Alpine National Park east of Glencairn and near Mount Von Guerard, north-west of Dargo, State forest near Bullumwaal, the Mitchell River National Park, near Bruthen, Holey

Plains State Park and from the vicinities of Willung South, Flynn and Rosedale Hill. The species has been recorded at a wide range of altitudes and from State forest, private land and conservation reserves (Atlas of Victorian Wildlife). A recent broad scale survey of the region failed to record Chestnut-rumped Heathwren despite including several areas of potentially suitable habitat (G. Appleby pers. comm.).

Disturbances and potentially threatening processes operating in the Gippsland RFA region:

The ground and shrub layers are important habitat components of the Chestnut-rumped Heathwren; disturbances that remove or deplete these habitat resources are likely to cause population declines. Areas with abundant fallen tree debris are favoured foraging habitat (Emison *et al.* 1987). Removal of fallen dead timber as a result of firewood collection, is a significant threat to the species. Nesting and foraging habitat may be lost as a result of fuel reduction burning and wildfire and these disturbances may be significant threats to the species (C. Silveira pers. comm.). The effect of timber harvesting on the Chestnut-rumped Heathwren is unknown although it has been recorded from the early post harvesting regeneration stages (Emison *et al.* 1987). Being a ground foraging species that nests close to the ground, Chestnut-rumped Heathwrens are vulnerable to predation by introduced species such as cats. However, the impact of this potentially threatening process on populations is unknown (C. Silveira pers. comm.).

Azure Kingfisher
Alcedo azurea

RARITY

a) Geographic Range

- Classification of range size within the Gippsland region: Large
- Distribution of records within the Gippsland region: Widespread
- Number of 5 minute grid cells recorded from: 48
 - Source: Atlas of Victorian Wildlife

b) Abundance

- Classification of abundance Low
- Population estimate: Unknown
- Density: Unknown
- Home range: 1.6 km and 1.0 km of creek in the breeding and non-breeding seasons respectively at Murphy's Ck, Qld; 200 m of creek near Sydney, NSW. Dependent on the size of the stream, but usually 200-500 m of stream bank is occupied by one pair.
 - Source: Blakers *et al.* (1984), Shields (1994)

c) Habitat Specificity

- Classification of habitat specificity: Narrow ; sheltered creeks and rivers.
- Vegetation types inhabited in the Gippsland region: Riparian EVCs
 - Source: Emison *et al.* (1987), C. Silveira pers. comm.

DYNAMICS

Population Trend in Last Decade

- Increasing, stable or declining: Unknown
 - Source: C. Silveira pers. comm.

Population trend since discovery by Europeans

- Increasing, stable or declining: Declined at southern end of its Australian range (eg. extinct in South Australia)
Source: Blakers *et al.* (1984), R. Loyn pers. comm.

SPATIAL DYNAMICS

a) Population variability

- Classification of population variability: High; marked fluctuations at some sites.
Source: R. Loyn pers. comm.

b) Dispersal

- Classification of powers of dispersal: Unknown
- Average distance dispersed: Unknown, but reported migratory movements in the Upper

Murray and Eastern Uplands would suggest many tens, perhaps hundreds, of km.

- Maximum distance dispersed: 10 km by a banded individual.
Source: McEvey (1965), Emison *et al.* (1987), Baker *et al.* (1997)

LIFE HISTORY PARAMETERS

a) Reproductive output

- Classification of reproductive output: Medium
- Age of sexual maturity: Probably 1-2 years.
- Mean clutch/litter/brood size: Five eggs
- Mean no. of clutches/litters/broods per year: One
- Time of year young born/hatch: Spring to early summer.
Source: Beruldsen (1980), C. Silveira pers. comm.

b) Longevity

- Classification of lifespan: Probably long-lived.
- Average lifespan: Unknown
- Maximum lifespan: 11 years for a banded individual.
Source: Baker *et al.* (1997)

c) Morphology

Adult body size

- Weight (g): 34.9 (n=19)
- Length (mm): 180
Source: Simpson and Day (1996), Baker *et al.* (1997)

d) Social organisation

- Colonial or non-colonial: Non-colonial; solitary or in dispersed pairs.
- Territoriality: Territorial when breeding.
Source: Schodde and Mason (1997)

e) Other

- Nomadic, migratory, sedentary: Sedentary in most of Victoria, but considered a summer migrant in the Upper Murray and Eastern Uplands.
- Mode of feeding: Carnivorous (fish, frogs, insects and crustaceans).
Source: McEvey (1965), Blakers *et al.* (1984), Emison *et al.* (1987)

THREATS

1. Clearing of Native Vegetation: Rating (2)

C. Silveira and R. Loyn pers. comm.

2. Timber harvesting: Rating (1)

Campbell and Doeg (1989), Shields (1994)

3. Fuel Reduction Burning: Rating (0)

R. Loyn pers. comm.

4. Firewood Collection: Rating (0)

R. Loyn pers. comm.

5. Unplanned Fire: Rating (0)

R. Loyn pers. comm.

6. Introduced Species: Rating (2)

Shields (1994), S. Saddler pers. comm., R. Loyn pers. comm.

7. Grazing/Trampling: Rating (1)

Shields (1994), C. Silveira pers. comm.

8. Pest Control: Rating (-)

9. Road Construction and Maintenance: Rating (-)

10. Mining/Quarrying: Rating (-)

11. Tree Dieback: Rating (0)

R. Loyn pers. comm.

12. Recreation: Rating (-)

13. Illegal Collection/Harvesting: Rating (0)

C. Silveira pers. comm.

14. Vandalism/Disturbance by Humans: Rating (0)

C. Silveira pers. comm.

15. Dams/Impoundments: Rating (3)

Shields (1994), Koehn *et al.* (1996), R. Loyn pers. comm.

Current management:

The Azure Kingfisher is not considered "threatened" in Victoria (NRE 1999). There are no threat-ameliorating management prescriptions for the Azure Kingfisher within the Gippsland RFA region.

Species characteristics:

The Azure Kingfisher is rarely recorded far from watercourses. Within Victoria, it occurs along the Murray and Goulburn Rivers as well as along lowland and foothill rivers and streams. It catches its prey by plunging from low perches overhanging the water, such as snags and dead branches. The majority of prey is aquatic and includes small fish, frogs, crustaceans and aquatic insects and their larvae (Emison *et al.* 1987, Shields 1994). The Azure Kingfisher nests in a tunnel, which it excavates in the bank of the stream beside the water (Blakers *et al.* 1984, Shields 1994).

Distribution in the Gippsland RFA region:

Records of the Azure Kingfisher are widespread within the Gippsland RFA region although there is a gap in the distribution in the north-east of the region with a single record from Buckwong Creek in the Alpine National Park representing the only record of the species from this part of the study area. There is a concentration of records in the area bounded by Lakes Entrance, Swan Reach, Tambo Upper, Bairnsdale, Eagle Point and Paynesville. It has also been recorded from Fraser and Rotamah Islands. The most south-westerly records are from the vicinities of Korumburra South and Koonwarra and the most southerly record from Wilsons Promontory National Park. Most records are close to water courses, some are within extensive areas of forest, others are from streamside frontages surrounded by predominantly cleared land. The species has also been recorded from swamps, reservoirs (eg. Moondarra) and Lakes (Atlas of Victorian Wildlife). A recent broad scale survey of the region failed to record Azure Kingfisher and although Wilson's Promontory National Park and the Gippsland Lakes were not covered, the survey did include other areas of potentially suitable habitat (G. Appleby pers. comm.).

Disturbances and potentially threatening processes operating in the Gippsland RFA region:

Disturbances that result in the fouling of streams, alterations to stream flow or that remove adjacent riparian vegetation such as clearing and timber harvesting, are likely to threaten the Azure Kingfisher. Streamside frontages are commonly grazed under license within the region; nesting habitat may be lost as a result of grazing and trampling which can cause erosion and collapse of river banks (Shields 1994, C. Silveira pers. comm.). Fluctuating water levels as a result of water releases from impoundments may flood out nest tunnels (Shields 1994). Changes in water temperatures in rivers downstream of impoundments as a result of cold water releases, are known to have a significant effect on the species composition and abundance of fish and macroinvertebrate fauna (Koehn *et al.* 1996); the significance of these changes to the food resource of the Azure Kingfisher are unknown. Introduced Carp increase water turbidity (S. Saddler pers. comm.) which is likely to have a significant effect on habitat quality of the Azure Kingfisher, and may result in population declines (R. Loyn pers. comm.).

Gang-gang Cockatoo

Callocephalon fimbriatum

RARITY

a) Geographic Range

- Classification of range size within the Gippsland region: Large

- Distribution of records within the Gippsland region: Widespread
- Number of 5 minute grid cells recorded from: 220

Source: Atlas of Victorian Wildlife

b) Abundance

- Classification of abundance: Medium
- Population estimate: Unknown
- Density: 0.14-0.44 birds/ha at Boola Boola, Victoria.
- Home range: Unknown

Source: Loyn (1980), C. Silveira pers. comm.

c) Habitat Specificity

- Classification of habitat specificity: Wide, but requires tree-hollows in which to nest.
- Vegetation types inhabited in the Gippsland region: Tall open-forest, open-forest and woodland where the annual rainfall exceeds 700 mm.

Source: Emison *et al.* (1987)

DYNAMICS

Population Trend in Last Decade

- Increasing, stable or declining: Unknown, possibly declining

Source: Chambers (1995)

Population trend since discovery by Europeans

- Increasing, stable or declining: Likely decline commensurate with large-scale habitat clearance and the progressive conversion of remaining forests and woodlands on unreserved public land to younger-aged stands with fewer or no hollows in which to nest. Known to have declined in some parts of its range.

Source: Blakers *et al.* (1984), Crome (1992), Chambers (1995), C. Silveira pers. comm.

SPATIAL DYNAMICS

a) Population variability

- Classification of population variability: Unknown, probably high

Source: Blakers *et al.* (1984), Emison *et al.* (1987)

b) Dispersal

- Classification of powers of dispersal: High
- Average distance dispersed: Unknown
- Maximum distance dispersed: Hundreds of kilometres.

Source: Blakers *et al.* (1984), Schodde and Mason (1997)

LIFE HISTORY PARAMETERS

a) Reproductive output

- Classification of reproductive output: Low
- Age of sexual maturity: Probably 2-3 years.
- Mean clutch/litter/brood size: 2
- Mean no. of clutches/litters/broods per year: 1
- Time of year young born/hatch: Spring to summer.

Source: Beruldsen (1980)

b) Longevity

- Classification of lifespan: Probably long-lived.
- Average lifespan: Unknown
- Maximum lifespan: At least 60 in captivity; captive birds often continue to breed at 20-25 years.

Source: G. Dosser pers. comm. in Chambers (1995)

c) Morphology

Adult body size

- Weight (g): 219
- Length (mm): 340

Source: Simpson and Day (1996)

d) Social organisation

- Colonial or non-colonial: Non-colonial; pairs or family groups during breeding season; large flocks of up to 100 at other times, although smaller flocks of up to six more common.
- Territoriality: Territorial when breeding.

Source: Forshaw and Cooper (1981), Blakers *et al.* (1984), Schodde and Tidemann (1986), Chambers (1995)

e) Other

- Nomadic, migratory, sedentary: Partial altitudinal migrant which occurs in coastal and lower altitudes of the Great Dividing Range in autumn and winter and higher, cooler

- mountain forests in which it breeds in spring and summer.
- Mode of feeding: Granivorous and occasionally insectivorous.
Source: Forshaw and Cooper (1981), Blakers *et al.* (1984), Schodde and Mason (1997)

THREATS

- Clearing of Native Vegetation:**
Rating (2)
Emison *et al.* (1987)
- Timber-harvesting:**
Rating (2)
Emison *et al.* (1987)
- Fuel Reduction Burning:**
Rating (1)
C. Silveira pers. comm.
- Firewood Collection:
Rating (-)
- Unplanned Fire:**
Rating (2)
C. Silveira pers. comm.
- Introduced Species:
Rating (0)
C. Silveira pers. comm.
- Grazing/Trampling:
Rating (-)
- Pest Control:
Rating (0)
C. Silveira pers. comm.
- Road Construction and Maintenance:
Rating (-)
- Mining/Quarrying:
Rating (-)
- Tree Dieback:
Rating (-)
- Recreation:
Rating (0)
- Illegal Collection/Harvesting:
Rating (-)
C. Silveira pers. comm.
- Vandalism/Disturbance by Humans:
Rating (0)
C. Silveira pers. comm.
- Dams/Impoundments:
Rating (0)
C. Silveira pers. comm.

Current management:

The Gang-gang Cockatoo is not considered "threatened" in Victoria (NRE 1999). There are no threat-ameliorating management prescriptions for the species within the Gippsland region.

Species characteristics:

The Gang-gang Cockatoo is a widely distributed species, which is most frequently recorded from forests and woodlands where rainfall exceeds 700 mm (Emison *et al.* 1987). There is a seasonal shift in the bulk of the population; during the winter Gang-gangs are more common in lowland habitats but return to the mountain forests in spring where the majority of birds nest (Forshaw and Cooper 1981, Blakers *et al.* 1984). Gang-gangs nest in tree hollows placed high up in eucalypts, mainly in mature forest (Schodde and Tidemann 1986, Emison *et al.* 1987, Crome 1992). Mature forests also provide important foraging habitat; birds generally forage amongst the canopy, sub-canopy and shrub layers for the seeds of eucalypts and acacias. Berries, nuts, fruits, vegetable matter and insects and their larvae are also eaten (Forshaw and Cooper 1981, Blakers *et al.* 1984, Recher and Holmes 1985).

Distribution in the Gippsland RFA region:

Widespread, but more common in habitats where rainfall exceeds 700 mm. There is a gap in the distribution along the Ninety Mile Beach west of The Lakes National Park inland to near Warruk then south to the coast (Emison *et al.* 1987, Atlas of Victorian Wildlife).

Disturbances and potentially threatening processes operating in the Gippsland RFA region:

Habitat clearance, timber harvesting and wildfire result in the loss of hollow-rich old eucalypts and foraging habitat and are the most significant threats to the Gang-gang Cockatoo in the region. The retention of mature forest for nesting is considered essential for maintaining numbers at present levels (Emison *et al.* 1987).

Pink Robin

Petroica rodinogaster

RARITY

a) Geographic Range

- Classification of range size within the Gippsland region: Large
- Distribution of records within the Gippsland region: Widespread and thinly distributed.
- Number of 5 minute grid cells recorded from: 42
Source: Atlas of Victorian Wildlife

b) Abundance

- Classification of abundance: Medium
- Population estimate: Unknown
- Density: On average about 5 pairs bred each year along about 300 m of creek at Ferntree, Tasmania.
- Home range: Probably <10 ha
Source: Blakers *et al.* (1984), C. Silveira pers. comm.

c) Habitat Specificity

- Classification of habitat specificity: Wide, although more restricted during the breeding season
- Vegetation types inhabited in the Gippsland region: Tall open-forest, especially gullies therein; but most other vegetation types utilised when individuals disperse, including foothill forests and lowland rainforest gullies, as well as drier coastal scrubs and farmland. Breeds mainly in cool temperate rainforest.
Source: LCC (1980), Loyn (1985), Emison *et al.* (1987), R. Loyn pers. comm.

DYNAMICS

Population Trend in Last Decade

- Increasing, stable or declining: Stable
Source: R. Loyn pers. comm.

Population trend since discovery by Europeans

- Increasing, stable or declining: Unknown
Source: C. Silveira pers. comm.

SPATIAL DYNAMICS

a) Population variability

- Classification of population variability: Low
Source: R. Loyn pers. comm.

b) Dispersal

- Classification of powers of dispersal: High
- Average distance dispersed: Unknown
- Maximum distance dispersed: Many hundreds of kilometres.
Source: Blakers *et al.* (1984)

LIFE HISTORY PARAMETERS

a) Reproductive output

- Classification of reproductive output: Low
- Age of sexual maturity: Probably 1-2 years.
- Mean clutch/litter/brood size: 3 eggs
- Mean no. of clutches/litters/broods per year: 1-2
- Time of year young born/hatch: Spring to early summer
Source: Beruldsen (1980)

b) Longevity

- Classification of lifespan: Short-lived
- Average lifespan: Unknown
- Maximum lifespan: Three years for a banded individual.
Source: Baker *et al.* (1997)

c) Morphology

Adult body size

- Weight (g): 9.4 (n=2)
- Length (mm): 120
Source: Simpson and Day (1996), Baker *et al.* (1997)

d) Social organisation

- Colonial or non-colonial: Non-colonial; solitary especially when dispersing, or in pairs.
- Territoriality: Territorial when breeding.

Source: Schodde and Tidemann (1986)

e) Other

- Nomadic, migratory, sedentary: Many adult males are sedentary, but other individuals disperse widely.
- Mode of feeding: Insectivorous
Source: Blakers *et al.* (1984), Schodde and Tidemann (1986), R. Loyn pers. comm.

THREATS

1. **Clearing of Native Vegetation:**
Rating (1)
R. Loyn pers. comm.
2. **Timber harvesting:**
Rating (2)
Blakers *et al.* (1984)
3. **Fuel Reduction Burning:**
Rating (1)
R. Loyn pers. comm.
4. **Firewood Collection:**
Rating (-)
5. **Unplanned Fire:**
Rating (1)
R. Loyn pers. comm.
6. **Introduced Species:**
Rating (-)
7. **Grazing/Trampling:**
Rating (1)
R. Loyn pers. comm.
8. **Pest Control:**
Rating (0)
R. Loyn pers. comm.
9. **Road Construction and Maintenance:**
Rating (-)
10. **Mining/Quarrying:**
Rating (0)
R. Loyn pers. comm.
11. **Tree Dieback:**
Rating (2)
R. Loyn pers. comm.
12. **Recreation:**
Rating (0)
R. Loyn pers. comm.
13. **Illegal Collection/Harvesting:**
Rating (0)
R. Loyn pers. comm.
14. **Vandalism/Disturbance by Humans:**
Rating (0)
R. Loyn pers. comm.
15. **Dams/Impoundments:**
Rating (0)
R. Loyn pers. comm.
16. **Climate Change:**
Rating (2)
Bennett *et al.* (1991)

Current management:

The Pink Robin is not considered "threatened" in Victoria (NRE 1999). Under the Code of Forest Practices for Timber Production (NRE 1996b), cool temperate rainforest, important breeding habitat of the Pink Robin, is excluded from harvesting and must be surrounded by an appropriate buffer. For rainforest stands of lesser significance, buffers of 40 m are to be retained, or 20 m exclusion plus a 40 m modified harvesting strip. For stands where *Nothofagus* makes up greater than 20% of the canopy, a 60 m buffer is to be retained, or 40 m buffer with 40 m modified harvesting zone. Stands containing nationally significant rainforest are generally protected at the sub-catchment level (NRE 1996b).

Species characteristics:

The Pink Robin breeds exclusively in mountain forests, usually in gullies. In Wet Forest highest densities are recorded from gullies containing cool temperate rainforest of Myrtle Beech *Nothofagus cunninghamii* (Blakers *et al.* 1984, Loyn 1985). During the non-breeding season, females and juveniles disperse into drier and lower elevation forests while adult males tend to stay in the vicinity of the breeding territory but forage over a wider area (Blakers *et al.* 1984). Pink Robins feed exclusively on insects and other invertebrates taken from the

ground, the air and the foliage of low understorey shrubs; the majority of food is taken on the ground by diving on to it from a low perch (Blakers *et al.* 1984, Schodde and Tidemann 1986).

Distribution in the Gippsland RFA region:

Records of the Pink Robin are widespread although sparsely distributed throughout the region. The species has been recorded from the upland forests and rainforests, drier coastal scrubs foothill forests and lowland rainforest gullies (Emison *et al.* 1987). Records are mainly from State forest although the species has been recorded from several conservation reserves (eg. Bulga National Park, The Alpine National Park, Wilsons Promontory National Park) (Atlas of Victorian Wildlife).

Disturbances and threatening processes operating in the Gippsland RFA region:

The ground layer and understorey shrub layers are important habitat components for the Pink Robin; disturbances that affect these layers are potential threats to the species. Grazing and fuel reduction burning simplify understorey structure, which may affect its habitat quality for the Pink Robin. Timber harvesting, clearing and wildfire may result in habitat loss. Invasion of stream-side gullies by Blackberry may constitute loss of breeding habitat, although the significance of this disturbance is unknown (R. Loyn pers. comm.). Loss and degradation of breeding habitat as a result of dieback associated with Myrtle Wilt is potentially a moderate threat to the species in the region. Habitat alteration as a consequence of climate change associated with the Enhanced Greenhouse Effect is also a threat to this species (Bennett *et al.* 1991).

Hooded Robin

Melanodryas cucullata

RARITY

a) Geographic Range

- Classification of range size within the Gippsland region: Medium
- Distribution of records within the Gippsland region: There are a limited number of records, mainly from the south-east and centre of the region and a small number of records from the north-east of the region.
- Number of 5 minute grid cells recorded from: 31
Source: Atlas of Victorian Wildlife

b) Abundance

- Classification of abundance: Low
- Population estimate: Unknown but very rare within the region
- Density: Unknown
- Home range: 8.3-25.5 ha (mean 18) with a breeding territory from 4.5-9.5 ha (mean 6) were recorded for groups near Armidale, N.S.W.; home range of approximately 15 ha with a breeding territory of approximately 4 ha recorded for a pair in Canberra.
Source: Emison *et al.* (1987), Sullivan (1993), Fitri and Ford (1997), R. Loyn pers. comm.

c) Habitat Specificity

- Classification of habitat specificity: Wide
- Vegetation types inhabited in the Gippsland region: In southern Victoria occur in lightly timbered habitats containing tall shrubs such as Yellow Box *Eucalyptus melliodora* woodlands, coastal heaths and heathy woodlands
Source: Emison *et al.* (1987), Fitri and Ford (1997)

DYNAMICS

Population Trend in Last Decade

- Increasing, stable or declining: Declined
Source: Bennett (1993), Fitri and Ford (1997), Atlas of Victorian Wildlife

Population trend since discovery by Europeans

- Increasing, stable or declining: Declined
Source: Robinson (1991, 1993)

SPATIAL DYNAMICS

a) Population variability

- Classification of population variability: Unknown, probably low
Source: Fitri and Ford (1997)

b) Dispersal

- Classification of powers of dispersal: Low
- Average distance dispersed: Unknown
- Maximum distance dispersed: 2 km for a banded individual
Source: Baker *et al.* (1997), Fitri and Ford (1997)

LIFE HISTORY PARAMETERS

a) Reproductive output

- Classification of reproductive output: Low
- Age of sexual maturity: Unknown
- Mean clutch/litter/brood size: 2-3
- Mean no. of clutches/litters/broods per year: 1-2
- Time of year young born/hatch: July-November
Source: Schodde and Tidemann (1986), Boles (1988)

b) Longevity

- Classification of lifespan: Unknown
- Average lifespan: Unknown
- Maximum lifespan: Seven years for a banded individual.
Source: Baker *et al.* (1997), R. Loyn pers. comm.

c) Morphology

Adult body size

- Weight (g): 21-27
- Length (mm): 140-170
Source: Schodde and Tidemann (1986), Boles (1988)

d) Social organisation

- Colonial or non-colonial: Non-colonial; breeding pairs or may breed communally, often join mixed species feeding flocks.
- Territoriality: Yes
- Source: Bell (1984), Schodde and Tidemann (1986)

e) Other

- Nomadic, migratory, sedentary: Sedentary although pairs or groups may move within or between breeding seasons.
- Diet: Insects and other arthropods, also recorded taking small lizards
Source: Emison *et al.* (1987), Faithfull (1991), Sullivan (1993), Fitri and Ford (1997)

THREATS

- 1. Clearing of Native Vegetation:**
Rating (2)
Bell (1984), Fitri and Ford (1997), R. Loyn pers. comm.
- 2. Timber harvesting:**
Rating (-)
- 3. Fuel Reduction Burning:**
Rating (2)
R. Loyn pers. comm.
- 4. Firewood Collection:**
Rating (2)
Schodde and Tidemann (1986), Sullivan (1993), R. Loyn pers. comm.
- 5. Unplanned Fire:**
Rating (2)
R. Loyn pers. comm.
- 6. Introduced Species:**
Rating (3)
Sullivan (1993), Fitri and Ford (1997), R. Loyn pers. comm.
- 7. Grazing/Trampling:**
Rating (2)
Sullivan (1993), Fitri and Ford (1997), R. Loyn pers. comm.
- 8. Pest Control:**
Rating (-)
- 9. Road Construction and Maintenance:**
Rating (-)
- 10. Mining/Quarrying:**
Rating (-)
- 11. Tree Dieback:**
Rating (2)
Fitri and Ford (1997), R. Loyn pers. comm.

12. Recreation:

Rating (0)

13. Illegal Collection/Harvesting:

Rating (0)

14. Vandalism/Disturbance by Humans:

Rating (0)

Sullivan (1993)

15. Dams/Impoundments:

Rating (0)

Current management:

The Hooded Robin is not considered "threatened" in Victoria (NRE 1999). There are no threat ameliorating management prescriptions for this species within the Gippsland RFA region.

Species characteristics:

The Hooded Robin is a widespread species that is found throughout the continent with the exception of Tasmania and Cape York Peninsula. In southern Victoria it occurs in lightly timbered habitats containing tall shrubs such as Yellow Box *Eucalyptus melliodora* woodlands, coastal heaths and heathy woodlands (Schodde and Tidemann 1986, Emison *et al.* 1987). In most areas the Hooded Robin is considered a relatively sedentary species that occupies a home range of approximately 10-20 ha year-round. However, there may be some movement of pairs or groups within or between breeding seasons (Fitri and Ford 1997) which may be related to local food availability. In other areas it is likely there is post-breeding winter dispersal from higher to lower altitudes (Emison *et al.* 1987, Boles 1988). Hooded Robins nest in pairs or communally; groups including up to three helpers have been recorded (Bell 1984, Fitri and Ford 1997). Nests are built in trees, shrubs, and stumps or in hollows of dead tree trunks. Hooded Robins are ground foragers that use vantage points such as the ends of broken branches or stumps to detect prey; areas with dead fallen timber provide suitable habitat for hunting with plenty of exposed boughs close to the ground (Boles 1988, Sullivan 1993). The diet consists of a wide range of insects and other arthropods; the occasional small lizard may also be taken (Faithfull 1991, Sullivan 1993). Although not currently listed as a threatened species, the Hooded Robin is declining in woodland and agricultural areas, particularly in southern Australia (Robinson 1993, Fitri and Ford 1997).

Distribution in the Gippsland RFA region:

There are 49 records of the Hooded Robin from the region; the majority of these records are pre-1980. More recent records are from State forest north-east of Weisleigh (1986), Dowds Morass State Game Reserve (1991), in remnant forest habitat amidst cleared land east of Stratford (1993) and Lankeys Plain approximately 10 km north of White Timber (1995) (Atlas of Victorian Wildlife).

Disturbances and threatening processes

operating in the Gippsland RFA region:

Although widely distributed with apparently generalised habitat requirements, the Hooded Robin is declining in woodland and agricultural areas. However, reasons for the decline are unclear (Fitri and Ford 1997). Although largely cleared open paddocks provide foraging habitat for Hooded Robins, trees, particularly saplings, provide nest sites and cover; nesting attempts in the open are generally unsuccessful due to predation (Bell 1984). Loss of nesting habitat as a result of clearing is considered a moderate threat to the species in Gippsland. Long grass and leaf litter provide ground-level camouflage for fledglings, which have been recorded spending long periods sitting on the ground (Sullivan 1993). Grazing results in loss of trees and shrubs and long grass, and is likely to adversely impact on breeding success even though the species may still be able to forage adequately (Fitri and Ford 1997). Tree dieback in agricultural areas will result in loss of nesting habitat in the long-term. Dead, fallen timber provides ample perches for foraging. Firewood collection removes this element of the Robin's habitat. Being a ground foraging species that often nests close to the ground, Hooded Robins are particularly vulnerable to predation by introduced species (Fitri and

Ford 1997). The effects of wildfire and fuel reduction burning are unknown although both disturbances will result in some loss of habitat at least in the short-term. Being a largely sedentary species, Hooded Robins are vulnerable to population declines as a consequence of chance catastrophic events such as wildfire (Robinson 1993).

Cicadabird

Coracina tenuirostris

RARITY

a) Geographic Range

- Classification of range size within the Gippsland region: Large
- Distribution of records within the Gippsland region: Widespread and thinly distributed with two small concentrations of records.
- Number of 5 minute grid cells recorded from: 30
Source: Atlas of Victorian Wildlife

b) Abundance

- Classification of abundance: Low
- Population estimate: Unknown
- Density: 0.3-0.5 birds/ha at Wollomombi, NSW; 0.08-0.11 birds/ha at Moruya, NSW; and 0.1 birds/ha at one site at Boola Boola, Victoria.
- Home range: Unknown
Source: Loyn (1980), Blakers *et al.* (1984), C. Silveira and R. Loyn pers. comm.

c) Habitat Specificity

- Classification of habitat specificity: Wide
- Vegetation types inhabited in the Gippsland region: Tall open-forest and open-forest across a range of EVCs (mainly wet forests and rainforests in the Eastern Uplands and Narrow-leaf Peppermint *Eucalyptus radiata* and White-Stringybark-Silvertop *E. globoidea* - *E. sieberi* forests on the ridges and in gullies in the foothills); rarely in woodland in Victoria. Generally found in mature forest.
Source: Emison *et al.* (1987), R. Loyn and C. Silveira pers. comm.

DYNAMICS

Population Trend in Last Decade

- Increasing, stable or declining: Unknown
Source: C. Silveira pers. comm.

Population trend since discovery by Europeans

- Increasing, stable or declining: Unknown
Source: C. Silveira pers. comm.

SPATIAL DYNAMICS

a) Population variability

- Classification of population variability: Unknown
Source: C. Silveira pers. comm.

b) Dispersal

- Classification of powers of dispersal: High
- Average distance dispersed: Unknown, but absence from southern Australia during winter suggests thousands of kilometres.
- Maximum distance dispersed: Unknown
Source: Blakers *et al.* (1984), Schodde and Tidemann (1986), C. Silveira pers. comm.

LIFE HISTORY PARAMETERS

a) Reproductive output

- Classification of reproductive output: Low
- Age of sexual maturity: Probably 1-2 years.
- Mean clutch/litter/brood size: 1 egg
- Mean no. of clutches/litters/broods per year: Probably one.
- Time of year young born/hatch: Late spring to early summer in southern Australia.
Source: Beruldsen (1980), Shields (1994), C. Silveira pers. comm.

b) Longevity

- Classification of lifespan: Long-lived
- Average lifespan: Unknown
- Maximum lifespan: Six years for a banded individual.
Source: Baker *et al.* (1997), R. Loyn pers. comm.

c) Morphology

Adult body size

- Weight (g): 64-73
- Length (mm): 240-260

Source: Rowland (1984), Simpson and Day (1996), Baker *et al.* (1997)

d) Social organisation

- Colonial or non-colonial: Non-colonial; solitary or in pairs; occasionally clusters of adults.
- Territoriality: Territorial when breeding.
Source: Shields (1994), Schodde and Tidemann (1986)

e) Other

- Nomadic, migratory, sedentary: Migratory in Victoria.
- Mode of feeding: Insectivorous
Source: Rowland (1984), Emison *et al.* (1987)

THREATS

1. Clearing of Native Vegetation:

Rating (2)

C. Silveira pers. comm.

2. Timber harvesting:

Rating (2)

C. Silveira pers. comm.

3. Fuel Reduction Burning:

Rating (-)

4. Firewood Collection:

Rating (0)

C. Silveira pers. comm.

5. Unplanned Fire:

Rating (2)

C. Silveira pers. comm.

6. Introduced Species:

Rating (0)

C. Silveira pers. comm.

7. Grazing/Trampling:

Rating (0)

C. Silveira pers. comm.

8. Pest Control:

Rating (0)

C. Silveira pers. comm.

9. Road Construction and Maintenance:

Rating (0)

C. Silveira pers. comm.

10. Mining/Quarrying:

Rating (0)

C. Silveira pers. comm.

11. Tree Dieback:

Rating (1)

C. Silveira pers. comm.

12. Recreation:

Rating (0)

C. Silveira pers. comm.

13. Illegal Collection/Harvesting:

Rating (0)

C. Silveira pers. comm.

14. Vandalism/Disturbance by Humans:

Rating (0)

C. Silveira pers. comm.

15. Dams/Impoundments:

Rating (0)

C. Silveira pers. comm.

Current management:

The Cicadabird is not considered "threatened" in Victoria (NRE 1999). There are no threat-ameliorating management prescriptions for the Cicadabird within the Gippsland RFA region.

Species characteristics:

The Cicadabird is a summer breeding migrant to Victoria; most individuals arrive from about October, breed, then depart by March. Cicadabirds mainly occur in wet forests and rainforests in the Eastern Uplands although, in the foothills, they also inhabit drier forest types (Emison *et al.* 1987). Mature forest is preferred (Loyn 1980, 1985). Cicadabirds forage in the canopy or sub-canopy for insects and their larvae, which are taken mainly from leaves or twigs. Fruit and seeds are also eaten. Nests are built in trees, and are often placed in a horizontal fork on a small branch. Males actively defend the well-defined territory; individual birds or pairs may return to the same site in successive seasons (Schodde and Tidemann 1986, Shields 1994).

Distribution in the Gippsland RFA region:

There are two small groups of records of the Cicadabird within the region, one isolated group is in

the north-east corner of the region from the Pinnibar-Pendergast State Forest while the other group is from the Fainting Range near Stirling, Wattle Circle, Mt. Elizabeth and north of Reedy Flat. Other records are scattered east of this second group mainly within the centre of the region as far west as Erica. The most southerly records are from near Chalmers Hill and Tarra Bulga National Park (Atlas of Victorian Wildlife).

Disturbances and potentially threatening processes operating in the Gippsland RFA region:

Habitat clearance, timber harvesting, unplanned intense fires and tree dieback all remove the canopy layer that is essential habitat of the Cicadabird. Habitat clearance also results in fragmentation of habitat and the creation of small remnants that are not then utilised by this "interior" species, which requires continuous eucalypt forest (C. Silveira pers. comm.).

Broad-toothed Rat***Mastacomys fuscus***Source: Calaby and Wimbush (1964), Carron *et al.* (1990)**RARITY****a) Geographic Range**

- Classification of range size within the Gippsland region: Medium
- Distribution of records within the Gippsland region: Records are mainly concentrated around a few widely spaced locations including the Cobberas Range, Mt Hotham and Wilsons Promontory National Park
- Number of 5 minute grid cells recorded from: 19
Source: Atlas of Victorian Wildlife

b) Abundance

- Classification of abundance: Low
- Population Estimate: Unknown
- Density: Unknown, dependent on habitat
- Home Range (m²): Female 1044-1614 (1390), Male 996-2703 (1620), differences are seasonal
Source: Bubela *et al.* (1991), Atlas of Victorian Wildlife

c) Habitat Specificity

- Classification of habitat specificity: Narrow
- Vegetation types inhabited in the region: Tall alpine herffield, subalpine sedgeland, fen bog heath and woodland.
Source: Menkhorst (1995a)

DYNAMICS**Population Trend in Last Decade**

- Increasing, stable or declined: Probably declined due to habitat clearance
Source: J. Seebeck pers. comm.

Population trend since discovery by Europeans

- Increasing, stable or declined: Declined due to clearing of native vegetation; particularly in the Strzelecki Ranges
Source: P. Menkhorst pers. comm.

SPATIAL DYNAMICS**a) Population variability**

- Classification of population variability: Probably low
Source: Happold (1989)

b) Dispersal

- Classification of powers of dispersal: Unknown, possibly high as may have to travel long distances to find suitable habitat
- Average distances dispersed: Unknown
- Maximum distance dispersed: Unknown
Source: J. Seebeck pers. comm.

LIFE HISTORY PARAMETERS**a) Reproductive output**

- Classification of reproductive output: Low
- Age of sexual maturity (mths): 10-12
- Mean clutch/litter/brood size: 1-3
- Mean no of clutches/litters/broods per year: 1-2, depends on site quality
- Time of year young born/hatch: November-March
Source: Calaby and Wimbush (1964), Happold (1989), Menkhorst (1995a), J. Seebeck pers. comm.

b) Longevity

- Classification of lifespan: Considered long-lived for an Australian rodent
- Average lifespan (yrs): 2-3
- Maximum lifespan (yrs): Unknown
Source: Happold (1989), J. Seebeck pers. comm.

c) Morphology**Adult body size**

- Weight (g): Female 110-130(118), Male 122-144(131)
- Length (mm): Female 154, Male 172
Source: Wallis *et al.* (1982)

d) Social organisation

- Colonial or non-colonial: Colonial during winter in subalpine region
- Territoriality: Females territorial
Source: Happold (1989), Bubela and Happold (1993)

e) Other

- Nomadic, migratory, sedentary: Sedentary
- Diet: Herbivore (mainly monocotyledons)

THREATS**1. Clearing of Native Vegetation:
Rating (1)**

P. Menkhorst pers. comm.

**2. Timber Harvesting:
Rating (2)**

P. Menkhorst pers. comm.

**3. Fuel Reduction Burning:
Rating (1)**

P. Menkhorst pers. comm.

**4. Firewood Collection:
Rating (1)**

P. Menkhorst pers. comm.

**5. Unplanned Fire:
Rating (2)**

P. Menkhorst pers. comm.

**6. Introduced Species:
Rating (2)**

Mansergh and Marks (1993), P. Menkhorst pers. comm.

**7. Grazing/Trampling:
Rating (3)**

Menkhorst (1995a), P. Menkhorst pers. comm.

**8. Pest Control:
Rating (0)**

P. Menkhorst pers. comm.

**9. Road Construction and Maintenance:
Rating (2)**

P. Menkhorst pers. comm.

**10. Mining/Quarrying:
Rating (0)**

P. Menkhorst pers. comm.

**11. Tree Dieback:
Rating (0)**

P. Menkhorst pers. comm.

**12. Recreation:
Rating (2)**

Menkhorst (1995a) P. Menkhorst pers. comm.

**13. Illegal Collecting/Harvesting:
Rating (0)**

P. Menkhorst pers. comm.

**14. Vandalism:
Rating (0)**

P. Menkhorst pers. comm.

**15. Dams/Impoundments:
Rating (1)**

P. Menkhorst pers. comm.

**16. Other: Climate change:
Rating (2)**Bennett *et al.* (1991)**Current Management:**

The Broad-toothed Rat is classified as "lower risk - near threatened" in Victoria (NRE 1999). A portion of its range, the Alpine Bog Community was accepted for listing under the *Flora and Fauna Guarantee Act* 1988 (SAC 1991a). Within the Alpine National Park a number of areas containing Broad-toothed Rat sites have been included in the Special Protection Zone (DCE 1992a,b).

Species characteristics: The Broad-toothed Rat is a specialist herbivore feeding mainly on grasses and sedges (monocotyledons), with dicotyledon leaf and small amounts of bark, seed and fungi making up the remainder of its diet (Watts and Aslin 1981, Carron *et al.* 1990). Restricted to areas where the annual rainfall exceeds 1000 mm (Watts and Aslin 1981), this species has been found in a variety of environments from alpine herffield to coastal tussock grassland. A common feature of these habitats is the presence of a dense ground layer of grasses, sedges and herbs (Menkhorst 1995a).

Distribution in the Gippsland RFA region

In Gippsland the Broad-toothed Rat has been recorded mainly from alpine and subalpine areas. The majority of sites are clustered around a few widely spaced locations; the Cobberas Range, Mt Wills (within the Mt Wills Historic Area), Mt Hotham (including within the Mt Hotham Alpine Resort), Erica and within Wilsons Promontory National Park. Records are from State forest and Wilsons Promontory and Alpine National Parks (Atlas of Victorian Wildlife).

Disturbances and potentially threatening processes operating in the Gippsland RFA region

The Broad-toothed Rat is threatened by processes that destroy its habitat such as clearing, timber harvesting and fuel reduction burning. Vegetation in alpine areas is particularly sensitive to disturbances, taking a long time to recover from damage (McDougall 1982). Trampling by cattle and recreational activities such as hiking, skiing and associated resort development can cause loss of cover and food (Menkhorst 1995a). Such disturbances associated with grazing are considered a major threat to populations of this species (P. Menkhorst pers. comm.). As populations of this species are small and disjunct, they are also extremely vulnerable to local declines and extinction by stochastic events such as wildfire (Bennett 1990). A moderate threat to the Broad-toothed Rat is predation by foxes (P. Menkhorst pers. comm.) which may selectively prey on this species (Green and Osborne 1981, Mansergh and Marks 1993). The bioclimate of the Broad-toothed Rat is predicted to contract to higher altitudes in response to climatic warming (Bennett *et al.* 1991) and is potentially a serious threat to populations.

Spot-tailed Quoll

Dasyurus maculatus

RARITY

a) Geographic Range

- Classification of range size within the Gippsland region: Large
- Distribution of records within the Gippsland region: Records mainly concentrated around the Gippsland Lakes area, otherwise spaced widely including from Mt Leinster (west of Cobberas Ranges), Tyers and Won Wron State Forest
- Number of 5 minute grid cells recorded from: 29
Source: Atlas of Victorian Wildlife

b) Abundance

- Classification of abundance: Low
- Population Estimate: Unknown
- Density: Unknown
- Home Range (ha): females 614 - 1067, males up to 4500
Source: Mansergh (1984), Belcher (1995b), Belcher (1997)

c) Habitat Specificity

- Classification of habitat specificity: Wide
- Vegetation types inhabited in the region: Recorded from a broad range of vegetated habitats including rainforest, wet sclerophyll forest, dry sclerophyll forest and woodland. Specific habitat requirements are not known.
Source: Mansergh (1984), Mansergh and Belcher (1992)

DYNAMICS

Population Trend in Last Decade

- Increasing, stable or declined: Declined; numbers of records have remained relatively stable over the past 20 years despite an increased survey effort and use of improved survey techniques in the region.
Source: Atlas of Victorian Wildlife, C. Belcher pers. comm.

Population trend since discovery by Europeans

- Increasing, stable or declined: Declined
Source: Mansergh (1984)

SPATIAL DYNAMICS

a) Population variability

- Classification of population variability: Low
Source: Belcher (1995b)

b) Dispersal

- Classification of powers of dispersal: Unknown, presumably high
- Average distances dispersed: Unknown
- Maximum distance dispersed: Unknown
Source: Belcher (1995b), C. Belcher pers. comm.

LIFE HISTORY PARAMETERS

a) Reproductive output

- Classification of reproductive output: Medium
- Age of sexual maturity (yrs): 2
- Mean clutch/litter/brood size: 5; actual number weaned is unknown
- Mean no of clutches/litters/broods per year: 1
- Time of year young born/hatch: July-August (in East Gippsland and south-east NSW)
Source: Fleay (1940), Settle (1978), Green and Scarborough (1990), C. Belcher unpublished data

b) Longevity

- Classification of lifespan: Unknown
- Average lifespan (yrs): Unknown
- Maximum lifespan (yrs): 5
Source: C. Belcher unpublished data

c) Morphology

Adult body size

- Weight (g): Females 1500-2200 (2000) max. 4000, males 1900-4100 (3000) max. 7000
- Length (mm): Females 350-450, males 380-759
Source: Belcher (1995b), Edgar and Belcher (1995), Belcher (1997)

d) Social organisation

- Colonial or non-colonial: Non-colonial
- Territoriality: Females maintain exclusive female territories (but tolerate juvenile females), male territories overlap with other male and female territories at least during the breeding season
Source: Belcher (1995b), C. Belcher unpublished data

e) Other

- Nomadic, migratory, sedentary: Sedentary
- Diet: Primarily a carnivore, juveniles also prey on invertebrates
Source: Belcher (1995a,b)

THREATS

1. Clearing of Native Vegetation:

Rating (2)

Mansergh and Belcher (1992), C. Belcher pers. comm.

2. Timber Harvesting:

Rating (3)

Mansergh and Belcher (1992), C. Belcher pers. comm.

3. Fuel Reduction Burning:

Rating (2)

Catling (1991), C. Belcher and P. Menkhorst pers. comm.

4. Firewood Collection:

Rating (2)

C. Belcher pers. comm.

5. Unplanned Fire:

Rating (2)

C. Belcher and P. Menkhorst pers. comm.

6. Introduced Species:

Rating (2)

Mansergh (1984), Mansergh and Belcher (1992), C. Belcher and P. Menkhorst pers. comm.

7. Grazing/Trampling:

Rating (1)

C. Belcher pers. comm.

8. Pest Control:

Rating (3)

Mansergh and Belcher (1992), Belcher (1995c), Belcher (1998), C. Belcher and P. Menkhorst pers. comm.

9. Road Construction and Maintenance:

Rating (1)

C. Belcher and P. Menkhorst pers. comm.

10. **Mining/Quarrying:**
Rating (1)
 C. Belcher and P. Menkhorst pers. comm.
11. **Tree Dieback:**
Rating (1)
 C. Belcher pers. comm.
12. **Recreation:**
Rating (0)
 C. Belcher and P. Menkhorst pers. comm.
13. **Illegal Collecting/Harvesting:**
Rating (1)
 C. Belcher pers. comm.
14. **Vandalism:**
Rating (0)
 C. Belcher and P. Menkhorst pers. comm.
15. **Dams/Impoundments:**
Rating (1)
 C. Belcher pers. comm.

Current Management:

The Spot-tailed Quoll is classified as "endangered" in Victoria (NRE 1999) and is listed under the Victorian *Flora and Fauna Guarantee Act 1988*. It is also listed as vulnerable under the Commonwealth *Endangered Species Act 1992*. An Action Statement has been prepared for this species (Mansergh and Belcher 1992) which includes the following proposed actions: maintenance of viable populations of the Spot-tailed Quoll within its remaining range, the recording of all sightings on the Atlas of Victorian Wildlife and the protection of sites of importance for scientific research such as latrine or den sites, by a minimum 200 m interim buffer zone pending formal management prescriptions.

Species characteristics: The Spot-tailed Quoll scavenges and preys on mammals, birds and reptiles. Medium-sized mammals (500 g-5 kg) are the major diet component for adult quolls (Belcher 1995a, Belcher 1997). Prey are stalked on the ground (e.g. rabbits) and arboreally (e.g. Greater Glider, Ringtail Possum) (Settle 1978, Belcher 1997). Juveniles are more dependent on small mammals, reptiles and invertebrates (Belcher 1995a, Belcher pers. comm.). Spot-tailed Quolls are forest dependent and appear to be restricted to areas where rainfall exceeds 600 mm per year and to riparian vegetation along the Murray River (Mansergh 1984). They have been recorded from a variety of habitat types around the state including wet sclerophyll forest, dry sclerophyll forest, woodland and heathland (Mansergh 1984, Edgar and Belcher 1995). Specific habitat requirements are not known (C. Belcher pers. comm.). Den sites include tree hollows, logs, windrows, burrows, rock crevices, caves and boulder tumbles with many different sites being used within a home range (Belcher 1997). Spot-tailed Quolls, although seemingly solitary creatures, use common defecation sites: 'latrines', which appear to have an important social function such as communication of female reproductive condition (Belcher 1994). Information on juvenile dispersal and reproductive success is limited; further research in these areas is required.

Distribution in the Gippsland RFA region

There are fewer than 35 records of the Spot-tailed Quoll in the Gippsland RFA region mainly concentrated around the Gippsland Lakes area. Other sites include Mt Leinster (west of the Cobberas Ranges), Ensay and Tyers. About half of the records from this region are pre-1970, the two most recent records are from State forest north of Bairnsdale in 1991 and Won Wron State Forest in 1985 (Atlas of Victorian Wildlife). A targeted survey of areas known to have supported Spot-tailed Quoll in the past and of potentially suitable habitat conducted as part of the comprehensive regional assessment of the Gippsland region, found conclusive evidence of the species at a single site in the Mitchell River National Park (Waldegrave-Knight and Cunningham 1999).

Disturbances and potentially threatening processes operating in the Gippsland RFA region

Spot-tailed Quolls have large home ranges and require extensive areas of habitat to sustain populations. Major threats to this species relate to fragmentation of habitat and reduction of suitable foraging habitat and den sites which can be caused by clearing of vegetation, timber harvesting, fuel reduction burning and wildfire (Catling 1991, Mansergh and Belcher 1992, C. Belcher pers. comm.). Fragmentation, degradation and loss of Spot-tailed Quoll habitat may result in a disjunct distribution, with populations more prone to extinction, recolonisation more difficult and gene flow between populations retarded. Research involving surveys of existing populations is required to help investigation of these issues (C. Belcher pers. comm.). Firewood collection can also result in a reduction in den sites through the removal of logs and is considered a significant threat to the species (C. Belcher pers. comm.). The Spot-tailed Quoll is susceptible to non-target poisoning from 1080-poisoned baits used to control pest animals (rabbits, wild dogs and foxes) which may result in the death of individuals or local populations (Mansergh and Belcher 1992, Belcher 1995c, Belcher 1998, Murray 1998, C. Belcher pers. comm.). Secondary poisoning can also occur through ingestion of poisoned rabbits. Foxes and feral cats represent a potential threat to the Spot-tailed Quoll via competition for prey items (Mansergh 1984, Mansergh and Belcher 1992) and the spread of disease (C. Belcher pers. comm.).

Eastern Bent-wing Bat

Miniopterus schreibersii oceanensis

RARITY

a) Geographic Range

- Classification of range size within the Gippsland region: Large
- Distribution of records within the Gippsland region: Records widely scattered over region including from Walhalla, Moe, Strzelecki Ranges, Glenmaggie, Rotamah Island (Gippsland Lakes), and near Mt Wills
- Number of 5 minute grid cells recorded from: 11
 Source: Atlas of Victorian Wildlife, L. Lumsden pers comm.

b) Abundance

- Classification of abundance: Low
- Population Estimate: Unknown
- Density: Unknown
- Home Range (ha): Unknown; however lactating females are known to travel from Nargun Cave (East Gippsland) to Rotamah Island 34 km away for nightly foraging trips.
 Source: L. Lumsden pers. comm.

c) Habitat Specificity

- Classification of habitat specificity: Narrow; depends on mineshafts and caves for roosting.
- Vegetation types inhabited in the region: Forages over forested areas
 Source: Menkhorst and Lumsden (1995)

DYNAMICS

Population Trend in Last Decade

- Increasing, stable or declined: Unknown
 Source: L. Lumsden pers. comm.

Population trend since discovery by Europeans

- Increasing, stable or declined: Increased, the construction of mineshafts has resulted in an increase of suitable roost sites.
 Source: L. Lumsden pers. comm.

SPATIAL DYNAMICS

a) Population variability

- Classification of population variability: Low
 Source: Lumsden pers. comm.

b) Dispersal

- Classification of powers of dispersal: High
- Average distances dispersed: Approximately 200 km; juveniles disperse this distance from Nargun's Cave, East Gippsland to the Central Highlands and probably travel a similar distance to some sites in Gippsland.
- Maximum distance dispersed: Hundreds of kilometres.

Source: Lumsden *et al.* (1991), Dwyer (1995), Atlas of Victorian Wildlife.

LIFE HISTORY PARAMETERS

a) Reproductive output

- Classification of reproductive output: Low
- Age of sexual maturity (yrs): 2 females, 1 males
- Mean clutch/litter/brood size: 1
- Mean no of clutches/litters/broods per year: 1
- Time of year young born/hatch: December
Source: McKean and Hamilton-Smith (1967), Dwyer (1963)

b) Longevity

- Classification of lifespan: Long-lived
- Average lifespan (yrs): Unknown
- Maximum lifespan (yrs): 20
Source: Purchase (1982)

c) Morphology

Adult body size

- Weight (g): 13-17
- Length (mm): 52-58
Source: Dwyer (1995)

d) Social organisation

- Colonial or non-colonial: Colonial
- Territoriality: Unknown
Source: Dwyer (1966a)

e) Other

- Nomadic, migratory, sedentary: Adult females are migratory. All adult females from the Gippsland RFA region migrate to the maternity site at Nargun Cave to give birth to their young. Males and first year females are largely sedentary although long distance movements are sometimes made.
- Diet: Insectivore (flying insects)
Source: Dwyer and Hamilton-Smith (1965), Vestjens and Hall (1977), L. Lumsden pers. comm.

THREATS

1. Clearing of Native Vegetation:

Rating (1)

Hamilton-Smith (1979), L. Lumsden pers. comm.

2. Timber harvesting:

Rating (-)

Law (1996), L. Lumsden pers. comm.

3. Fuel Reduction Burning:

Rating (-)

L. Lumsden pers. comm.

4. Firewood Collection:

Rating (-)

L. Lumsden pers. comm.

5. Unplanned Fire:

Rating (-)

L. Lumsden pers. comm.

6. Introduced Species:

Rating (2)

Dwyer (1964), Dwyer (1966b), Hall (1982), Menkhorst and Lumsden (1995), L. Lumsden pers. comm.

7. Grazing/Trampling:

Rating (0)

L. Lumsden pers. comm.

8. Pest Control:

Rating (2)

Dunsmore *et al.* (1974), Menkhorst and Lumsden (1995), L. Lumsden pers. comm.

9. Road Construction and Maintenance:

Rating (0)

L. Lumsden pers. comm.

10. Mining/Quarrying:

Rating (2)

Lumsden *et al.* (1991), L. Lumsden pers. comm.

11. Tree Dieback:

Rating (-)

L. Lumsden pers. comm.

12. Recreation:

Rating (2)

L. Lumsden pers. comm.

13. Illegal Collection/Harvesting:

Rating (1)

L. Lumsden pers. comm.

14. Vandalism/Disturbance by Humans:

Rating (3)

Seebeck and Hamilton-Smith (1967), Hall (1982), Lumsden *et al.* (1991), Menkhorst and Lumsden (1995), L. Lumsden pers. comm.

15. Dams/Impoundments:

Rating (0)

L. Lumsden pers. comm.

16. Other: Collapse of mineshafts and

overgrown entrances:

Rating (3)

L. Lumsden pers. comm.

Current Management:

The Eastern Bent-wing Bat is classified as "vulnerable" in Victoria (NRE 1999), and is listed under the Victorian *Flora and Fauna Guarantee Act* 1988. Within the Alpine National Park, there are a couple of known roosting sites located within caves and a mining tunnel (Mt Wills Historic Area) which are included in the Special Protection Zone (DCE 1992b). The Eastern Bent-wing Bat population at Glenmaggie is regularly monitored by local NRE staff. Mine shafts targeted for closure under the Disused Mines Risk Mitigation Program undertaken by Land Victoria are being investigated for bat presence, and attempts are being made to develop a gate-type structure designed to allow access to bats but prevent people from entering mines (Lumsden 1998). An Action Statement is currently being prepared for this species (Clunie in prep.).

Species characteristics:

The Eastern Bent-wing Bat is a fast flying, highly mobile aerial insectivore. Female Eastern Bent-wing Bats congregate in large breeding colonies to give birth; only two sites are known for Victoria, one near Nowa Nowa, and the other near Warrnambool (Dwyer and Hamilton-Smith 1965). Roosting habitats include caves, mines, and tunnels and the species is restricted to areas of southern Victoria where there are suitable roost sites. Roost sites are usually near well timbered areas where bats forage for aerial insects, primarily moths, both above and below the canopy (Menkhorst and Lumsden 1995). Males and first year females use these sites all year round while adult females travel to maternity sites from December to March then return to overwinter. Although relatively widespread, Eastern Bent-wing Bats are considered threatened due to their dependence on a small number of maternity caves and overwintering sites (L. Lumsden pers. comm.). Most available information is related to roosting; very little is known about other habitat requirements and ecology.

Distribution in the Gippsland RFA Region:

Records of the Eastern Bent-wing Bat are widely scattered over the Gippsland RFA region from a low number of locations. The species has been recorded from Walhalla, the Strzelecki Ranges, Glenmaggie, the Gippsland Lakes area, up to near Mt Wills (within the Mt Wills Historic Area) (Atlas of Victorian Wildlife, L. Lumsden pers. comm.).

Disturbances and potentially threatening process operating in the Gippsland RFA Region:

Eastern Bent-wing Bats go into torpor over winter. The species is particularly vulnerable to disturbances that rouse them during torpor; human disturbance of torpid bats is known to have caused significant losses and abandonment of roost sites (Seebeck and Hamilton-Smith 1967, L. Lumsden pers. comm.). The deliberate closure of mineshaft entrances for safety reasons can also cause losses. Collapse of mineshafts, blockage of entrances by vegetation that inhibits bat access, and the reworking of mines are also threats to the species (L. Lumsden pers. comm.). Bats have been recorded being taken by feral cats as they leave roosts, and poisoning through cumulation of pesticides (Menkhorst and Lumsden 1995) are also significant threats to the species (L. Lumsden pers. comm.). Clearing of native vegetation for agriculture can physically destroy or damage caves and surrounding habitat and may alter the composition and abundance of insects. The effects of forestry practices such as timber harvesting and fuel reduction burning on this species and its prey, are unknown (Law 1996, L. Lumsden pers. comm.).

Southern Horseshoe Bat

Rhinolophus megaphyllus

RARITY

a) Geographic Range

- Classification of range size within the Gippsland region: Small
- Distribution of records within the Gippsland region: Records are from three closely located sites: Dogtown, Deptford and Nicholson River
- Number of 5 minute grid cells recorded from: 3
Source: Atlas of Victorian Wildlife

b) Abundance

- Classification of abundance: Low
- Population Estimate: Unknown
- Density: Unknown
- Home Range (ha): Unknown
Source: L. Lumsden pers. comm.

c) Habitat Specificity

- Classification of habitat specificity: Narrow; depends on mineshafts and caves with a suitable warm and humid microclimate
- Vegetation types inhabited in the region: Range of forested habitats close to roost sites
Source: Lumsden and Menkhorst (1995), L. Lumsden pers. comm.

DYNAMICS

Population Trend in Last Decade

- Increasing, stable or declined: Unknown
Source: L. Lumsden pers. comm.

Population trend since discovery by Europeans

- Increasing, stable or declined: Unknown, possibly increased due to construction of mine shafts
Source: L. Lumsden pers. comm.

SPATIAL DYNAMICS

a) Population variability

- Classification of population variability: Low
Source: L. Lumsden pers. comm.

b) Dispersal

- Classification of powers of dispersal: Low, individuals rarely move far from their roosts however the species is thought to be capable of long distance movements on occasions.
- Average distances dispersed: Unknown
- Maximum distance dispersed: Longest recorded movement of a banded individual is 22 km
Source: Lumsden and Menkhorst (1995), Dwyer (1966c)

LIFE HISTORY PARAMETERS

a) Reproductive output

- Classification of reproductive output: Low
- Age of sexual maturity (yrs): 2-3 females, 2 males
- Mean clutch/litter/brood size: 1
- Mean no of clutches/litters/broods per year: 1
- Time of year young born/hatch: November/December
Source: Purchase and Hiscox (1960), Dwyer (1966c), Young (1975)

b) Longevity

- Classification of lifespan: Long-lived
- Average lifespan (yrs): Unknown
- Maximum lifespan (yrs): Unknown, closely related European species of the same genus can live up to 30 years.
Source: L. Lumsden pers. comm.

c) Morphology

Adult body size

- Weight (g): 10-14
- Length (mm): 42-58
Source: Pavey and Young (1995), L. Lumsden pers. comm.

d) Social organisation

- Colonial or non-colonial: Colonial
- Territoriality: Unknown, but unlikely
Source: Dwyer (1966c), L. Lumsden pers. comm.

e) Other

- Nomadic, migratory, sedentary: Probably sedentary, although females move to maternity sites during the breeding season.
- Diet: Insectivore
Source: Vestjens and Hall (1977), Lumsden and Menkhorst (1995), L. Lumsden pers. comm.

THREATS

1. Clearing of Native Vegetation:
Rating (-)
L. Lumsden pers. comm.
2. Timber harvesting:
Rating (-)
Law (1996), L. Lumsden pers. comm.
3. Fuel Reduction Burning:
Rating (-)
L. Lumsden pers. comm.
4. Firewood Collection:
Rating (-)
L. Lumsden pers. comm.
5. Unplanned Fire:
Rating (-)
L. Lumsden pers. comm.
6. **Introduced Species:**
Rating (2)
Lumsden and Menkhorst (1995), L. Lumsden pers. comm.
7. Grazing/Trampling:
Rating (0)
L. Lumsden pers. comm.
8. **Pest Control:**
Rating (2)
Dunsmore *et al.* (1974), L. Lumsden pers. comm.
9. Road Construction and Maintenance:
Rating (0)
L. Lumsden pers. comm.
10. **Mining/Quarrying:**
Rating (2)
Lumsden *et al.* (1991), L. Lumsden pers. comm.
11. Tree Dieback:
Rating (0)
L. Lumsden pers. comm.
12. **Recreation:**
Rating (2)
L. Lumsden pers. comm.
13. Illegal Collection/Harvesting:
Rating (0)
L. Lumsden pers. comm.
14. **Vandalism/Disturbance by Humans:**
Rating (3)
Lumsden and Menkhorst (1995), L. Lumsden pers. comm.
15. Dams/Impoundments:
Rating (0)
L. Lumsden pers. comm.
16. **Other: Mineshaft collapse and entrances overgrown:**
Rating (2)
L. Lumsden pers. comm.

Current Management:

The Southern Horseshoe Bat is classified as "vulnerable" (NRE 1999) and is listed under the Victorian *Flora and Fauna Guarantee Act 1988*. No Action Statement has been prepared for this species and there are currently no threat ameliorating management prescriptions within the Gippsland RFA region.

Species characteristics:

Like the Eastern Bent-wing Bat, the Southern Horseshoe Bat is dependent on caves and mineshafts for roosting and breeding. The species selects warm and humid roost sites, which are usually in enclosed chambers with little air circulation (Hall *et al.* 1975). Only three maternity sites have been located, all are in caves: near Nowa Nowa, Murrindal and on the Snowy River near Buchan (Lumsden and Menkhorst 1995). Recent records of lactating and heavily pregnant females from the Strathbogie Ranges (North East RFA region) indicate the presence of a maternity site, most likely in a mine in the North East region, which is yet to be located (L. Lumsden pers. comm.). The majority of records of the species are from East Gippsland and it is likely that the construction of mines has allowed a western range expansion (L. Lumsden pers. comm.). Southern Horseshoe Bats mainly forage for relatively large, slow-flying insects amongst low vegetation, often close to the ground (Lumsden and Menkhorst 1995). During the winter this species undergoes periods of torpor (Lumsden and Menkhorst 1995).

Distribution within the Gippsland RFA Region:

The Southern Horseshoe Bat has been recorded in the Gippsland region from State forest around three closely situated localities; Dogtown, Deptford and Nicholson River. Roost sites have been recorded at Deptford and Dogtown (Atlas of Victorian Wildlife).

Disturbances and potentially threatening processes operating within the Gippsland RFA Region:

Potential threats to the Southern Horseshoe Bat relate mostly to disturbance at the roost and include loss of habitat through mineshaft collapse, overgrown entrances and reworking of old mines, and predation by feral animals, particularly foxes and cats (Lumsden *et al.* 1991, Lumsden and Menkhorst 1995, L. Lumsden pers. comm.). Direct human disturbance at roost sites is seen as a major threat to populations. The recreational exploration of caves and mine shafts can also disturb roosting bats. Such disturbances may cause bats to arouse from torpor and the subsequent loss of valuable energy stores may cause mortalities if not replenished. Bats may also be prompted to abandon the roost site (Lumsden *et al.* 1991, Menkhorst and Lumsden 1995, L. Lumsden pers. comm.). Poisoning through cumulation of pesticides via prey items (Dunsmore *et al.* 1974) may adversely impact on the species (L. Lumsden pers. comm.). The Southern Horseshoe Bat may also be susceptible to fluctuations in insect availability and loss of foraging substrates as a result of disturbances such as timber harvesting, wildfire and fuel reduction burning, although the affect of these disturbances on the species and its prey, are unknown (Law 1996, L. Lumsden pers. comm.).

Long-footed Potoroo

Potorous longipes

RARITY

a) Geographic Range

- Classification of range size within the Gippsland region: Small
- Distribution of records within the Gippsland region: Southern end of the Tea Tree Ranges (Barry Mountains) including Mt Hart
- Number of 5 minute grid cells recorded from: 2
Source: Atlas of Victorian Wildlife

b) Abundance

- Classification of abundance: Low
- Population Estimate: Unknown
- Density: Probably low
- Home Range (ha): 14-23
Source: Thomas *et al.* (1994), Green *et al.* (in prep.), N. Jones pers. comm.

c) Habitat Specificity

- Classification of habitat specificity: Narrow
- Vegetation types inhabited in the region: Prefers sheltered sites with moist soils and a dense understorey. Recorded from the following EVCs: Riparian Forest, Damp forest, Wet Forest, Montane Damp Forest, Herb-rich Foothill Forest
Source: Scotts and Seebeck (1989), Jones and Johnson (1997)

DYNAMICS

Population Trend in Last Decade

- Increasing, stable or declined: Unknown
Source:

Population trend since discovery by Europeans

- Increasing, stable or declined: Unknown
Source:

SPATIAL DYNAMICS

a) Population variability

- Classification of population variability: Unknown, probably low
Source: Scotts and Seebeck (1989)

b) Dispersal

- Classification of powers of dispersal: Low, only males disperse to establish new territories
- Average distances dispersed: Unknown, one male recorded to disperse 3 km away
- Maximum distance dispersed: Unknown
Source: Green and Mitchell (1997)

LIFE HISTORY PARAMETERS

a) Reproductive output

- Classification of reproductive output: Low
- Age of sexual maturity (yrs): 2
- Mean clutch/litter/brood size: 1
- Mean no. of clutches/litters/broods per year: 1-2
- Time of year young born/hatch: Through-out year with a peak in July-Sept
Source: Scotts and Seebeck (1989), Seebeck (1992), Green and Mitchell (1997)

b) Longevity

- Classification of lifespan: Long-lived
- Average lifespan (yrs): Unknown, possibly 5 based on similar species *P. tridactylus*
- Maximum lifespan (yrs): Unknown, in captivity have lived for over 14 years
Source: D. McDonald pers. comm. in Nunan *et al.* (in prep.), J. Seebeck pers. comm.

c) Morphology

Adult body size

- Weight (g): males 2000-2200 (2100), females 1600-1800 (1700)
- Length (mm): 380-415 (400)
Source: Seebeck (1995b)

d) Social organisation

- Colonial or non-colonial: Non-colonial, solitary
- Territoriality: Territorial monogamy; a monogamous pair share a common territory but only nest together to breed
Source: Scotts and Seebeck (1989), Seebeck (1995a)

e) Other

- Nomadic, migratory, sedentary: Sedentary
- Diet: Primarily mycophagous (fungi feeding), also a small amount of plant material and invertebrates
Source: Scotts and Seebeck (1989)

THREATS

1. Clearing of Native Vegetation:

Rating (2)

Thomas *et al.* (1994), J. Seebeck pers. comm.

2. Timber Harvesting:

Rating (3)

Saxon *et al.* (1994), Nunan *et al.* (in prep.), J. Seebeck pers. comm.

3. Fuel Reduction Burning:

Rating (3)

Catling (1991), Thomas *et al.* (1994), J. Seebeck pers. comm.

4. Firewood Collection:

Rating (-)

J. Seebeck pers. comm.

5. Unplanned Fire:

Rating (3)

Scotts and Seebeck (1989), J. Seebeck pers. comm.

6. Introduced Species:

Rating (3)

Saxon *et al.* (1994), Scotts and Seebeck (1989), J. Seebeck pers. comm.

7. Grazing/Trampling:

Rating (2)

J. Seebeck pers. comm.

8. Pest Control:

Rating (0)

J. Seebeck pers. comm.

9. Road Construction and Maintenance:

Rating (2)

Thomas *et al.* (1994), J. Seebeck pers. comm.

10. Mining/Quarrying:

Rating (0)

J. Seebeck pers. comm.

11. Tree Dieback:

Rating (0)

J. Seebeck pers. comm.

12. Recreation:

Rating (0)

J. Seebeck pers. comm.

13. Illegal Collecting/Harvesting:
Rating (0)
J. Seebeck pers. comm.
14. Vandalism:
Rating (0)
J. Seebeck pers. comm.
15. Dams/Impoundments:
Rating (0)
J. Seebeck pers. comm.

Current Management:

The Long-footed Potoroo is classified as "endangered" in Victoria (NRE 1999) and is listed under the Victorian *Flora and Fauna Guarantee Act* 1988. An Action Statement (Thomas *et al.* 1994) and Management Strategy (Saxon *et al.* 1994) have been prepared. The species is listed under the Commonwealth *Endangered Species Protection Act* 1992; a Recovery Plan is currently being finalised (Nunan *et al.* in prep.). At present there is a moratorium on timber harvesting, new roading and other new development activities at all Long-footed Potoroo sites within the Gippsland RFA region. Fuel-reduction burning is also strictly limited. These prescriptions are interim, pending research on distribution and habitat disturbance (Nunan *et al.* in prep.).

Species characteristics: The Long-footed Potoroo is a ground-dwelling species that appears to be heavily mycophagous (fungi-feeding), feeding on the sporocarps (fruiting bodies) of hypogean (underground fruiting) and sub-hypogean fungi. Small amounts of invertebrates and plant material are also eaten (Scotts and Seebeck 1989). Potoroos characteristically forage by digging conical pits in litter and surface soil with their forefeet (Seebeck 1995a). The Long-footed Potoroo occurs in a variety of vegetation classes but seems to prefer sheltered sites with moist soils (which appear to be favourable for fungi growth) and a dense understorey interspersed with bare patches (Scotts and Seebeck 1989, Saxon *et al.* 1994, Jones and Johnson 1997).

Distribution in the Gippsland RFA region

The Long-footed Potoroo was discovered in this part of Victoria in 1995 when several carcasses were found in a logging coupe. Since then, surveys have recorded animals mainly in areas around the Barry Mountains, specifically West Buffalo, East Riley and Tea Tree Ranges. Most of these sites fall within the North East RFA region, just north of the Gippsland RFA Region. There are two records of Long-footed Potoroo from the Gippsland RFA region: the species was recorded from a scat that was picked up from Mount Hart at the southern end of the Tea Tree Ranges, the second is an historic record (1900) from Rosedale. Previously this species had only been recorded in East Gippsland and south-eastern New South Wales (Atlas of Victorian Wildlife).

Disturbances and potentially threatening processes operating in the Gippsland RFA region

The Long-footed Potoroo has a limited known distribution in Gippsland and any loss of habitat due to clearing, timber harvesting, roading and fires and could result in fragmentation and declines of sub-populations (Saxon *et al.* 1994, Thomas *et al.* 1994). Dense understorey appears to be important shelter sites for the Long-footed Potoroo, particularly as protection from the Red Fox and wild Dog (Scotts and Seebeck 1989). A reduction in this shelter may increase predation on this species, which is regarded as a major threat (J. Seebeck pers. comm.). Compaction and disturbance of soil and reduction of litter as a result of timber harvesting, burning and grazing may also affect hypogean fungi availability (Thomas *et al.* 1994); further research is required in regard to this.

Dingo

Canis latrans dingo

RARITY

a) Geographic Range

- Classification of range size within the Gippsland region: Unknown, possibly large
- Distribution of records within the Gippsland region: Three records from Bentleys Plains west of Stirling
- Number of 5 minute grid cells recorded from: 1
Source: Atlas of Victorian Wildlife

b) Abundance

- Classification of abundance: Low
- Population Estimate: Unknown
- Density: Unknown
- Home Range (ha): 2700 (in mountain forest in NSW, dependent on habitat and prey numbers
Source: Harden (1985), Menkhorst (1995b))

c) Habitat Specificity

- Classification of habitat specificity: Wide
- Vegetation types inhabited in the region: Unknown, in general inhabits wet and dry forest and subalpine woodland
Source: Menkhorst (1995b)

DYNAMICS

Population Trend in Last Decade

- Increasing, stable or declined: Unknown
Source: Menkhorst (1995b)

Population trend since discovery by Europeans

- Increasing, stable or declined: Declined substantially
Source: P. Menkhorst pers. comm.

SPATIAL DYNAMICS

a) Population variability

- Classification of population variability: Unknown, probably low
Source: Harden (1985)

b) Dispersal

- Classification of powers of dispersal: High
- Average distances dispersed: Unknown
- Maximum distance dispersed: Unknown
Source: Harden (1985)

LIFE HISTORY PARAMETERS

a) Reproductive output

- Classification of reproductive output: Low, given packs have only one breeding pair, hence a high proportion of non-breeding adults
- Age of sexual maturity (yrs): 1-4 females, 2-3 males
- Mean clutch/litter/brood size: 2-9 (5.5)
- Mean no of clutches/litters/broods per year: 1
- Time of year young born/hatch: March to September, peak between June and August
Source: Jones and Stevens (1988)

b) Longevity

- Classification of lifespan: Long-lived
- Average lifespan (yrs): Unknown
- Maximum lifespan (yrs): 12 - may have been hybrids
Source: Corbett (1995)

c) Morphology

Adult body size

- Weight (kg): 9.5-22.5 (14.0) females, 10.5-24.0 (16.3) males
- Length (mm): 779-1099 (927) females, 770-1131 (973) males
Source: Jones (1990)

d) Social organisation

- Colonial or non-colonial: Live singly, in pairs or in packs
- Territoriality: Territorial
Source: Corbett (1995)

e) Other

- Nomadic, migratory, sedentary: Sedentary
- Diet: Carnivore, medium to large mammals are the major prey item
Source: Brown and Triggs (1990), Corbett (1995)

THREATS

1. Clearing of Native Vegetation:

Rating (1)

P. Menkhorst pers. comm.

2. Timber Harvesting:

Rating (2)

- P. Menkhorst pers. comm.
3. **Fuel Reduction Burning:**
Rating (1)
P. Menkhorst pers. comm.
 4. **Firewood Collection:**
Rating (1)
P. Menkhorst pers. comm.
 5. **Unplanned Fire:**
Rating (1)
P. Menkhorst pers. comm.
 6. **Introduced Species:**
Rating (2)
P. Menkhorst pers. comm.
 7. **Grazing/Trampling:**
Rating (2)
P. Menkhorst pers. comm.
 8. **Pest Control:**
Rating (3)
Menkhorst (1995b), P. Menkhorst pers. comm.
 9. **Road Construction and Maintenance:**
Rating (1)
P. Menkhorst pers. comm.
 10. **Mining/Quarrying:**
Rating (1)
P. Menkhorst pers. comm.
 11. Tree Dieback:
Rating (0)
P. Menkhorst pers. comm.
 12. **Recreation:**
Rating (1)
P. Menkhorst pers. comm.
 13. Illegal Collecting/Harvesting:
Rating (0)
P. Menkhorst pers. comm.
 14. Vandalism:
Rating (0)
P. Menkhorst pers. comm.
 15. **Dams/Impoundments:**
Rating (1)
P. Menkhorst pers. comm.
 16. **Other - Genetic dilution due to inbreeding with Dogs:**
Rating (2)
Corbett (1995), P. Menkhorst pers. comm.

Current Management:

Dingoes are classified as "data deficient" in Victoria (NRE 1999). Dingoes and their hybrids are declared pests in Victoria under the *Catchment and Land Protection Act* 1994 and are actively persecuted on public land, particularly where it borders private land utilised for grazing.

Species characteristics: Dingoes are the largest terrestrial predator in Australia. They are a social animal commonly living in packs consisting of one dominant breeding pair and other non-breeding animals. They may also live in pairs or singly. The size of the pack, usually 3-12 members, may be related to the availability of resources (Corbett 1995). Dingoes feed mainly on medium to large mammals such as Common and Mountain Brushtail Possums, Black Wallabies and Common Wombats (Newsome *et al.* 1983, Brown and Triggs 1990). Birds, reptiles, insects and plant material are also included in their diet (Brunner *et al.* 1981, Newsome *et al.* 1983). Dingoes inhabit wet and dry forest and subalpine woodlands, using hollow logs, old wombat burrows and occasionally caves under rock ledges as den sites (Corbett 1995, Menkhorst 1995b). Most dens occur close to a water source (Corbett 1995).

Distribution in the Gippsland RFA region

There are three records (1992/93) of the Dingo within the Gippsland region from the one location; Bentleys Plains, west of Stirling. When Dingo and wild Dog records are combined the number of records increases substantially with locations spread throughout the region. It is not known what

proportion of these records are of pure Dingoes (Atlas of Victorian Wildlife).

Disturbances and potentially threatening processes operating in the Gippsland RFA region

The status of Dingo populations in Gippsland is unclear partly due to the difficulties in distinguishing between Dingoes, feral dogs and their hybrids (Menkhorst 1995b). This is reflected by the low number of specifically Dingo records on the Atlas of Victorian Wildlife. The extent of hybridisation and therefore its importance as a threatening process is not clear. Interbreeding with dogs is considered a moderate threat to the survival of pure Dingoes via dilution of the gene pool (Corbett 1995, P. Menkhorst pers. comm.). Corbett (1995) believed that hybrids are on the rise although a morphological study concluded that little hybridisation has occurred (Jones 1990). Dingoes are declared vermin in Victoria due to their perceived role in killing stock. Snaring and baiting programs are conducted throughout Gippsland, mainly on the private land/State forest interface (Abbott *et al.* 1993), with no distinction made between dogs, Dingoes and their hybrids. This form of pest control is seen as a major threat to this species (P. Menkhorst pers. comm.). Although a declared pest, the Dingo is considered an indigenous species within the Alpine National Park which affords it some protection in this area (DCE 1992a,b,c). Competition between foxes and Dingoes may also be a threat to the species, due to the dietary overlap in prey items (Brown and Triggs 1990). In a study of ground-dwelling mammals in south eastern NSW, Catling and Burt (1995) found the Dingo to be positively correlated with high habitat complexity. Therefore, activities that simplify the vegetation structure such as fuel-reduction burning, grazing and timber harvesting, may cause population declines. Widespread severe wildfire and fuel reduction burnings may result in loss of den sites and the death of individuals (P. Menkhorst pers. comm.).

Smoky Mouse

Pseudomys fumeus

RARITY

a) Geographic Range

- Classification of range size within the Gippsland region: Medium
- Distribution of records within the Gippsland region: Patchily distributed from Aberfeldy, Mt McDonald, Howitt Plains, the Snowy Range, Wombat Spur and the Blue Rag Range
- Number of 5 minute grid cells recorded from: 13
Source: Atlas of Victorian Wildlife

b) Abundance

- Classification of abundance: Low
- Population Estimate: Unknown
- Density: Unknown
- Home Range (ha): Unknown
Source: Menkhorst and Seebeck (1981)

c) Habitat Specificity

- Classification of habitat specificity: Narrow
- Vegetation types inhabited in the region: Subalpine heath, open-forest with a diverse heathy understorey dominated by Papilionaceae and Epacridaceae and dry forest of *Eucalyptus dives* and *E. mannifera*, or *E. dalrympleana* and *E. delegatensis*.
Source: Menkhorst and Seebeck (1981)

DYNAMICS

Population Trend in Last Decade

- Increasing, stable or declined: Declined, few records since 1978
Source: Atlas of Victorian Wildlife, P. Menkhorst pers. comm., Kambouris (1999)

Population trend since discovery by Europeans

- Increasing, stable or declined: Declined
Source: Menkhorst and Seebeck (1981)

SPATIAL DYNAMICS

a) Population variability

- Classification of population variability: High (especially if in suboptimal habitat)
Source: Cockburn (1981b)

b) Dispersal

- Classification of powers of dispersal: Unknown, probably low
- Average distances dispersed: Unknown
- Maximum distance dispersed: Unknown
Source: Cockburn (1981b)

LIFE HISTORY PARAMETERS

a) Reproductive output

- Classification of reproductive output: Medium
- Age of sexual maturity (yrs): 1
- Mean clutch/litter/brood size: 3
- Mean no of clutches/litters/broods per year: 1-2
- Time of year young born/hatch: December-January
Source: Cockburn (1981b), P. Menkhorst pers. comm.

b) Longevity

- Classification of lifespan: Short-lived
- Average lifespan (yrs): 1
- Maximum lifespan (yrs): 2
Source: Cockburn (1981b)

c) Morphology

Adult body size

- Weight (g): 29-40 (37)
- Length (mm): 85-100 (90)
Source: P. Menkhorst pers. comm.

d) Social organisation

- Colonial or non-colonial: Unknown, probably non-colonial
- Territoriality: Territorial
Source: Cockburn (1981b), J. Seebeck pers. comm.

e) Other

- Nomadic, migratory, sedentary: Sedentary
- Diet: Omnivore; fungi, seed, insects, flowers
Source: Cockburn (1981a, b)

THREATS

1. **Clearing of Native Vegetation:**
Rating (1)
J. Seebeck and P. Menkhorst pers. comm.
2. **Timber Harvesting:**
Rating (2)
P. Menkhorst pers. comm.
3. **Fuel Reduction Burning:**
Rating (3)
SAC (1996b), J. Seebeck pers. comm.
4. **Firewood Collection:**
Rating (1)
J. Seebeck pers. comm.
5. **Unplanned Fire:**
Rating (2)
J. Seebeck and P. Menkhorst pers. comm.
6. **Introduced Species:**
Rating (2)
Lee (1995), SAC (1996b), P. Menkhorst pers. comm.
7. **Grazing/Trampling:**
Rating (1)
P. Menkhorst pers. comm.
8. **Pest Control:**
Rating (0)
P. Menkhorst pers. comm.
9. **Road Construction and Maintenance:**
Rating (1)
P. Menkhorst pers. comm.
10. **Mining/Quarrying:**
Rating (1)
P. Menkhorst pers. comm.
11. **Tree Dieback:**
Rating (0)
P. Menkhorst pers. comm.
12. **Recreation:**
Rating (-)
13. **Illegal Collecting/Harvesting:**
Rating (0)
P. Menkhorst pers. comm.
14. **Vandalism/Disturbance by Humans:**
Rating (0)
P. Menkhorst pers. comm.

15. **Dams/Impoundments:**
Rating (0)
P. Menkhorst pers. comm.

Current Management:

The Smoky Mouse is classified as "endangered" in Victoria (NRE 1999) and has been recommended for listing under the Victorian *Flora and Fauna Guarantee Act 1988* (SAC 1996b). The Alpine National Park Management Plan (Wonnangatta-Moroka Unit) recommends research into distribution, ecology and potential threats, particularly fuel reduction burning, regarding this species. There are a number of known Smoky Mouse sites included within the Special Protection zone of the Alpine National Park (DCE 1992c).

Species characteristics: The Smoky Mouse is an omnivorous heath specialist. It utilises the seasonal availability of underground fungi, various seeds and berries and insects, including Bogong Moths in rocky sub-alpine heaths during summer (Cockburn 1981a). Smoky Mouse habitat is usually dry and rocky with a sparse to medium-density understorey of sclerophyllous shrubs. These shrubs are an important food source and in particular include members from the families Epacridaceae and Fabaceae (Cockburn 1981a, Menkhorst and Seebeck 1981, Jurskis *et al.* 1997). There have been very few biological studies carried out on the Smoky Mouse. Most information is from a study carried out on a Grampians population (Cockburn 1981b), which was not located in recent surveys in the area (SAC 1996b).

Distribution in the Gippsland RFA region

Records of the Smoky Mouse in the Gippsland region are patchily distributed. There are two records from the vicinity of Aberfeldy (1971/1972), other records are from south of Mt McDonald, The Bluff and The Knobs, Howitt Plains, Mt Reynard and the Gorge on the Snowy Range, the vicinity of Mt Von Guerard and Herne Spur and as well as south of Mount Freezeout on the Blue Rag Range. The majority of records are from the 1978 and are from the Wonnangatta Moroka Unit of the Alpine National Park. The species has also been recorded from State forest (Atlas of Victorian Wildlife) A targeted survey of potentially suitable Smoky Mouse habitat conducted as part of the comprehensive regional assessment of the Gippsland region, recorded the species from three of 51 surveyed sites. These records were from Zeka Spur and Howitt Plain in the Alpine National Park and from Hart Spur in State forest. The species was also recorded indirectly from Howitt Plain and Saltlick Saddle (State forest) in predator scats (Kambouris 1999).

Disturbances and potentially threatening processes operating in the Gippsland RFA region

Populations of the Smoky Mouse are small and isolated making them particularly vulnerable to disturbances. Any loss of habitat due to clearing, fires and road construction could result in local population fragmentation and declines. The effect of timber harvesting on Smoky Mouse populations is unclear. The species has been recorded from harvested areas in NSW (Jurskis *et al.* 1997). However, this disturbance has the potential to remove habitat and fragment populations, and is considered a moderate threat to the species in Gippsland. Much of the Smoky Mouse habitat is said to be fire-generated and the apparent reliance on such vegetation structure may make this species vulnerable to inappropriate fire regimes (SAC 1996b). However, there is a lack of information on the species' ecological requirements, particularly in relation to fire (Lee 1995). Populations appear to fluctuate in response to microhabitat quality (Cockburn 1981b), disturbances which impact on habitat quality (eg. grazing/trampling) may contribute to population declines. Predation by cats and foxes is considered to be a moderate threat to this species (Lee 1995, J. Seebeck pers. comm.).

New Holland Mouse

Pseudomys novaehollandiae

RARITY

a) Geographic Range

- Classification of range size within the Gippsland region: Small
- Distribution of records within the Gippsland region: Few records from several disjunct localities; most records from coastal areas in the vicinity of Loch Sport and Wilsons Promontory. Also recorded from Mullundung State Forest and Providence Ponds, up to 30 km inland.
- Number of 5 minute grid cells recorded from: 13
Source: Atlas of Victorian Wildlife

b) Abundance

- Classification of abundance: Low
- Population Estimate: Unknown
- Density: Variable depending on habitat: Reported densities in the eastern Otway Ranges from 0.2-3.1 animals per ha. In disturbed heathy woodland on the NSW coast 17 animals/ha but lower in forest 2.3 animals/ha
- Home Range (ha): Approx 1 ha.
Source: Fox and McKay (1981), Kemper in Strahan (1983), Wilson (1991), NRE (1997)

c) Habitat Specificity

- Classification of habitat specificity: Narrow - populations particularly sensitive to seral stage of vegetation
- Vegetation types inhabited in the region: Woodland with a heathy understorey, heathland and vegetated sand dunes: Mullundung State Forest and Providence Ponds: Patches of heath with emergent *E. willisii* (Shining Peppermint) and *Banksia serrata* (Saw Banksia). *Pteridium esculentum* (Austral Bracken) was present in more recently burnt areas at Providence Ponds. Reeves Beach habitat was primary sand dunes with tussocks of *Poa* sp. and *Ammophila arenaria* (Marram Grass) and in *Lepidosperma* sedge-field overtopped by scattered *Acacia sophorae* (Coast Wattle), *Banksia integrifolia* (Coast Banksia), *Leptospermum laevigatum* (Coast Tea-tree), *Leucopogon parviflorus* (Coast Beard-heath), *Myoporum insulare* (Common Boobialla) and *Olearia* sp. In the Loch Sport area the vegetation was *B. serrata*/*E. willisii* woodland with a heath understorey as well as heath dominated by *L. myrsinoides*. On the Yanakie Isthmus the dunes carry a woodland of *Allocasuarina verticillata* (Drooping Sheoke) and *B. serrata*, with *L. laevigatum* and *M. insulare* also present over an open overstorey of sedges and low shrubs.
Source: Seebeck *et al.* (1996)

DYNAMICS

Population Trend in Last Decade

- Increasing, stable or declined: Unknown, Loch Sport population most likely stable. Difficult to ascertain throughout region due to highly variable nature of populations
Source: G. Hollis pers. comm.

Population trend since discovery by Europeans

- Increasing, stable or declined: Declined
Source: Wilson (1996)

SPATIAL DYNAMICS

a) Population variability

- Classification of population variability: High
Source: Braithwaite and Gullan (1978), Kemper in Strahan (1983), Wilson (1991)

b) Dispersal

- Classification of powers of dispersal: Unknown
- Average distances dispersed: Unknown
- Maximum distance dispersed: Unknown
Source: Seebeck *et al.* (1996)

LIFE HISTORY PARAMETERS

a) Reproductive output

- Classification of reproductive output: High
- Age of sexual maturity (yrs): 13 weeks for females and 20 weeks for males
- Mean clutch/litter/brood size: average 4.6 (range 1-6)
- Mean no of clutches/litters/broods per year: 1 for first year females, 3-4 per season for second year females

- Time of year young born/hatch: August-early January
Source: Kemper (1976, 1980)

b) Longevity

- Classification of lifespan: Short-lived
- Average lifespan (yrs): 1.5-2
- Maximum lifespan (yrs): 2
Source: Kemper (1990)

c) Morphology

Adult body size

- Weight (g): 12-20 (16)
- Length (mm): 65-88 (78) head and body, 81-107 (87) tail length
Source: Kemper in Strahan (1983)

d) Social organisation

- Colonial or non-colonial: Probably lives in family groups
- Territoriality: Males territorial; home ranges of breeding females may overlap, but those of mature males do not.
Source: Kemper (1981), Kemper in Strahan (1983)

e) Other

- Nomadic, migratory, sedentary: Sedentary
- Diet: Omnivore, seeds form major component of diet, particularly seeds of legumes. Insects, soil invertebrates, moss, roots, flowers and fungi also eaten
Source: Braithwaite and Gullan (1978), Cockburn (1980)

THREATS

1. Clearing of Native Vegetation:

Rating (2)

Seebeck *et al.* (1996), G. Hollis pers. comm.

2. Timber Harvesting:

Rating (0)

G. Hollis pers. comm.

3. Fuel Reduction Burning:

Rating (3)

Seebeck *et al.* (1996), Wilson (1996), G. Hollis pers. comm.

4. Firewood Collection:

Rating (0)

G. Hollis pers. comm.

5. Unplanned Fire:

Rating (1)

Wilson (1981), Fox and McKay (1981), Fox (1982), G. Hollis pers. comm.

6. Introduced Species:

Rating (2)

Seebeck *et al.* (1996), Wilson (1996), G. Hollis pers. comm.

7. Grazing/Trampling:

Rating (0)

G. Hollis pers. comm.

8. Pest Control:

Rating (0)

G. Hollis pers. comm.

9. Road Construction and Maintenance:

Rating (1)

Seebeck *et al.* (1996), G. Hollis pers. comm.

10. Mining/Quarrying:

Rating (0)

G. Hollis pers. comm.

11. Tree Dieback:

Rating (0)

12. Recreation:

Rating (1)

Seebeck *et al.* (1996), Wilson (1996), G. Hollis pers. comm.

13. Illegal Collecting/Harvesting:

Rating (0)

G. Hollis pers. comm.

14. Vandalism/Disturbance by Humans:

Rating (0)

G. Hollis pers. comm.

15. Dams/Impoundments:

Rating (0)

G. Hollis pers. comm.

16. **Other: Cinnamon Fungus *Phytophthora cinnamomi* Infection of habitat**
Rating (2)
Seebeck *et al.* (1996), Wilson (1996)

Current Management:

The New Holland Mouse is classified as "critically endangered" in Victoria (NRE 1999) and is listed under the Victorian *Flora and Fauna Guarantee Act* 1988. An Action Statement has been published (Seebeck *et al.* 1996). Intended management actions include: initiation of a recovery team to establish a timetable for coordinated research reflecting priority conservation needs such as investigation of habitat and resource requirements, development of habitat restoration techniques and population monitoring; community education; preparation of management plans, particularly with respect to burning regimes; habitat protection at key sites through control of fire, alienation, predation, spread of weeds and Cinnamon Fungus; and incorporation of proposed conservation actions for the species in management plans for The Lakes National Park and Gippsland Lakes Coastal Park.

Species characteristics : The New Holland Mouse is a small, nocturnal, burrowing rodent found in disjunct populations at mainly coastal locations in south-eastern Victoria, New South Wales and Tasmania. The species has been recorded from heathlands, woodlands with a heathy understorey, open forests and vegetated sand dunes. In heathlands and forest areas its distribution is patchy. This is most likely a reflection of its preference for habitats with soft, sandy substrates, floristically rich vegetation and low vegetation cover (Kemper in Strahan 1983, Wilson 1991, Seebeck *et al.* 1996). The New Holland Mouse actively recolonises areas after disturbances such as wildfire and mining, and reaches maximum densities in the early to mid-successional regeneration stages, at 2-3 years post-disturbance (Fox and McKay 1981, Fox 1982, Kemper in Strahan 1983, Fox and Fox 1984). Some populations do not persist as the vegetation ages (Wilson 1991). However, relatively high densities of New Holland Mouse have been recorded from Wilsons Promontory on sand-dune habitat which is at least 20-30 years old (Quin 1994).

The New Holland Mouse is omnivorous and its diet changes seasonally and with locality. In the spring and summer it prefers the seeds of legumes, while insects and other invertebrates are eaten mainly in winter. The diet also includes moss, roots, leaves, flowers and fungi (Cockburn 1980, Kemper in Strahan 1983). New Holland Mice probably live in family groups that share permanent nests in deep burrows, which are constructed in sandy soils. Short, shallow escape burrows are also constructed (Kemper 1981). Breeding females occupy overlapping home ranges, while the home ranges of mature males are exclusive (Kemper in Strahan 1983).

Distribution in the Gippsland RFA region

The New Holland Mouse has been recorded from six localities within the Gippsland RFA region: Providence Ponds Flora and Fauna Reserve, Gippsland Lakes Coastal Park (Loch Sport), Reeves Beach and Hummock Island (Nooramunga Marine and Coastal Park), Wilsons Promontory National Park and Mullundung State Forest. The species has not been recorded from Reeves Beech or Hummock Island since 1977 and it may be locally extinct in these areas (Seebeck *et al.* 1996, Atlas of Victorian Wildlife). A targeted survey of areas of potential New Holland Mouse habitat was conducted as part of the comprehensive regional assessment of Gippsland. The survey focused on areas that had received either little or no previous survey and included heathy woodland across the Gippsland plains, Holey Plains State Park, Mullundung State Forest, Won Wron State Forest, Gellions Run and Snake Island. The species was not recorded (Reside and Hooper 1999).

Disturbances and potentially threatening processes operating in the Gippsland RFA region

Due to its dependency on vegetation of a particular seral stage, the most significant threat to the survival of New Holland Mouse populations is inappropriate fire regimes (Seebeck and Menkhorst in Menkhorst 1995, Seebeck *et al.* 1996, Wilson 1996, G. Hollis pers. comm.). Fire regimes that do not provide habitat patches of suitable successional age, size and distribution can result in alteration and increasing fragmentation of habitat. Providence Ponds is a priority area for fuel reduction burning because of its proximity to settled areas; too frequent burning may result in the absence of remaining refuge patches from which colonisation can occur resulting in local extinction (Seebeck *et al.* 1996).

Alteration of habitat due to invasion by exotic or non-indigenous plants has been identified as a threat to populations at several sites (Quin 1994, Wilson 1996, Seebeck *et al.* 1996). The plant pathogen *Phytophthora cinnamomi* (Cinnamon Fungus) has been recorded from Wilsons Promontory, Mullundung State Forest and the Gippsland Lakes Coastal Park. This pathogen has the potential to alter floristic diversity and structure and cause dieback. Although its impact on New Holland Mouse habitat is unknown, simplification of vegetation communities will reduce dietary resources for the species and may adversely impact populations (Seebeck *et al.* 1996, Wilson 1996).

Although the majority of New Holland Mouse habitat is in reserves and protected from clearing (G. Hollis pers. comm.), clearing associated with infrastructure development in the Gippsland Lakes Coastal Park may be a moderate threat to populations in this area. Highway development at Providence Ponds could affect habitat integrity in this area and is considered a minor threat (Seebeck *et al.* 1996). Recent studies of dog and fox scats showed that less than one per cent of scats contained New Holland Mouse hair. This indicates that predation by these species in Gippsland is unlikely to pose a significant threat to New Holland Mouse (G. Hollis pers. comm.).

Recreational activities such as horseriding, four-wheel driving and trail-bike riding have the potential to modify, fragment or disturb suitable habitat through the formation of new tracks which facilitate the introduction of weeds, and predators. New tracks can also change drainage patterns causing erosion and alteration of vegetation communities (Seebeck *et al.* 1996). This threat is considered minor in Gippsland (G. Hollis pers. comm.).

Long-nosed Bandicoot

Perameles nasuta

RARITY

a) Geographic Range

- Classification of range size within the Gippsland region within region: Large
- Distribution of records within the Gippsland region: Scattered over whole of region
- Number of 5 minute grid cells recorded from: 64
Source: Atlas of Victorian Wildlife

b) Abundance

- Classification of abundance: Medium
- Population Estimate: Unknown
- Density: Probably low
- Home Range (ha): Unknown
Source: Menkhorst and Seebeck (1995)

c) Habitat Specificity

- Classification of habitat specificity: Wide
- Vegetation types inhabited in the region: Recorded from Riparian Forest, Damp Sclerophyll Forest, heathy woodlands ; vegetation with dense ground or shrub layers.

Source: Opie *et al.* (1990), Menkhorst and Seebeck (1990)

DYNAMICS

Population Trend in Last Decade

- Increasing, stable or declined: Unknown, most likely some decline due to loss of habitat as a result of clearing for agriculture and development
Source: J. Seebeck pers. comm.

Population trend since discovery by Europeans

- Increasing, stable or declined: Unknown, most likely some decline due to loss of habitat as a result of clearing for agriculture and development
Source: Opie *et al.* (1990)

SPATIAL DYNAMICS

a) Population variability

- Classification of population variability: Unknown
Source: J. Seebeck pers. comm.

b) Dispersal

- Classification of powers of dispersal: Unknown, probably high; individuals can cover large areas
- Average distances dispersed: Unknown
- Maximum distance dispersed: Unknown
Source: Scott (1995), J. Seebeck pers. comm.

LIFE HISTORY PARAMETERS

a) Reproductive output

- Classification of reproductive output: High
- Age of sexual maturity (yrs): Males 5 months, Females 4 months
- Mean clutch/litter/brood size: 1-4(2,3)
- Mean no of clutches/litters/broods per year: Up to 4
- Time of year young born/hatch: all year/ pouch young recorded during September - December
Source: Lyne (1964), Menkhorst and Seebeck (1995), Scott (1995)

b) Longevity

- Classification of lifespan: Unknown, probably short-lived
- Average lifespan (yrs): Unknown
- Maximum lifespan (yrs): Unknown
Source: Stodart (1977)

c) Morphology

Adult body size

- Weight (g): 500-1900
- Length (mm): 310-425
Source: Stodart (1995)

d) Social organisation

- Colonial or non-colonial: Solitary
- Territoriality: Adults aggressively territorial, especially females
Source: Menkhorst and Seebeck (1995)

e) Other

- Nomadic, migratory, sedentary: Sedentary
- Diet: Omnivore
Source: Stodart (1977), Claridge (1993)

THREATS

1. **Clearing of Native Vegetation:**
Rating (2)
J. Seebeck pers. comm.
2. **Timber Harvesting:**
Rating (2)
J. Seebeck pers. comm.
3. **Fuel Reduction Burning:**
Rating (2)
Catling (1991), J. Seebeck pers. comm.
4. **Firewood Collection:**
Rating (1)
J. Seebeck pers. comm.
5. **Unplanned Fire:**
Rating (2)
J. Seebeck pers. comm.
6. **Introduced Species:**
Rating (3)
Claridge *et al.* (1991), J. Seebeck pers. comm.
7. **Grazing/Trampling:**
Rating (2)
J. Seebeck pers. comm.
8. **Pest Control:**
Rating (1)

McIlroy (1983), J. Seebeck pers. comm.

9. **Road Construction and Maintenance:**
Rating (0)
J. Seebeck pers. comm.
10. **Mining/Quarrying:**
Rating (0)
J. Seebeck pers. comm.
11. **Tree Dieback:**
Rating (0)
J. Seebeck pers. comm.
12. **Recreation:**
Rating (0)
J. Seebeck pers. comm.
13. **Illegal Collecting/Harvesting:**
Rating (0)
J. Seebeck pers. comm.
14. **Vandalism:**
Rating (0)
J. Seebeck pers. comm.
15. **Dams/Impoundments:**
Rating (0)
J. Seebeck pers. comm.

Current Management:

The Long-nosed Bandicoot is not considered threatened in Victoria (NRE 1999). There are no current management prescriptions for this species in the Gippsland region.

Species characteristics: The Long-nosed Bandicoot is widely distributed in the eastern half of Victoria. There are also isolated populations in the Otway Ranges and westwards to the Naringal district (Menkhorst and Seebeck 1995, Atlas of Victorian Wildlife). This species prefers habitats that feature a water component; it is usually found in areas associated with watercourses or where soils are frequently moist. A dense ground or shrub layer is also important (Menkhorst and Seebeck 1990, Opie *et al.* 1990). Habitat includes wet open-forest with dense riparian vegetation and heathy woodland (Menkhorst *et al.* 1984). The Long-nosed Bandicoot forages among the ground litter and digs conical holes searching for invertebrates, fungi (mostly underground-fruited mycorrhizal types), seeds and plant material (Claridge 1993, Menkhorst and Seebeck 1995). It also nests on the ground, placing dry grass and plant material in well camouflaged depressions (Menkhorst and Seebeck 1995). A number of different nests may be used over several nights (C. Dickmann pers. comm. in Menkhorst and Seebeck 1995). A high reproductive output is offset by high juvenile mortality (Stodart 1977). The Long-nosed Bandicoot is a difficult animal to study in the wild and consequently little is known of its ecology (J. Seebeck pers. comm.).

Distribution in the Gippsland RFA region

Long-nosed Bandicoot records are scattered throughout the Gippsland region including sites in the Alpine National Park. Locations of records include Binginwarri, around Sale and Bairnsdale, Ensay North, Dargo and Mt Sassafras (east of Dartmouth Dam). Records are from State forest and a number of National Parks including Mitchell River, Alpine and Wilsons Promontory (Atlas of Victorian Wildlife).

Disturbances and potentially threatening processes operating in the Gippsland RFA region

Although currently widespread within the region, the Long-nosed Bandicoot is very sensitive to disturbance (J. Seebeck pers. comm.). In addition, the ecology of this species and its response to disturbance are poorly known. This species is threatened by processes relating to alteration of habitat, especially those that simplify the understorey and disturb the ground litter layer. Clearing of native vegetation and timber harvesting involves direct loss of sheltering, nesting and foraging sites. Inappropriate fire regimes and wildfire can reduce and eliminate understorey resulting in loss of habitat and may lead to increased predation (Catling 1991).

Recent research suggests that the effect of fire on hypogean (underground-fruited) fungi availability may be detrimental (Thomas *et al.* 1994). However, there has been limited research in this area; further investigation is required. Predation is considered a major threat; high incidences of predator scats containing Long-nosed Bandicoot remains have been reported (Claridge *et al.* 1991, J. Seebeck pers. comm.). Non-target poisoning is also possible via ingestion of 1080 poison used to control rabbits, foxes and wild dogs (McIlroy 1983).

Red-necked Wallaby

Macropus rufogriseus

RARITY

a) Geographic Range

- Classification of range size within the Gippsland region: Large
- Distribution of records within the Gippsland region: Records from two widely separated general areas; north east of Omeo including within the Pinnibar Pendergast State Forest and near Mt Cobberas, from within Mullundung State Forest (near Carrajong South) to Traralgon South and Longford (Gippsland Highlands and Gippsland Plain). There are a few isolated records scattered between these locations.
- Number of 5 minute grid cells recorded from: 21
Source: Atlas of Victorian Wildlife

b) Abundance

- Classification of abundance: Unknown
- Population Estimate: Unknown
- Density: Unknown
- Home Range (ha): In NSW: females 12, males 32 (median home range)
Source: Johnson (1987)

c) Habitat Specificity

- Classification of habitat specificity: Wide
- Vegetation types inhabited in the region: Open forest and woodlands with a dense shrubby open-heath cover both in the lowlands and subalpine areas. Utilises forest clearings and margins of agricultural land adjacent to forests for grazing.
Source: Norris *et al.* (1983), Menkhorst (1995d)

DYNAMICS

Population Trend in Last Decade

- Increasing, stable or declined: Declined, particularly populations from the Gippsland Highlands and Gippsland Plain
Source: Menkhorst (1995d)

Population trend since discovery by Europeans

- Increasing, stable or declined: Most likely declined due to clearing of habitat
Source: Norris *et al.* (1983), Calaby (1995)

SPATIAL DYNAMICS

a) Population variability

- Classification of population variability: Probably low
Source: Merchant and Calaby (1981)

b) Dispersal

- Classification of powers of dispersal: High; however only males disperse, females stay within home range of mother
- Average distances dispersed: Unknown
- Maximum distance dispersed: Unknown
Source: Johnson (1986)

LIFE HISTORY PARAMETERS

a) Reproductive output

- Classification of reproductive output: Low
- Age of sexual maturity (mths): Females 14, males 19
- Mean clutch/litter/brood size: 1
- Mean no of clutches/litters/broods per year: 1-2
- Time of year young born/hatch: All year round
Source: Merchant and Calaby (1981)

b) Longevity

- Classification of lifespan: Unknown
- Average lifespan (yrs): Unknown
- Maximum lifespan (yrs): Unknown
Source:

c) Morphology

Adult body size

- Weight (kg): Females 12-15.5 (13.8), males 15-23.7 (18.6)
- Length (mm): Females 708-837 (772), males 770-888 (823)
Source: Calaby (1995)

d) Social organisation

- Colonial or non-colonial: Non-colonial
- Territoriality: Home ranges may extensively overlap
Source: Calaby (1995), Menkhorst (1995d)

e) Other

- Nomadic, migratory, sedentary: Sedentary
- Diet: Herbivore, probably eats a variety of grasses and herbaceous plants
Source: Johnson (1987), Menkhorst (1995d)

THREATS

1. Clearing of Native Vegetation:

Rating (2)

J. Seebeck pers. comm.

2. Timber Harvesting:

Rating (2)

J. Seebeck pers. comm.

3. Fuel Reduction Burning:

Rating (2)

J. Seebeck pers. comm.

4. Firewood Collection:

Rating (2)

J. Seebeck pers. comm.

5. Unplanned Fire:

Rating (2)

J. Seebeck pers. comm.

6. Introduced Species:

Rating (2)

Johnson (1987), J. Seebeck pers. comm.

7. Grazing/Trampling:

Rating (2)

J. Seebeck pers. comm.

8. Pest Control:

Rating (-)

J. Seebeck pers. comm.

9. Road Construction and Maintenance:

Rating (-)

J. Seebeck pers. comm.

10. Mining/Quarrying:

Rating (-)

J. Seebeck pers. comm.

11. Eucalypt Dieback:

Rating (-)

J. Seebeck pers. comm.

12. Recreation:

Rating (-)

J. Seebeck pers. comm.

13. Illegal Collecting/Harvesting:

Rating (-)

J. Seebeck pers. comm.

14. Vandalism:

Rating (-)

J. Seebeck pers. comm.

15. Dams/Impoundments:

Rating (-)

J. Seebeck pers. comm.

Current Management:

The Red-necked Wallaby is not considered threatened in Victoria (NRE 1999). There are no current management prescriptions for this species in the Gippsland RFA region.

Species characteristics: The Red-necked Wallaby lives in open forests and woodlands that have a dense open-heath understorey. It inhabits both lowland and subalpine areas (Norris *et al.* 1983, Atlas of Victorian Wildlife). This species commonly utilises grassy clearings and agricultural land adjacent to forests for grazing (Norris *et al.* 1983, Menkhorst 1995d). Although there is no data available on diet it is probable that the Red-necked Wallaby eats a variety of grasses and herbaceous plants (Menkhorst

1995d). This species is generally solitary though can occur in high densities in overlapping home ranges (Menkhorst 1995d).

Distribution in the Gippsland RFA region

The Red-necked Wallaby has been recorded from two widely spaced general areas within the Gippsland RFA region. There are records from sites concentrated north east of Ormeo within the Pinnibar Pendergast State Forest and near Mt Cobberas and Mt Wombargo. Some of these sites are within the Alpine National Park. Other records are scattered along the Gippsland Plain and Gippsland Highlands between Mullundung State Forest (east of Carrajung South), Traralgon South and Longford; populations from these areas are thought to be declining (Menkhorst 1995d). There is an isolated site within Colquhoun State Forest. The Red-necked Wallaby has been recorded on approximately 25 occasions within the Gippsland region (Atlas of Victorian Wildlife).

Disturbances and potentially threatening processes operating in the Gippsland RFA region

Disturbances that reduce understorey vegetation have the potential to threaten Red-necked Wallaby populations via an increase in predation. A dense understorey appears to be important for shelter from introduced predators such as foxes, particularly for juveniles who may be heavily preyed upon (Johnson 1987, Menkhorst 1995d). Disturbances that remove or degrade such vegetation include clearing, timber harvesting, fuel reduction burning, wildfire and grazing. This species may be a target for illegal shooting, however, the effect of this on populations is unknown (J. Seebeck pers. comm.). Although not currently considered threatened, isolated populations of the Red-necked Wallaby occurring on the Gippsland Plains are declining for reasons unknown (Menkhorst 1995d); the status of this species needs to be investigated.

Yellow-bellied Glider

Petaurus australis

RARITY

a) Geographic Range

- Classification of range size within the Gippsland region: Large
- Distribution of records within the Gippsland region: East of Woods Point, Boola Boola State Forest, Colquhoun State Forest, Mt Sassafras (east of Dartmouth Dam) and the Dargo High Plains.
- Number of 5 minute grid cells recorded from: 124
Source: Atlas of Victorian Wildlife

b) Abundance

- Classification of abundance: Low
- Population Estimate: Unknown
- Density: 0.05-0.14/ha in preferred habitat, probably related to food availability
- Home Range (ha): 30-65
Source: Henry and Craig (1984), Craig (1985), Goldingay and Kavanagh (1991)

c) Habitat Specificity

- Classification of habitat specificity: Wide, but needs hollows for dens
- Vegetation types inhabited in the region: Prefer mixed species eucalypt forest with a predominance of smooth-barked trees. Recorded utilising sub-alpine woodland, foothill open forest and tall open forest including Mountain Grey Gum *Eucalyptus cypellocarpa*, Messmate *E. obliqua* and Victorian Eurabbie *E. globulus*; Apple Box *E. bridgesiana*, Red Ironbark *E. sideroxylon*, White Stringybark *E. globoidea* and Scentbark *E. aromaphloia*
Source: Norris *et al.* (1979), Craig and Belcher (1980), Henry and Craig (1984)

DYNAMICS

Population Trend in Last Decade

- Increasing, stable or declined: Unknown, most likely declined
Source: S. Henry pers. comm.

Population trend since discovery by Europeans

- Increasing, stable or declined: Declined due to widespread loss of habitat resulting from clearing for agriculture and past uncontrolled exploitative forest management practices.
Source: Newman (1961), Recher *et al.* (1975), Norris *et al.* (1983)

SPATIAL DYNAMICS

a) Population variability

- Classification of population variability: Low
Source: Goldingay and Kavanagh (1990)

b) Dispersal

- Classification of powers of dispersal: High
- Average distances dispersed: Unknown
- Maximum distance dispersed: Unknown
Source: Goldingay and Kavanagh (1991)

LIFE HISTORY PARAMETERS

a) Reproductive output

- Classification of reproductive output: Low
- Age of sexual maturity (yrs): 2
- Mean clutch/litter/brood size: 1
- Mean no of clutches/litters/broods per year: 1; breeding may occur in alternate years
- Time of year young born/hatch: Through-out year
Source: Henry and Craig (1984), Craig (1986), Goldingay and Kavanagh (1990)

b) Longevity

- Classification of lifespan: Long-lived
- Average lifespan (yrs): Unknown
- Maximum lifespan (yrs): Unknown, 6 year-old individuals known from the wild, can live up to 14 years in captivity
Source: Goldingay and Kavanagh (1990), Slater (1997)

c) Morphology

Adult body size

- Weight (g): 450-700
- Length (mm): 270-480 (433)
Source: Russell (1995)

d) Social organisation

- Colonial or non-colonial: Colonial
- Territoriality: Family groups occupy large exclusive home ranges
Source: Henry and Craig (1984), Goldingay and Kavanagh (1991)

e) Other

- Nomadic, migratory, sedentary: Sedentary
- Diet: Plant exudates, insectivore
Source: Russell (1995)

THREATS

1. Clearing of Native Vegetation:

Rating (2)

Goldingay and Kavanagh (1991), Henry (1995), S. Henry pers. comm.

2. Timber Harvesting:

Rating (2)

Goldingay and Kavanagh (1991), Henry (1995), S. Henry pers. comm.

3. Fuel Reduction Burning:

Rating (1)

S. Henry pers. comm.

4. Firewood Collection:

Rating (0)

S. Henry pers. comm.

5. Unplanned Fire:

Rating (1)

Goldingay and Kavanagh (1991), S. Henry pers. comm.

6. Introduced Species:

Rating (0)

S. Henry pers. comm.

7. Grazing/Trampling:

Rating (0)

S. Henry pers. comm.

8. Pest Control:

Rating (0)

S. Henry pers. comm.

9. Road Construction and Maintenance:

Rating (0)

- S. Henry pers. comm.
10. Mining/Quarrying:
Rating (0)
S. Henry pers. comm.
11. **Tree Dieback:**
Rating (1)
S. Henry pers. comm.
12. Recreation:
Rating (0)
S. Henry pers. comm.
13. Illegal Collecting/Harvesting:
Rating (0)
S. Henry pers. comm.
14. Vandalism:
Rating (0)
S. Henry pers. comm.
15. **Dams/Impoundments:**
Rating (1)
S. Henry pers. comm.

Current Management:

The Yellow-bellied Glider is not considered threatened in Victoria (NRE 1999). There are no specific management prescriptions for this species in the Gippsland region.

Species characteristics: The Yellow-bellied Glider is an arboreal marsupial that feeds on arthropods and insect and plant exudates (sap, nectar, honeydew and manna) (Craig 1985, Russell 1995). The most important food source in the Gippsland region is thought to be nectar (S. Henry pers. comm.). This species uses a wide variety of eucalypt species for foraging, utilising different feeding substrates (such as shedding bark) as they become seasonally available (Kavanagh 1987). About 90% of time spent outside the den is dedicated to foraging (Goldingay 1989). The Yellow-bellied Glider occurs in low densities (Craig 1985) in tall, mature eucalypt forests (Russell 1995) where there is both a predominance of smooth barked eucalypts and a mixture of eucalypt species (Kavanagh 1987). Preferred species include Messmate (*Eucalyptus obliqua*), Manna Gum (*E. viminalis*), Apple Box (*E. bridgesiana*) and Mountain Grey Gum (*E. cypellocarpa*). Large hollows are used as dens and many are used within a home area (Craig 1985). Yellow-bellied Gliders pair for life and maintain large exclusive family home ranges (30-65 ha) (Henry and Craig 1984, Goldingay and Kavanagh 1991).

Distribution in the Gippsland RFA region

Records of the Yellow-bellied Glider in the Gippsland region are concentrated between Woods Point, Boola Boola State Forest (north of Traralgon), Colquhoun State Forest, Mt Sassafras (east of Dartmouth Dam) and the Dargo High Plains. There are two sites south-west of Warragul with records dating from the early 1900's. A number of records are from the Alpine National Park (Atlas of Victorian Wildlife).

Disturbances and potentially threatening processes operating in the Gippsland RFA region

The main threat to the Yellow-bellied Glider in the Gippsland region is habitat loss and alteration as a result of clearing and timber harvesting and associated habitat fragmentation (Goldingay and Kavanagh 1991, S. Henry pers. comm.); both these processes are known to result in population declines (Henry 1995). Following such a disturbance to their habitat, Yellow-bellied Gliders may be impacted by a loss of critical food resources and den trees, a rise in the time spent foraging and an increase in the exposure to predation (Goldingay and Kavanagh 1991). Timber harvesting converts older age classes of forest to young regrowth stands resulting in loss of foraging habitat and den sites. Other processes that can degrade habitat include fuel reduction burning and wildfire (Goldingay and Kavanagh 1991). This species requires large hollows (which only occur in large old trees), large foraging ranges and habitat consisting of a wide mixture of eucalypt species; long-term survival depends on maintaining the

integrity of large areas of forest (Russell 1995). Fragmentation of habitat is an important threat and can be caused by the clearing of vegetation, timber harvesting and the construction of dams. Yellow-bellied Gliders have been reported using corridors between suitable patches of habitat; these links may be an important management consideration although more research in this area is required (Goldingay and Kavanagh 1991). It has been suggested that the sensitivity of this species to habitat alteration, its dependence on hollows and its wide distribution makes the Yellow-bellied Glider a suitable management indicator species (Goldingay and Kavanagh 1993). If this were to be the case, however, extensive on-going research is required to clarify the status of this species in Gippsland.

White-footed Dunnart

Sminthopsis leucopus

RARITY

a) Geographic Range

- Classification of range size within the Gippsland region: Medium
- Distribution of records within the Gippsland region: Disjunct distribution from Tarwin Lower and Wilsons Promontory National Park to near Tambo Crossing including sites within Colquhoun State Forest, north-west of Heyfield and near Traralgon.
- Number of 5 minute grid cells recorded from: 25
Source: Atlas of Victorian Wildlife

b) Abundance

- Classification of abundance: Unknown
- Population Estimate: Unknown
- Density: Unknown
- Home Range (ha): 0.917 in coastal dry heathland; 0.4 in coastal forest
Source: Lunney and Leary (1989), Laidlaw *et al.* (1996)

c) Habitat Specificity

- Classification of habitat specificity: Wide
- Vegetation types inhabited in the region: Open forest (eg. of Forest Red Gum *Eucalyptus tereticornis*) and woodland, closed heathland with a herbaceous understorey
Source: Norris *et al.* (1979), Morton *et al.* (1980), Norris *et al.* (1983)

DYNAMICS

Population Trend in Last Decade

- Increasing, stable or declined: Declined; less than 15 records since 1978
Source: Atlas of Victorian Wildlife

Population trend since discovery by Europeans

- Increasing, stable or declined: Most likely declined due to loss of habitat mainly due to clearing for agriculture and urban development.
Source: J. Seebeck pers. comm.

SPATIAL DYNAMICS

a) Population variability

- Classification of population variability: Unknown
Source:

b) Dispersal

- Classification of powers of dispersal: High
- Average distances dispersed: Unknown
- Maximum distance dispersed: One male observed to move 1025 m over 24 hours
Source: Lunney and Leary (1989)

LIFE HISTORY PARAMETERS

a) Reproductive output

- Classification of reproductive output: High
- Age of sexual maturity (yrs): 11 mths
- Mean clutch/litter/brood size: 7-10
- Mean no of clutches/litters/broods per year: 1
- Time of year young born/hatch: Late August to September
Source: Woolley and Ahern (1983), Lunney and Ashby (1987)

b) Longevity

- Classification of lifespan: Short-lived
- Average lifespan (mths): Females 24, Males 15
- Maximum lifespan (mths): Unknown
Source: Woolley and Ahern (1983)

c) Morphology

Adult body size

- Weight (g): Female 19, Male 26
 - Length (mm): Female 67-74, Male 82-98
Source: Lunney (1995)
- d) Social organisation**
- Colonial or non-colonial: Probably non-colonial
 - Territoriality: One study found that females home ranges were exclusive while another study concluded that as both male and female home ranges overlapped territoriality was probably low
Source: Lunney and Leary (1989), Laidlaw *et al.* (1996)
- e) Other**
- Nomadic, migratory, sedentary: Sedentary
 - Diet: Primarily an insectivore; preys on a wide variety of invertebrates, also known to take small lizards
Source: Lunney *et al.* (1986), Lunney and Leary (1989)

THREATS

- 1. Clearing of Native Vegetation:**
Rating (2)
J. Seebeck pers. comm.
- 2. Timber Harvesting:**
Rating (2)
Lunney and Ashby (1987), J. Seebeck pers. comm.
- 3. Fuel Reduction Burning:**
Rating (2)
J. Seebeck pers. comm.
- 4. Firewood Collection:**
Rating (0)
J. Seebeck pers. comm.
- 5. Unplanned Fire:**
Rating (2)
Lunney and Ashby (1987), J. Seebeck pers. comm.
- 6. Introduced Species:**
Rating (2)
J. Seebeck pers. comm.
- 7. Grazing/Trampling:**
Rating (2)
J. Seebeck pers. comm.
Pest Control:
Rating (0)
J. Seebeck pers. comm.
- 8. Road Construction and Maintenance:**
Rating (0)
J. Seebeck pers. comm.
- 9. Mining/Quarrying:**
Rating (0)
J. Seebeck pers. comm.
- 10. Eucalypt Dieback:**
Rating (0)
J. Seebeck pers. comm.
- 11. Recreation:**
Rating (0)
J. Seebeck pers. comm.
- 12. Illegal Collecting/Harvesting:**
Rating (0)
J. Seebeck pers. comm.
- 13. Vandalism:**
Rating (0)
J. Seebeck pers. comm.
- 14. Dams/Impoundments:**
Rating (0)

J. Seebeck pers. comm.

Current Management:

The White-footed Dunnart is not considered threatened in Victoria (NRE 1999a). There are no threat-ameliorating prescriptions for this species in the region.

Species characteristics: The White-footed Dunnart is restricted to areas of intermediate annual rainfall (600-1100 mm) and is found in a wide variety of habitats including coastal dry heathland and sedgeland, wet heath and forest (eg. Forest Red Gum *Eucalyptus tereticornis*) or woodland with a dense heathy understorey or midstorey vegetation (Morton *et al.* 1980, Menkhorst 1995f, Laidlaw *et al.* 1996). Within its habitat it has been found in underground burrows, tree hollows and under bark or small logs (Lunney and Leary 1989, Laidlaw *et al.* 1996). There appears to be some relationship between presence of this species and the seral stages of various vegetation communities, however this requires further investigation (Menkhorst 1995f). Although males of this species do not survive to breed in a second season they do not exhibit 'die-off' immediately after breeding but are still present up to one month after young become independent (Woolley and Ahern 1983). The short life-span of this species means that successful breeding each year is essential for the continued existence of populations. The White-footed Dunnart mainly feeds on a wide range of invertebrates but also preys on small lizards (Lunney *et al.* 1986).

Distribution in the Gippsland RFA region

The White-footed Dunnart has a disjunct distribution within the Gippsland region. There is a concentration of sites along part of the coast from Tarwin Lower to Sandy Point as well as records from Wilsons Promontory National Park. Other records are from within State forest and are scattered around Traralgon, north-west of Heyfield, near Tambo crossing and Bruthen and from within Colquhoun State Forest. There are less than 40 records of the White-footed Dunnart from the Gippsland region, the most recent record is dated 1993 from State forest north of Bruthen (Atlas of Victorian Wildlife).

Disturbances and potentially threatening processes operating in the Gippsland RFA region

Disturbances that result in dense regrowth appear to have a deleterious effect on the White-footed Dunnart. A study in NSW found that a population living in a forest subjected to timber harvesting and wildfire was unable to persist after these disturbances due to dense regrowth making habitat unsuitable (Lunney and Ashby 1987). Other disturbances that result in modification of ground layer vegetation include fuel reduction burning and grazing; these may impact on prey availability or reduce cover that provides protection against introduced predators. Inappropriate fire regimes could prevent the continued presence of habitat that is at a suitable seral stage; however, more research is required in relation to such habitat requirements (Menkhorst 1995f). Clearing of vegetation, roading and timber harvesting removes and fragments habitat which may adversely impact on populations. Although not considered threatened, the White-footed Dunnart is not often recorded and the current status of this species in the region is unclear.

A M P H I B I A N S

Alpine Tree Frog

Litoria verreauxii alpina

RARITY

a) Geographic Range

- Classification of range size within the Gippsland region: Medium
- Distribution of records within the Gippsland region: Records are predominantly from the northern half of the region, extending from the vicinity of Tom Groggin near the Murray River in the north-east of the region, to the vicinity of Erica in the south-west.
- Number of 5 minute grid cells recorded from: 37
Source: Atlas of Victorian Wildlife

b) Abundance

- Classification of abundance: Low
- Population Estimate: Unknown
- Density: Unknown
Source: G. Gillespie pers. comm.

c) Habitat Specificity

- Classification of habitat specificity: Narrow
- Vegetation types inhabited in the region: Occurs in alpine meadows, heaths and snowgum woodland.
Source: Gillespie *et al.* (1995), G. Gillespie pers. comm.

DYNAMICS

Population Trend in Last Decade

- Increasing, stable or declined: Declined
Source: Gillespie *et al.* (1995)

Population trend since discovery by Europeans

- Increasing, stable or declined: Declined
Source: Gillespie *et al.* (1995)

SPATIAL DYNAMICS

a) Population variability

- Classification of population variability: Unknown
Source: G. Gillespie pers. comm.

b) Dispersal

- Classification of powers of dispersal: Low
- Average distances dispersed: Unknown
- Maximum distance dispersed: Unknown
Source: G. Gillespie pers. comm.

LIFE HISTORY PARAMETERS

a) Reproductive output

- Classification of reproductive output: Low
- Age of sexual maturity (yrs): 2 males, 3 females
- Mean clutch/litter/brood size: 395 eggs
- Mean no of clutches/litters/broods per year: 1
- Time of year young born/hatch: November-January
Source: Hero *et al.* (1991), Green and Osborne (1994), Gillespie *et al.* (1995), G. Gillespie pers. comm., D. Hunter pers. comm.

b) Longevity

- Classification of lifespan: Unknown
- Average lifespan (yrs): 4 males, 6 females
- Maximum lifespan (yrs): Unknown
Source: G. Gillespie pers. comm., D. Hunter pers. comm.

c) Morphology

Adult body size

- Weight (g): Unknown
- Length (mm): snout-vent - 29.5 males, 35.8 females
Source: Green and Osborne (1994), Cogger (1996), D. Hunter pers. comm.

d) Social organisation

- Colonial or non-colonial: Colonial (during breeding season)
- Territoriality: Unknown
Source: G. Gillespie pers. comm.

e) Other

- Nomadic, migratory, sedentary: Sedentary
- Diet: Opportunistic predator of small invertebrates including beetles, flies, spiders and the larvae of moths
Source: Pengilly (1971), G. Gillespie pers. comm.

THREATS

1. Clearing of Native Vegetation:
Rating (-)

2. Timber harvesting:
Rating (0)
G. Gillespie pers. comm.
3. Fuel Reduction Burning:
Rating (-)
4. Firewood Collection:
Rating (0)
G. Gillespie pers. comm.
5. Unplanned Fire:
Rating (-)
6. Introduced Species:
Rating (-)
7. **Grazing/Trampling:**
Rating (3)
Gillespie *et al.* (1995), G. Gillespie pers. comm.
8. **Pest Control:**
Rating (1)
G. Gillespie pers. comm.
9. **Road Construction and Maintenance:**
Rating (1)
G. Gillespie pers. comm.
10. **Mining/Quarrying:**
Rating (1)
G. Gillespie pers. comm.
11. Tree Dieback:
Rating (0)
12. **Recreation:**
Rating (2)
G. Gillespie pers. comm.
13. Illegal Collection/Harvesting:
Rating (-)
14. Vandalism/Disturbance by Humans:
Rating (-)
15. Dams/Impoundments:
Rating (-)
Gillespie *et al.* (1995)
16. **Other: Climate Change:**
Rating (3)
Brereton *et al.* (1995), Gillespie *et al.* (1995), Hunter *et al.* (1997), Tyler (1997)

Current Management:

The species is classified as "critically endangered" in Victoria (NRE 1999). There are no current management actions to ameliorate potential threats to this species in the Gippsland RFA region.

Species characteristics:

The Alpine Tree Frog is a high-altitude subspecies of the Whistling Tree Frog. This largely terrestrial species occurs in southern NSW and eastern Victoria and inhabits woodland, heath, grassland and herb fields at high montane, subalpine and alpine altitudes. During the breeding season, male Alpine Tree Frogs call while partially submerged at the edges of large pools in fen and wet grassland. Eggs are deposited in large jelly-like clumps around submerged vegetation. Tadpoles can be found in pools from November-January and metamorphosis occurs from December to January. The Alpine Tree Frog is rarely seen during the non-breeding season although some individuals have been found under flat rocks in stream beds or in rocky areas near streams, amongst litter and under logs (Green and Osborne 1994, Gillespie *et al.* 1995). The Alpine Tree Frog was formerly abundant in alpine and subalpine areas. Since the mid 1980's it has undergone a marked decline (Gillespie *et al.* 1995, Tyler 1997). A recent survey for the species in the Australian Alps National Parks confirmed a dramatic decline throughout its range (Hunter *et al.* 1997).

Distribution in the Gippsland RFA Region:

The Alpine Tree Frog has been recorded predominantly from the northern half of the Gippsland region. These records extend from the vicinity of Tom Groggin near the Murray River in the north-east of the region, across the higher altitudes of the Great Dividing Range, to the vicinity of Erica in the south-west of the region. Some records originate on privately-owned land, however the majority of records occur in the Alpine National Park and State forest

(Atlas of Victorian Wildlife). There are 413 records of this species in the Gippsland region.

Disturbances and potentially threatening process operating in the Gippsland RFA Region:

Large breeding populations of the Alpine Tree Frog occur on plains or open valleys where there are stream side pools, fens and bogs. It also breeds around the margins of artificial lakes (Gillespie *et al.* 1995). The ecology of the Alpine Tree Frog is not well understood. However, disturbances which impact on the breeding sites and non-breeding habitat are likely to adversely affect populations. Because the species is recorded from alpine environments, development of ski resort facilities and the associated recreational activities may result in loss and modification of habitat and adversely affect populations. Trampling of breeding sites by cattle is potentially a significant threat. Climate change associated with the Enhanced Greenhouse Effect may result in altered breeding conditions and is a major threat to alpine frog species including the Alpine Tree Frog (Gillespie *et al.* 1995). An increase in UV radiation as a consequence of ozone depletion, associated with the enhanced greenhouse effect, is known to cause the death of the eggs and larvae of this species (Broomhall 1997), and has been implicated as a major causal factor in population declines (Hunter *et al.* 1997, Tyler 1997, G. Gillespie pers. comm.).

Giant Burrowing Frog

Heleioporus australiacus

RARITY

a) Geographic Range

- Classification of range size within the Gippsland region: Medium
- Distribution of records within the Gippsland region: Records exist from the central part of the Gippsland RFA region, from near Toongabbie in the west, to near Buchan in the east.
- Number of 5 minute grid cells recorded from: 9
Source: Atlas of Victorian Wildlife

b) Abundance

- Classification of abundance: Low
- Population Estimate: Unknown
- Density: Unknown
Source: Gillespie (1997)

c) Habitat Specificity

- Classification of habitat specificity: Wide
- Vegetation types used in the region: Unknown, but known to be dependent on a variety of forest types in other areas
Source: Gillespie (1990), Gillespie (1997)

DYNAMICS

Population Trend in Last Decade

- Increasing, stable or declined: Unknown
Source: Gillespie (1997)

Population trend since discovery by Europeans

- Increasing, stable or declined: Unknown
Source: Gillespie (1997)

SPATIAL DYNAMICS

a) Population variability

- Classification of population variability: Unknown
Source:

b) Dispersal

- Classification of powers of dispersal: Unknown
- Average distances dispersed: Unknown
- Maximum distance dispersed: Unknown
Source:

LIFE HISTORY PARAMETERS

a) Reproductive output

- Classification of reproductive output: Unknown
- Age of sexual maturity (yrs): Unknown
- Mean clutch/litter/brood size: 775-1239 eggs
- Mean no of clutches/litters/broods per year: Unknown
- Time of year young born/hatch: February - March
Source: Gillespie (1990), Hero *et al.* (1991), Gillespie (1997)

b) Longevity

- Classification of lifespan: Unknown

- Average lifespan (yrs): Unknown
- Maximum lifespan (yrs): Unknown
Source:

c) Morphology

Adult body size

- Weight (g): Unknown
- Length (mm): 100 mm
Source: Mazzer (1994)

d) Social organisation

- Colonial or non-colonial: Unknown, possibly colonial
- Territoriality: Unknown
Source: Gillespie (1997)

e) Other

- Nomadic, migratory, sedentary: Unknown, possibly wide-ranging
- Diet: Arthropods
Source: Littlejohn and Martin (1967), Webb (1983), Webb (1987), Gillespie (1990), Gillespie (1997)

THREATS

1. Clearing of Native Vegetation:

Rating (1)

Gillespie (1990, 1997), Mazzer (1994), G. Gillespie pers. comm.

2. Timber Harvesting:

Rating (2)

Gillespie (1990, 1997), Mazzer (1994), G. Gillespie pers. comm.

3. Fuel Reduction Burning:

Rating (2)

Gillespie (1990, 1997), Mazzer (1994), G. Gillespie pers. comm.

4. Firewood Collection:

Rating (1)

G. Gillespie pers. comm.

5. Unplanned Fire:

Rating (2)

Gillespie (1990), G. Gillespie pers. comm.

6. Introduced Species:

Rating (2)

Mazzer (1994), Gillespie (1997), G. Gillespie pers. comm.

7. Grazing/Trampling:

Rating (1)

G. Gillespie pers. comm.

8. Pest Control:

Rating (-)

9. Road Construction and Maintenance:

Rating (2)

Gillespie (1990), Mazzer (1994), G. Gillespie pers. comm.

10. Mining/Quarrying:

Rating (1)

Mazzer (1994), G. Gillespie pers. comm.

11. Eucalypt Dieback:

Rating (0)

G. Gillespie pers. comm.

12. Recreation:

Rating (-)

13. Illegal Collecting/Harvesting:

Rating (0)

G. Gillespie pers. comm.

14. Vandalism:

Rating (0)

G. Gillespie pers. comm.

15. Dams/Impoundments:

Rating (-)

Current Management:

The Giant Burrowing Frog is classified as "vulnerable" in Victoria (NRE 1999). An Action Statement has been prepared for this species (Mazzer 1994). Intended management actions include: exclusion of timber harvesting and new roading at all Giant Burrowing Frog sites recorded since 1980, all post 1980 stream records will be buffered during fuel reduction burns by a 100 m exclusion zone, at sites of non-stream records burning will be carried out to provide a mosaic of burnt and unburnt patches, sites recorded prior to 1980 will be revisited to determine if the species is still extant at these locations, carry out biological and habitat studies, monitor sites where the Giant

Burrowing Frog has been recorded in recent years, raise public awareness through local media, Frogwatch scheme, production of an identification aid and encourage local organisations to search areas of likely habitat and report sightings. All sites will be identified on relevant NRE site registers and plans.

Species characteristics:

The Giant Burrowing Frog is a large burrowing frog that occurs in wet, dry and damp forests, montane woodlands, lowland forest and associated riparian habitats (Littlejohn and Martin 1967, Gillespie 1990, 1997, Hero *et al.* 1991, Mazzer 1994). This species appears to be absent from cleared farmland, and may therefore be dependent on aspects of forest habitats for feeding, sheltering and suitable breeding sites (Gillespie 1990, Mazzer 1994). The Giant Burrowing Frog is a cryptic species and is usually only located when moving or calling after heavy rain (Gillespie pers. comm.). Males have been recorded calling from December to February, usually from burrows in the vicinity of ephemeral and permanent stationary water bodies and streams (Gillespie 1990, Hero *et al.* 1991, Gillespie 1997). Eggs are laid in small water-filled burrows, or under thick vegetation in dams, ditches or slow-flowing streams. When laid in burrows, the larvae are released as the burrows flood after rain (Gillespie 1990, Hero *et al.* 1991). Records of this frog substantial distances from water suggest that this species may use a wide range of forested environments (Mazzer 1994). The Giant Burrowing Frog preys on a variety of arthropods (Littlejohn and Martin 1967, Webb 1983, Webb 1987, Gillespie 1990).

Distribution in the Gippsland RFA region:

Records of the Giant Burrowing Frog in the Gippsland region are disjunct, but occur predominantly inland, from near Toongabbie in the west, to near Buchan in the east. The records originate almost exclusively from State forest. Of the 48 records from the region, 34 are pre-1967 records, six occurred between 1973 and 1989 and seven were collected in 1992 (Atlas of Victorian Wildlife). There is a single record of Giant Burrowing Frog from an arm of the Glenmaggie Reservoir where an individual was heard calling in November 1997 (N. Clemann pers. comm.).

Disturbances and potentially threatening processes operating in the Gippsland RFA region:

The biology, distribution and habitat requirements of the Giant Burrowing Frog are poorly known. This species is threatened by processes that detrimentally affect breeding sites (ie. changes to water flow, water quality or streamside vegetation), or the wider forest environment which it inhabits or into which it disperses (Mazzer 1994). In Gippsland, most records are from State forest. Timber harvesting and regeneration burning may have a deleterious impact on the species through loss of habitat, loss and damage of potential breeding sites and a reduction of the species litter dwelling invertebrate prey (Gillespie 1990, 1997). Fuel reduction burning may also impact on the species through loss of prey and damage to potential breeding sites (Gillespie 1990). Timber harvesting may result in soil compaction, affecting burrowing species such as the Giant Burrowing Frog (Gillespie 1997). An increase in the sediment and nutrient load of streams may adversely impact tadpoles (Gillespie 1997). Forest roads may facilitate the invasion of weeds and exotic predators such as cats and foxes, which are likely to have a deleterious impact on this species (Gillespie 1997). Predation by exotic predators may be exacerbated by the loss of shelter sites following timber harvesting. It is unknown whether Giant Burrowing Frog tadpoles are palatable to exotic fish species such as trout (Gillespie 1997). Extractive industries and mining upstream of breeding locations may threaten these frogs through increased sediment inflow and possible

chemical pollution of streams (Mazzer 1994). Licence conditions are routinely established to address this threat. Use of herbicides to control weeds may also be deleterious to this species (Mazzer 1994, Gillespie 1997).

Large Brown Tree Frog

Litoria littlejohni

RARITY

a) Geographic Range

- Classification of range size within the Gippsland region: Small
- Distribution of records within the Gippsland region: All records originate from the east of the region. The records are in the vicinity of the towns of Buchan, Ensay and Brookville.
- Number of 5 minute grid cells recorded from: 3
Source: Atlas of Victorian Wildlife

b) Abundance

- Classification of abundance: Low
- Population Estimate: Unknown
- Density: Unknown
- Home Range (m): Unknown
Source: G. Gillespie pers. comm.

c) Habitat Specificity

- Classification of habitat specificity: Wide
- Vegetation types inhabited in the region: Unknown, but known to inhabit montane, wet and damp forests, and woodlands in other areas.
Source: Cogger (1996), Gillespie pers. comm.

DYNAMICS

Population Trend in Last Decade

- Increasing, stable or declined: Unknown
Source: G. Gillespie pers. comm.

Population trend since discovery by Europeans

- Increasing, stable or declined: Unknown
Source: G. Gillespie pers. comm.

SPATIAL DYNAMICS

a) Population variability

- Classification of population variability: Unknown
Source: G. Gillespie pers. comm.

b) Dispersal

- Classification of powers of dispersal: Unknown
- Average distances dispersed: Unknown
- Maximum distance dispersed: Unknown
Source: G. Gillespie pers. comm.

LIFE HISTORY PARAMETERS

a) Reproductive output

- Classification of reproductive output: High
- Age of sexual maturity (yrs): Unknown, possibly 3rd or 4th season.
- Mean clutch/litter/brood size: 1- 31 eggs/cluster although total egg compliment unknown.
- Mean no of clutches/broods per year: 50-100 clusters
- Time of year young born/hatch: Eggs recorded from region in January. Breeds in winter, through to January.
Source: Martin and Littlejohn (1966), G. Gillespie pers. comm.

b) Longevity

- Classification of lifespan: Unknown
- Average lifespan (yrs): Unknown
- Maximum lifespan (yrs): Unknown
Source: G. Gillespie pers. comm.

c) Morphology

Adult body size

- Weight (g): Up to 15
- Length (mm): 48-72 females, 38-56 males
Source: Martin and Littlejohn (1966), Barker *et al.* (1995), G. Gillespie pers. comm.

d) Social organisation

- Colonial or non-colonial: Non-colonial
- Territoriality: Unknown
Source: G. Gillespie pers. comm.

e) Other

- Nomadic, migratory, sedentary: Unknown
- Diet: Insectivore
Source: G. Gillespie pers. comm.

THREATS

- 1. Clearing of Native Vegetation:**
Rating (1)
Gillespie pers. comm.
- 2. Timber harvesting:**
Rating (2)
Gillespie pers. comm.
- 3. Fuel Reduction Burning:**
Rating (2)
Gillespie pers. comm.
- 4. Firewood Collection:**
Rating (1)
Gillespie pers. comm.
5. Unplanned Fire:
Rating (-)
6. Introduced Species:
Rating (-)
- 7. Grazing/Trampling:**
Rating (1)
Gillespie pers. comm.
- 8. Pest Control:**
Rating (1)
Gillespie pers. comm.
- 9. Road Construction and Maintenance:**
Rating (1)
Gillespie pers. comm.
- 10. Mining/Quarrying:**
Rating (1)
Gillespie pers. comm.
11. Eucalypt Dieback:
Rating (-)
12. Recreation:
Rating (-)
13. Illegal Collection/Harvesting:
Rating (-)
14. Vandalism/Disturbance by Humans:
Rating (-)
15. Dams/Impoundments:
Rating (-)

Current Management:

The Large Brown Tree Frog is classified as "vulnerable" in Victoria (NRE 1999). There are currently no threat-ameliorating prescriptions for the Large Brown Tree Frog within the Gippsland RFA region.

Species characteristics:

Little is known of the biology and habitat requirements of the Large Brown Tree Frog. It is known to inhabit wet and dry forest types at altitudes of 280-1000 m on the eastern slopes of the Great Dividing Range. The majority of Victorian records of the Large Brown Tree Frog are from East Gippsland (Barker *et al.* 1995, Atlas of Victorian Wildlife). It has been recorded from flowing rocky streams as well as from semi-permanent dams with some emergent vegetation. The species is known to breed in ephemeral water bodies including streamside pools, pools in logs, roadside puddles and fire dams where the eggs are deposited in small clusters attached to submerged sticks and vegetation (Hero *et al.* 1991, Barker *et al.* 1995, G. Gillespie pers. comm.).

Distribution within the Gippsland RFA Region:

There are seven records of the Large Brown Tree Frog from the Gippsland RFA region. Prior to its discovery in Gippsland in 1977, the species was only known from East Gippsland (Atlas of Victorian Wildlife). In the Gippsland RFA region all records occur in the north-east of the region, from the vicinity of the towns of Buchan, Ensay and Brookville. All seven records were collected between August and November 1977, and originate from public land (Atlas of Victorian Wildlife). Targeted surveys are required to determine this species' distribution and status within the region.

Disturbances and Potentially Threatening Processes within the Gippsland RFA Region:

As so little is known about the distribution of this frog in the Gippsland RFA region the effect of disturbances and the extent to which they are operating is largely unknown. Potential threatening processes include habitat loss and a reduction in litter and ground cover layers which harbour invertebrate

food as a result of disturbances including timber harvesting, wildfire and fuel reduction burning. These processes may also increase the sediment and nutrient load of streams, detrimentally affecting the larval stage of the Large Brown Tree Frog. Similarly, road construction and maintenance may increase the sediment load of streams, and provide a corridor for the invasion of exotic weeds and predators. The influence of exotic fish predators on the larvae of this species is unknown, but requires investigation.

Martin's Toadlet

Uperoleia martini

RARITY

a) Geographic Range

- Classification of range size within the Gippsland region: Small
- Distribution of records within the Gippsland region: Records exist from the southern part of the region around the towns of Bruthen and Yarram, and the Holey Plains State Park
- Number of 5 minute grid cells recorded from: 3
Source: Atlas of Victorian Wildlife

b) Abundance

- Classification of abundance: Unknown
- Population Estimate: Unknown
- Density: Unknown
Source: G. Gillespie pers. comm.

c) Habitat Specificity

- Classification of habitat specificity: Narrow
- Vegetation types used in the region: Forested habitats including riparian scrub, coastal heaths and adjacent woodlands and shrublands.
- Source: Hero *et al.* (1991), Bramwell *et al.* (1992), Gillespie *et al.* (1992), Kemp *et al.* (1994), Cogger (1996), Gillespie pers. comm.

DYNAMICS

Population Trend in Last Decade

- Increasing, stable or declined: Unknown
Source: G. Gillespie pers. comm.

Population trend since discovery by Europeans

- Increasing, stable or declined: Unknown
Source: G. Gillespie pers. comm.

SPATIAL DYNAMICS

a) Population variability

- Classification of population variability: Unknown
Source: G. Gillespie pers. comm.

b) Dispersal

- Classification of powers of dispersal: Unknown
- Average distances dispersed: Unknown
- Maximum distance dispersed: Unknown
Source: G. Gillespie pers. comm.

LIFE HISTORY PARAMETERS

a) Reproductive output

- Classification of reproductive output: Unknown
- Age of sexual maturity (yrs): Unknown
- Mean clutch/litter/brood size: Unknown
- Mean no of clutches/litters/broods per year: Unknown
- Time of year young born/hatch: Predicted to breed between October and January
Source: Hero *et al.* (1991)

b) Longevity

- Classification of lifespan: Unknown
- Average lifespan (yrs): Unknown
- Maximum lifespan (yrs): Unknown
Source: G. Gillespie pers. comm.

c) Morphology

Adult body size

- Weight (g): Unknown
- Length (mm): 30-33 male
Source: Davies and Littlejohn (1986)

d) Social organisation

- Colonial or non-colonial: Unknown
- Territoriality: Unknown
Source: G. Gillespie pers. comm.

e) Other

- Nomadic, migratory, sedentary: Unknown
- Diet: Unknown
Source: G. Gillespie pers. comm.

THREATS

1. Clearing of Native Vegetation:
Rating (-)
2. **Timber Harvesting:**
Rating (2)
Bramwell *et al.* (1992), Gillespie *et al.* (1992), G. Gillespie pers. comm.
3. **Fuel Reduction Burning:**
Rating (2)
Gillespie *et al.* (1992), Kemp *et al.* (1994), G. Gillespie pers. comm.
4. Firewood Collection:
Rating (-)
5. **Unplanned Fire:**
Rating (2)
Kemp *et al.* (1994), G. Gillespie pers. comm.
6. Introduced Species:
Rating (-)
7. Grazing/Trampling:
Rating (-)
8. Pest Control:
Rating (-)
9. **Road Construction and Maintenance:**
Rating (2)
Bramwell *et al.* (1992), G. Gillespie pers. comm.
10. Mining/Quarrying:
Rating (-)
11. Eucalypt Dieback:
Rating (-)
12. Recreation:
Rating (-)
13. Illegal Collecting/Harvesting:
Rating (-)
14. Vandalism:
Rating (-)
15. Dams/Impoundments:
Rating (-)

Current Management:

Martin's Toadlet is classified as "data deficient" in Victoria (NRE 1999). There are no threat-ameliorating prescriptions for this species in the Gippsland RFA region.

Species characteristics:

Martin's Toadlet is a small to moderate sized, ground dwelling species found in a range of habitats, from forests, woodlands, shrublands, and coastal heaths (Hero *et al.* 1991, Cogger 1996). It has also been recorded sheltering under rocks and logs in dry open-forest, away from breeding sites (Gillespie *et al.* 1992). Martin's Toadlet breeds in grassy depressions inundated with spring and summer rain (Hero *et al.* 1991, Cogger 1996). Little information exists on the biology and ecology of this species.

Distribution in the Gippsland RFA region:

Six records of Martin's Toadlet originate in the Gippsland region. These records are in the vicinity of the towns of Bruthen, and Yarram and the Holey Plains State Park in the south of the region. Four of the six records are from private land, one is from State forest and one is from Sate Park. Three of the records were collected in 1976, two in 1980, and one in 1990 (Atlas of Victorian Wildlife).

Disturbances and potentially threatening processes operating in the Gippsland RFA region:

The paucity of knowledge on the biology of this species and its distribution in the region mean that the impact of disturbances and the extent to which they threaten this species are largely unknown. Potential threatening processes include habitat loss and a reduction in litter and ground cover layers which harbour invertebrate food and provide shelter, as a result of disturbances such as timber harvesting, wildfire and fuel reduction burning (Bramwell *et al.* 1992, Gillespie *et al.* 1992). Activities that may alter the hydrological regime of Martin's Toadlet habitat, such as the construction and maintenance of roads, may threaten this species (Bramwell *et al.* 1992). The impact of predation on this species by exotic predators such as cats and foxes is unknown, but

may be detrimental to this species. Pollution and increased siltation and nutrient levels as a result of disturbances such as roading, timber harvesting and spraying of herbicides for weed removal in the aquatic habitats used by Martin's Toadlet as breeding sites are likely to harm larvae.

Spotted Tree Frog

Litoria spenceri

RARITY

a) Geographic Range

- Classification of range size within the Gippsland region: Medium
- Distribution of records within the Gippsland region: Records along the Great Diving Range from the Murray River in the north east of the region, to the Goulburn and Black Rivers, east of Woods Point.
- Number of 5 minute grid cells recorded from: 7
Source: Atlas of Victorian Wildlife

b) Abundance

- Classification of abundance: Low
- Population Estimate: 11 populations; maximum of 1500 adults in a population
- Density: Approximately 30-70 adults per square km
- Home Range (m): <200m
Source: Gillespie and Hollis (1996), Robertson and Gillespie (in prep), Robertson *et al.* (in prep), Gillespie pers. comm.

c) Habitat Specificity

- Classification of habitat specificity: Narrow
- Vegetation types inhabited in the region: Riparian, Dry Forest, Damp Forest, Montane Forest
Source: Gillespie and Hollis (1996), Gillespie pers. comm.

DYNAMICS

Population Trend in Last Decade

- Increasing, stable or declined: Declined
Source: Gillespie and Hollis (1996), G. Gillespie pers. comm.

Population trend since discovery by Europeans

- Increasing, stable or declined: Declined
Source: Gillespie and Hollis (1996)

SPATIAL DYNAMICS

a) Population variability

- Classification of population variability: High
Source: Robertson and Gillespie (in prep), G. Gillespie pers. comm.

b) Dispersal

- Classification of powers of dispersal: Low
- Average distances dispersed: No dispersal
- Maximum distance dispersed: No dispersal
Source: G. Gillespie pers. comm.

LIFE HISTORY PARAMETERS

a) Reproductive output

- Classification of reproductive output: Low
- Age of sexual maturity (yrs): ≥ 4 females, ≥ 2 males,
- Mean clutch/litter/brood size: 530 eggs
- Mean no of clutches/broods per year: 1
- Time of year young born/hatch: November/December (eggs laid)
Source: Gillespie *et al.* (1995), Gillespie (1997)

b) Longevity

- Classification of lifespan: Long-lived
- Average lifespan (yrs): 6-10
- Maximum lifespan (yrs): 13 females, 10 males
Source: G. Gillespie pers. comm.

c) Morphology

Adult body size

- Weight (g): 15 females, 6 males (maximum)
- Length (mm): 36.5-56 adult females, 28-42 adult males
Source: G. Gillespie pers. comm.

d) Social organisation

- Colonial or non-colonial: Non-colonial
- Territoriality: Males during breeding season
Source: Gillespie (1993), G. Gillespie pers. comm.

e) Other

- Nomadic, migratory, sedentary: Sedentary

- Diet: Insectivore
Source: Ehmann *et al.* (1992), Robertson and Gillespie (in prep), G. Gillespie pers. comm.

THREATS

- 1. Clearing of Native Vegetation:**
Rating (1)
G. Gillespie pers. comm.
- 2. Timber harvesting:**
Rating (2)
Campbell and Doeg (1989), Watson *et al.* (1991), deMaynadier and Hunter (1995), Gillespie and Hollis (1996), O' Shaughnessy *et al.* (1997), Robertson and Gillespie (in prep), G. Gillespie pers. comm.
- 3. Fuel Reduction Burning:**
Rating (-)
Watson *et al.* (1991), Robertson and Gillespie (in prep), G. Gillespie pers. comm.
- 4. Firewood Collection:**
Rating (1)
G. Gillespie pers. comm.
- 5. Unplanned Fire:**
Rating (-)
Campbell and Doeg (1989), Tyler (1997), Robertson and Gillespie (in prep), G. Gillespie pers. comm.
- 6. Introduced Species:**
Rating (3)
Watson *et al.* (1991), Gillespie *et al.* (1995), Tyler (1997), G. Gillespie pers. comm.
- 7. Grazing/Trampling:**
Rating (2)
Watson *et al.* (1991), Gillespie and Hollis (1996), Tyler (1997), Robertson and Gillespie (in prep.), G. Gillespie pers. comm.
- 8. Pest Control:**
Rating (2)
Bidwell and Gorrie (1995), Robertson and Gillespie (in prep), G. Gillespie pers. comm.
- 9. Road Construction and Maintenance:**
Rating (2)
Campbell and Doeg (1989), Watson *et al.* (1991), Gillespie and Hollis (1996), O' Shaughnessy *et al.* (1997), Robertson and Gillespie (in prep), G. Gillespie pers. comm.
- 10. Mining/Quarrying:**
Rating (3)
Hall (1988), Watson *et al.* (1991), Gillespie and Hollis (1996), Robertson and Gillespie (in prep), G. Gillespie pers. comm.
- 11. Tree Dieback:**
Rating (0)
G. Gillespie pers. comm.
- 12. Recreation:**
Rating (2)
Watson *et al.* (1991), Gillespie and Hollis (1996), Robertson and Gillespie (in prep.), G. Gillespie pers. comm.
- 13. Illegal Collection/Harvesting:**
Rating (-)
- 14. Vandalism/Disturbance by Humans:**
Rating (-)
- 15. Dams/Impoundments:**
Rating (2)
Watson *et al.* (1991), Robertson and Gillespie (in prep), G. Gillespie pers. comm.
- 16. Other: Climate Change:**
Rating (2)
Bennett *et al.* (1991), G. Gillespie pers. comm.

Current Management:

The Spotted Tree Frog is classified as "critically endangered" in Victoria (NRE 1999) and is listed under the Victorian *Flora and Fauna Guarantee Act* 1988. An action statement is currently being prepared (Robertson *et al.* in prep). The species is also listed under the Commonwealth *Endangered Species Protection Act* 1992 and a draft Recovery Plan has been prepared (Robertson and Gillespie in prep). A project monitoring populations of Spotted Tree Frog and investigating aspects of its ecology and response to disturbance including the effect of increased sedimentation and palatability of tadpoles to native and introduced fish, is currently being conducted. Fish surveys have also been undertaken

in streams where Spotted Tree Frogs historically and currently occur (Gillespie pers. comm.). Results from this project will assist in the development of threat-abating prescriptions.

Species characteristics:

The Spotted Tree Frog inhabits rocky, swift-flowing upland streams in dissected mountainous country. The distribution of individuals along the stream is patchy and is generally associated with substrates of loose rock, rocky banks and rapids. Adjacent stream-side vegetation is used for shelter and basking. Eggs are deposited under large boulders within the stream. Tadpole development occurs instream over summer, and metamorphosis takes place in late summer and early autumn (Watson *et al.* 1991, Hero *et al.* 1995, Robertson and Gillespie in prep.). Extensive searches of every major stream within the broad distribution of the Spotted Tree Frog have found only 11 extant populations. The distribution of the species is fragmented and there has been a significant decline over the last 20 years (Watson *et al.* 1991, Gillespie and Hollis 1996, Robertson and Gillespie in prep, Robertson *et al.* in prep.). Surveys are conducted during the breeding season (late spring and early summer) and are confined to rivers; use of adjoining forest in the non-breeding season is unknown (G. Gillespie pers. comm., Robertson *et al.* in prep).

Distribution within the Gippsland RFA Region:

Records of the Spotted Tree Frog originate mainly from the north of the region along the Great Dividing Range, from the Murray River in the north-east, the Big River near Glen Valley, the Wongungarra River West of the Blue Rag and the Goulburn and Black Rivers east of Woods Point in the west. Further south an isolated record exists from Coopers Creek near Tyers. These records date from the early 1960s to the present. A small proportion of the records occur in national parks, or on the border of national parks and State forest, but most originate from State forest (Atlas of Victorian Wildlife).

Disturbances and Potentially Threatening Processes within the Gippsland RFA Region:

Disturbances in and adjacent to streams and in catchments which affect water quality and flow and cause altered streambed conditions (e.g. sedimentation), and changes to stream-side vegetation are likely causes of Spotted Tree Frog population declines (Gillespie and Hollis 1996). The major sources of unacceptable increases in stream sedimentation are likely to be roads and tracks including fire trails and accessible major and minor roads used for timber extraction, recreation and management access (O' Shaughnessy *et al.* 1997). Timber harvesting operations also have significant effects on both water quality and quantity (Campbell and Doeg 1989, O' Shaughnessy *et al.* 1997). Roads near streams and post-1972 timber harvesting in catchments have been negatively correlated with Spotted Tree Frog abundance (Gillespie and Hollis 1996). The effects of fuel reduction burning in Spotted Tree Frog catchments is unknown but may represent a threat (Watson *et al.* 1991). Eductor dredging causes major alterations to the stream bed (Hall 1988) and has been negatively correlated with Spotted Tree Frog abundance. Although currently illegal in Victoria, dredging is still known to occur in most rivers and streams with road access (Goulburn, Black and Big Rivers) (Watson *et al.* 1991, Gillespie and Hollis 1996, G. Gillespie pers. comm.). Hydrological modification of streams through construction of dams and impoundments and water releases from existing impoundments may adversely affect populations (Gillespie *et al.* 1995). Anthropogenic disturbances including recreation/human access to catchments, off road vehicles, and clearance of bank vegetation for bush camping, have been negatively correlated with the relative abundance of the Spotted Tree Frog. Predation of eggs and larvae by trout may reduce or preclude recruitment to the adult stage (Gillespie *et al.* 1995, Robertson and Gillespie in prep, G. Gillespie pers. comm.). Invasion of riparian

vegetation by introduced weeds may result in loss and degradation of habitat (Tyler 1997, Robertson and Gillespie in prep.). However, herbicide use may be detrimental to both adults and tadpoles (Bidwell and Gorrie 1995, Robertson and Gillespie in prep.). Habitat alteration as a consequence of the Enhanced Greenhouse Effect is a significant threat to the Spotted Tree Frog (Bennett *et al.* 1991, G. Gillespie pers. comm.). The small size and isolation of most Spotted Tree Frog populations makes them vulnerable to stochastic events such as wildfire (Robertson and Gillespie in prep.).

Tyler's Toadlet

Uperoleia tyleri

RARITY

a) Geographic Range

- Classification of range size within the Gippsland region: Small
- Distribution of records within the Gippsland region: Records exist from the southern part of the region around the towns of Carrajung, Sale and Seacombe.
- Number of 5 minute grid cells recorded from: 3
Source: Atlas of Victorian Wildlife

b) Abundance

- Classification of abundance: Unknown
- Population Estimate: Unknown
- Density: Unknown
Source: G. Gillespie pers. comm.

c) Habitat Specificity

- Classification of habitat specificity: Narrow
- Vegetation types used in the region: Forested habitats including riparian scrub, coastal heaths and adjacent woodlands and shrublands.
- Source: Hero *et al.* (1991), Gillespie *et al.* (1992), Cogger (1996), Gillespie pers. comm.

DYNAMICS

Population Trend in Last Decade

- Increasing, stable or declined: Unknown
Source: G. Gillespie pers. comm.

Population trend since discovery by Europeans

- Increasing, stable or declined: Unknown
Source: G. Gillespie pers. comm.

SPATIAL DYNAMICS

a) Population variability

- Classification of population variability: Unknown
Source: G. Gillespie pers. comm.

b) Dispersal

- Classification of powers of dispersal: Unknown
- Average distances dispersed: Unknown
- Maximum distance dispersed: Unknown
Source: G. Gillespie pers. comm.

LIFE HISTORY PARAMETERS

a) Reproductive output

- Classification of reproductive output: Unknown
- Age of sexual maturity (yrs): Unknown
- Mean clutch/litter/brood size: Unknown
- Mean no of clutches/litters/broods per year: Unknown
- Time of year young born/hatch: Predicted to breed between September and January
Source: Hero *et al.* (1991)

b) Longevity

- Classification of lifespan: Unknown
- Average lifespan (yrs): Unknown
- Maximum lifespan (yrs): Unknown
Source: G. Gillespie pers. comm.

c) Morphology

Adult body size

- Weight (g): Unknown
- Length (mm): 22-33 male, 26-34 female
Source: Davies and Littlejohn (1986)

d) Social organisation

- Colonial or non-colonial: Unknown
- Territoriality: Unknown
Source: G. Gillespie pers. comm.

e) Other

- Nomadic, migratory, sedentary: Unknown
- Diet: Unknown
Source: G. Gillespie pers. comm.

THREATS

1. Clearing of Native Vegetation:
Rating (-)
2. **Timber Harvesting:**
Rating (2)
Gillespie *et al.* (1992), G. Gillespie pers. comm.
3. **Fuel Reduction Burning:**
Rating (2)
Gillespie *et al.* (1992), G. Gillespie pers. comm.
4. Firewood Collection:
Rating (-)
5. **Unplanned Fire:**
Rating (2)
G. Gillespie pers. comm.
6. Introduced Species:
Rating (-)
7. Grazing/Trampling:
Rating (-)
8. Pest Control:
Rating (-)
9. **Road Construction and Maintenance:**
Rating (2)
G. Gillespie pers. comm.
10. Mining/Quarrying:
Rating (-)
11. Eucalypt Dieback:
Rating (-)
12. Recreation:
Rating (-)
13. Illegal Collecting/Harvesting:
Rating (-)
14. Vandalism:
Rating (-)
15. Dams/Impoundments:
Rating (-)

Current Management:

Tyler's Toadlet is classified as "data deficient" in Victoria (NRE 1999). There are no threat-ameliorating prescriptions for this species in the Gippsland RFA region.

Species characteristics:

Tyler's Toadlet is a small to moderate sized, ground dwelling species found in a range of habitats, from forests, woodlands, shrublands, grasslands and coastal heaths (Hero *et al.* 1991, Cogger 1996). This species has also been recorded sheltering under rocks and logs in dry open-forest, away from breeding sites (Gillespie *et al.* 1992). This frog breeds in grassy depressions and roadside drains inundated with spring and summer rain (Hero *et al.* 1991, Cogger 1996). Little information exists on the biology and ecology of this species.

Distribution in the Gippsland RFA region:

Six records of Tyler's Toadlet originate in the Gippsland region. These records are in the vicinity of the towns of Carrajung, Sale and Seacombe in the south of the region. Of these records, two occur in the Holey Plains State Park, two occur in State forest, and the remaining two occur on privately-owned land. Two of the records were collected in 1975, and the remainder in 1978 (Atlas of Victorian Wildlife).

Disturbances and potentially threatening processes operating in the Gippsland RFA region:

The paucity of knowledge on the biology of this species and its distribution in the region mean that the impact of disturbances and the extent to which they threaten this species are largely unknown. Potential threatening processes include habitat loss and a reduction in litter and ground cover layers which harbour invertebrate food and provide shelter, as a result of disturbances such as timber harvesting, wildfire and fuel reduction burning (Gillespie *et al.* 1992). Activities that may alter the hydrological regime of Tyler's Toadlet habitat, such as the construction and maintenance of roads, may threaten this species. The impact of predation on this species by exotic predators such as cats and foxes is unknown, but may be detrimental to this species. Pollution and increased siltation and nutrient levels

as a result of disturbances such as roading, timber harvesting and spraying of herbicides for weed removal in the aquatic habitats used by Tyler's Toadlet as breeding sites are likely to harm larvae.

Blue Mountains Tree Frog

Litoria citropa

RARITY

a) Geographic Range

- Classification of range size within the Gippsland region: Medium
- Distribution of records within the Gippsland region: Records exist from near Broken River in the east of the region, to the Avon River in the west.
- Number of 5 minute grid cells recorded from: 7
Source: Atlas of Victorian Wildlife

b) Abundance

- Classification of abundance: Unknown
- Population Estimate: Unknown
- Density: Unknown
Source: G. Gillespie pers. comm.

c) Habitat Specificity

- Classification of habitat specificity: Narrow
- Vegetation types used in the region: Predominantly occurs at low altitudes below 200 m along slow-flowing streams within dry forests, well developed riparian forest and wet temperate rainforest.
Source: G. Gillespie pers. comm.

DYNAMICS

Population Trend in Last Decade

- Increasing, stable or declined: Unknown
Source: G. Gillespie pers. comm.

Population trend since discovery by Europeans

- Increasing, stable or declined: Declined in areas cleared for agriculture.
Source: G. Gillespie pers. comm.

SPATIAL DYNAMICS

a) Population variability

- Classification of population variability: Unknown
Source: G. Gillespie pers. comm.

b) Dispersal

- Classification of powers of dispersal: Unknown
- Average distances dispersed: Unknown, but known to move away from streams into forest outside breeding season.
- Maximum distance dispersed: Recorded up to one km from streams.
Source: G. Gillespie pers. comm.

LIFE HISTORY PARAMETERS

a) Reproductive output

- Classification of reproductive output: Unknown
- Age of sexual maturity (yrs): Males 2-3, females 3-4
- Mean clutch/litter/brood size: Approximately 900 eggs
- Mean no of clutches/litters/broods per year: 1
- Time of year young born/hatch: December to January
Source: Hero *et al.* (1991), Tyler (1994), G. Gillespie pers. comm.

b) Longevity

- Classification of lifespan: Unknown
- Average lifespan (yrs): Unknown
- Maximum lifespan (yrs): Unknown
Source: G. Gillespie pers. comm.

c) Morphology

Adult body size

- Weight (g): Males 5-7, females 10-20
- Length (mm): 65
Source: Cogger (1996), G. Gillespie pers. comm.

d) Social organisation

- Colonial or non-colonial: Unknown
- Territoriality: Males during breeding season
Source: G. Gillespie pers. comm.

e) Other

- Nomadic, migratory, sedentary: Unknown
- Diet: Insectivore
Source: G. Gillespie pers. comm.

THREATS

1. Clearing of Native Vegetation:

Rating (3)

Macfarlane *et al.* (1987), Gillespie *et al.* (1992), G. Gillespie pers. comm.

2. Timber Harvesting:

Rating (2)

Gillespie *et al.* (1992), G. Gillespie pers. comm.

3. Fuel Reduction Burning:

Rating (-)

4. Firewood Collection:

Rating (-)

5. Unplanned Fire:

Rating (-)

6. Introduced Species:

Rating (1)

7. Grazing/Trampling:

Rating (-)

8. Pest Control:

Rating (-)

9. Road Construction and Maintenance:

Rating (2)

Gillespie *et al.* (1992), G. Gillespie pers. comm.

10. Mining/Quarrying:

Rating (-)

11. Eucalypt Dieback:

Rating (-)

12. Recreation:

Rating (-)

13. Illegal Collecting/Harvesting:

Rating (-)

14. Vandalism:

Rating (-)

15. Dams/Impoundments:

Rating (-)

Current Management:

The Blue Mountains Tree Frog is not classified as a threatened species in Victoria (NRE 1999). There are currently no management prescriptions for this species in the Gippsland RFA region.

Species characteristics:

The Blue Mountains Tree Frog is a riverine species, which inhabits rocky rivers and streams in wet and dry sclerophyll forests, woodlands, heaths and riparian communities (Hero *et al.* 1991, Gillespie *et al.* 1992, Cogger 1996). This species shows a preference for heavily forested areas (Barker *et al.* 1995). Within this habitat it is usually found sheltering under rocks or in rock crevices (Hero *et al.* 1991, Cogger 1996). It has also been observed perched on the limbs of vegetation overhanging streams, or amongst dense vegetation within stream margins and has been recorded up to 900 m from the nearest stream on a ridge (Gillespie *et al.* 1992). However, how it utilises habitat away from the stream is unknown. The Blue Mountains Tree Frog is a strong jumper and able swimmer, despite a lack of webbing on its feet (Hero *et al.* 1991). This species has a predicted breeding season between October and December (Hero *et al.* 1991), and prefers streams with deep pools separated by shallow rocky sections as breeding and oviposition sites (Gillespie *et al.* 1992).

Distribution in the Gippsland RFA region:

Eleven records of the Blue Mountains Tree Frog exist from the region (Atlas of Victorian Wildlife). These records originate in the central and eastern parts of the region, from the vicinity of Buchan, Bruthen, Tambo Crossing, Bullumwaal and Stratford townships. This frog is known to occur along the Mitchell, Nicholson, Tambo and Buchan Rivers, and their tributaries (G. Gillespie pers. comm.). These records occur in State forest and privately-owned land (Atlas of Victorian Wildlife).

Disturbances and potentially threatening processes operating in the Gippsland RFA region:

The biology, distribution and habitat requirements of the Blue Mountains Tree Frog are poorly known.

This species prefers heavily forested areas, and all Victorian records are from areas of ecologically mature forest (Gillespie *et al.* 1992). The Blue Mountains Tree Frog is not found in riparian areas cleared for agriculture, but is found in intervening areas of uncleared riparian vegetation (Macfarlane *et al.* 1987). A number of the Gippsland records of this species are from private land and loss of habitat through clearing is potentially a major threat (Gillespie *et al.* 1992, G. Gillespie pers. comm.). The effects of forest management practices on this species are largely unknown, but maintenance of riparian vegetation is thought to be essential (Gillespie *et al.* 1992). There is a risk of increased sediment loading resulting from timber harvesting and roading activities, and the changes in stream flow and nutrient levels post-harvest may detrimentally affect this species, particularly the larval stage (Gillespie *et al.* 1992). Road construction may provide corridors facilitating the invasion of exotic weeds and predators into the habitat of the Blue Mountains Tree Frog. Although Blue Mountain Tree Frog tadpoles are known to be palatable to introduced trout, this species is mostly found in lowland streams where trout are absent (G. Gillespie pers. comm.).

Leaf Green Tree Frog

Litoria phyllochroa

RARITY

a) Geographic Range

- Classification of range size within the Gippsland region: Large
- Distribution of records within the Gippsland region: Records are predominantly from the northern half of the region, from the vicinity of the Murray River in the north, to the vicinity of Walhalla in the south-west.
- Number of 5 minute grid cells recorded from: 45
Source: Atlas of Victorian Wildlife

b) Abundance

- Classification of abundance: Unknown
- Population Estimate: Unknown
- Density: Unknown
Source: G. Gillespie pers. comm.

c) Habitat Specificity

- Classification of habitat specificity: Narrow
- Vegetation types used in the region: Riparian forest in both dry sclerophyll and montane EVCs.
Source: G. Gillespie pers. comm.

DYNAMICS

Population Trend in Last Decade

- Increasing, stable or declined: Declined
Source: G. Gillespie pers. comm.

Population trend since discovery by Europeans

- Increasing, stable or declined: Declined
Source: G. Gillespie pers. comm.

SPATIAL DYNAMICS

a) Population variability

- Classification of population variability: Unknown
Source: G. Gillespie pers. comm.

b) Dispersal

- Classification of powers of dispersal: Unknown
- Average distances dispersed: Unknown
- Maximum distance dispersed: Unknown
Source: G. Gillespie pers. comm.

LIFE HISTORY PARAMETERS

a) Reproductive output

- Classification of reproductive output: High
- Age of sexual maturity (yrs): males 2, females 3
- Mean clutch/litter/brood size: 300-500 eggs
- Mean no of clutches/litters/broods per year: 1
- Time of year young born/hatch: December to January
Source: Hero *et al.* (1991), Tyler (1994), G. Gillespie pers. comm.

b) Longevity

- Classification of lifespan: Unknown
- Average lifespan (yrs): 5
- Maximum lifespan (yrs): 7
Source: G. Gillespie pers. comm.

c) Morphology

Adult body size

- Weight (g): 8
- Length (mm): 27-41
Source: Hero *et al.* (1991), Barker *et al.* (1995), Cogger (1996), G. Gillespie pers. comm.

d) Social organisation

- Colonial or non-colonial: Unknown
- Territoriality: Unknown
Source: G. Gillespie pers. comm.

e) Other

- Nomadic, migratory, sedentary: Sedentary
- Diet: Invertebrates
Source: Rose (1974), G. Gillespie pers. comm.

THREATS

1. Clearing of Native Vegetation:

Rating (3)

Gillespie and Hines (in review), G. Gillespie pers. comm.

2. Timber Harvesting:

Rating (2)

Gillespie *et al.* (1992), G. Gillespie pers. comm.

3. Fuel Reduction Burning:

Rating (-)

4. Firewood Collection:

Rating (-)

5. Unplanned Fire:

Rating (-)

6. Introduced Species:

Rating (2)

Gillespie and Hines (in review), G. Gillespie pers. comm.

7. Grazing/Trampling:

Rating (-)

8. Pest Control:

Rating (-)

9. Road Construction and Maintenance:

Rating (2)

Gillespie *et al.* (1992), G. Gillespie pers. comm.

10. Mining/Quarrying:

Rating (-)

11. Eucalypt Dieback:

Rating (-)

12. Recreation:

Rating (-)

13. Illegal Collecting/Harvesting: Rating (-)

14. Vandalism:

Rating (-)

15. Dams/Impoundments:

Rating (-)

Current Management:

The Leaf Green Tree Frog is not classified as a threatened species in Victoria (NRE 1999). Despite this, there is evidence to suggest this species is declining in abundance, particularly in the upland parts of its range (G. Gillespie pers. comm.). There are currently no management prescriptions for this species in the Gippsland RFA region.

Species characteristics:

The Leaf Green Tree Frog is a riverine, forest-dependent species which inhabits rocky rivers and mountain streams in rainforest and wet forest (Hero *et al.* 1991, G. Gillespie pers. comm.). Within this habitat it is usually encountered among vegetation beside watercourses (Barker *et al.* 1995, Cogger 1996); the degree to which it uses surrounding forest away from riparian habitat is unknown. This species has a predicted breeding season between October and January (Hero *et al.* 1991), and streamside pools and backwaters are used as oviposition sites (Hero *et al.* 1991). In these locations clumps of small eggs are attached to submerged vegetation (Barker *et al.* 1995). The tadpoles of this species actively swim in the flowing water of rivers and streams, and cling to rocks from which they probably feed on algae (Hero *et al.* 1991). The larval stage lasts around 12 weeks before metamorphosis occurs (Barker *et al.* 1995).

Distribution in the Gippsland RFA region:

Records of the Leaf Green Tree Frog occur predominantly in the northern half of the region, from

near Benambra and around the Murray River in the north, to the vicinity of Bairnsdale in the south and the Thomson River catchment in the southwest. Records in the east of the region extend to the boundary it shares with East Gippsland. These records originate from a range of land tenures, including national parks and other reserves, State forest and privately-owned land (Atlas of Victorian Wildlife).

Disturbances and potentially threatening processes operating in the Gippsland RFA region:

Ecologically, the Leaf Green Tree Frog is similar to the endangered Spotted Tree Frog, and may be threatened by similar processes in the upper altitudes of its range (G. Gillespie pers. comm.). This frog is known to have been displaced in riparian areas cleared for agriculture and as the species has been

recorded from private land in Gippsland, clearing is considered a major threat. The effects of forest management practices on this species are largely unknown, but maintenance of riparian vegetation is thought to be essential (Gillespie and Hines in review, G. Gillespie pers. comm.). There is a risk of increased sediment loading resulting from timber harvesting and roading activities, and the changes in stream flow and nutrient levels post-harvest may detrimentally affect this riverine species, particularly the larval stage (Gillespie *et al.* 1992). Road construction may provide corridors facilitating the invasion of exotic weeds and predators into the Leaf Green Tree Frog's habitat. The tadpoles of this species are known to be palatable to introduced trout, and this may be a major factor in the low occurrence of this frog in upland streams (Gillespie and Hines in review, G. Gillespie pers. comm.).

R E P T I L E S

Glossy Grass Skink

Pseudemoia rawlinsoni

RARITY

a) Geographic Range

- Classification of range size: Medium
- Distribution of records within the Gippsland region: Most records are near the coast, stretching from Metung in the east to Wilsons Promontory in the west. Inland records are concentrated around Rams Head Range and Benambra in the north-east of the region.
- Number of 5 minute grid cells recorded from: 18
Source: Atlas of Victorian Wildlife

b) Abundance

- Classification of abundance: Low
- Population Estimate: Unknown
- Density: Unknown
- Home Range (ha): Unknown, but likely to be less than 10m²
Source: G. Brown pers. comm., P. Robertson pers. comm.

c) Habitat Specificity

- Classification of habitat specificity: Narrow
- Vegetation types used in the region: This lizard favours areas with very humid microenvironments such as swamp, saltmarsh and riparian vegetation, boggy creek valleys, the margins of permanent lakes, wet heathlands, fens and sphagnum bogs. It appears to require dense vegetation at ground level.
Source: Hutchinson and Donnellan (1988), Ehmann (1992)

Population Trend in Last Decade

- Increasing, stable or declined: Unknown
Source: P. Robertson pers. comm.

Population trend since discovery by Europeans

- Increasing, stable or declined: Declined
Declined due to habitat reduction commensurate with broad-scale clearing of native vegetation and drainage of swamps and wetlands for agricultural development
Source: P. Robertson pers. comm.

SPATIAL DYNAMICS

a) Population variability

- Classification of population variability: Unknown
Source: P. Robertson pers. comm.

b) Dispersal

- Classification of powers of dispersal: Low
- Average distances dispersed: Unknown
- Maximum distance dispersed: Unknown
Source: P. Robertson pers. comm.

LIFE HISTORY PARAMETERS

a) Reproductive output

- Classification of reproductive output: Low
- Age of sexual maturity (yrs): 1-3 years
- Mean litter size: 4-8 young
- Mean no of litters per year: 1
- Time of year young born: December-February (gravid females have been collected between October and January)
Source: Hutchinson and Donnellan (1988), P. Robertson pers. comm.

b) Longevity

- Classification of lifespan: Unknown
- Average lifespan (yrs): Unknown
- Maximum lifespan (yrs): Unknown
Source: P. Robertson pers. comm.

c) Morphology

Adult body size

- Weight (g): Unknown
- Length (mm): 40-61 females, 37-63 males (females tend to be larger than males)
Source: Hutchinson and Donnellan (1988)

d) Social organisation

- Colonial or non-colonial: Non-colonial
- Territoriality: None observed, unlikely
Source: P. Robertson pers. comm.

e) Other

- Nomadic, migratory, sedentary: Sedentary
- Mode of feeding: Insectivore, preys on insects, spiders and small crustaceans

Source: Ehmann (1992), P. Robertson pers. comm.

THREATS

1. Clearing of Native Vegetation: Rating (3)

P. Robertson pers. comm.

2. Timber Harvesting: Rating (1)

P. Robertson pers. comm.

3. Fuel Reduction Burning: Rating (1)

P. Robertson pers. comm.

4. Firewood Collection: Rating (0)

P. Robertson pers. comm.

5. Unplanned Fire: Rating (1)

P. Robertson pers. comm.

6. Introduced Species: Rating (2)

P. Robertson pers. comm.

7. Grazing/Trampling: Rating (2)

P. Robertson pers. comm.

8. Pest Control: Rating (0)

P. Robertson pers. comm.

9. Road Construction and Maintenance: Rating (1)

P. Robertson pers. comm.

10. Mining/Quarrying: Rating (0)

P. Robertson pers. comm.

11. Eucalypt Dieback: Rating (0)

P. Robertson pers. comm.

12. Recreation: Rating (0)

P. Robertson pers. comm.

13. Illegal Collecting/Harvesting: Rating (0)

P. Robertson pers. comm.

14. Vandalism: Rating (0)

P. Robertson pers. comm.

15. Dams/Impoundments: Rating (2)

P. Robertson pers. comm.

Current Management:

The Glossy Grass Skink is classified as "lower risk - near threatened" in Victoria (NRE 1999). There are no threat-ameliorating management prescriptions for this species within the Gippsland RFA region.

Species characteristics:

The Glossy Grass Skink is a small scincid that is confined to swampy habitats from sea-level to subalpine elevations (Hutchinson and Donnellan 1988). This lizard favours humid microenvironments such as saltmarshes, boggy creek valleys, the margins of permanent lakes and swamps, wet heathland, fens and sphagnum bogs, particularly in areas that are densely vegetated at ground level (Hutchinson and Donnellan 1988). This dense vegetation is used for basking and foraging. A viviparous species, the Glossy Grass Skink produces four to eight young between December and February, and the females store sperm over winter after mating in late summer or autumn (Hutchinson and Donnellan 1988, Ehmann 1992). Females tend to be slightly larger than males (Hutchinson and Donnellan 1988, Ehmann 1992).

Distribution in the Gippsland RFA region:

Records of Glossy Grass Skinks in the Gippsland region are predominantly from coastal areas, from Metung in the east to Wilsons Promontory in the west. A number of records originate from the subalpine areas around Benambra and Rams Head

Range on the Victorian/New South Wales border in the north-east of the region. Further south the Glossy Grass Skink has also been recorded inland from the vicinity of Churchill. Most of these records are from privately-owned land and State forest (Atlas of Victorian Wildlife).

Disturbances and potentially threatening processes operating in the Gippsland RFA region:

Loss of habitat as a result of clearing and draining of swamps and wetlands on private land is a significant threat to Glossy Grass Skink populations in Gippsland. Grazing/trampling causes degradation of wetland habitat and loss and simplification of dense ground layer vegetation utilised by this species for basking and foraging. Loss and alteration of habitat may also result from inappropriate fire regimes and wildfire. Other threats include changes to hydrological regimes within drainage lines and swamps as a result of timber harvesting in nearby forest and associated road construction activities. The impact of exotic predators such as cats and foxes is unclear but likely to be deleterious. Populations of Glossy Grass Skinks that occur close to towns may suffer predation from domestic pets, in particular cats (P. Robertson pers. comm.).

Swamp Skink

Egernia coventryi

RARITY

a) Geographic Range

- Classification of range size within the Gippsland region: Small
- Distribution of records within the Gippsland region: Disjunct records, predominantly from coastal areas in the south of the region extending from the Gippsland Lakes area in the east, to the Anderson Inlet area in the west. Inland records from the Rosedale area.
- Number of 5 minute grid cells recorded from: 10
Source: Atlas of Victorian Wildlife

b) Abundance

- Classification of abundance: Low
- Population Estimate: Unknown
- Density: 50 animals per ha, estimated for areas of suitable habitat in other regions
- Home Range (ha): possibly greater than 10m², estimate for mark-recapture 5m²
Source: Clemann (1997), P. Robertson pers. comm.

c) Habitat Specificity

- Classification of habitat specificity: Narrow
- Vegetation types used in the region: This lizard favours swamp, saltmarsh and riparian vegetation, particularly sedge and tussock life-form species, often on the margins of heathland
Source: Robertson (1980), Smales (1981), Schulz (1985), Clemann (1997)

DYNAMICS

Population Trend in Last Decade

- Increasing, stable or declined: Unknown
Source: P. Robertson pers. comm.

Population trend since discovery by Europeans

- Increasing, stable or declined: Declined
Declined due to habitat clearance
Source: P. Robertson pers. comm.

SPATIAL DYNAMICS

a) Population variability

- Classification of population variability: Unknown
- Source: P. Robertson pers. comm.

b) Dispersal

- Classification of powers of dispersal: Low
- Average distances dispersed: Unknown
- Maximum distance dispersed: Unknown
Source: P. Robertson pers. comm.

LIFE HISTORY PARAMETERS

a) Reproductive output

- Classification of reproductive output: Low
- Age of sexual maturity (yrs): 2-3 years
- Mean clutch/litter/brood size: 2-6 young, usually 3

- Mean no of clutches/litters/broods per year: 1
- Time of year young born/hatch: January-February
Source: Robertson (1980), P. Robertson pers. comm.

b) Longevity

- Classification of lifespan: Probably long-lived
- Average lifespan (yrs): Estimated to be approximately 10 years
- Maximum lifespan (yrs): Unknown
Source: P. Robertson pers. comm.

c) Morphology

Adult body size

- Weight (g): 25-28g
- Length (mm): 100 (snout-vent)
Source: Cogger (1996), Clemann (1997), P. Robertson pers. comm.

d) Social organisation

- Colonial or non-colonial: Non-colonial
- Territoriality: Yes, aggressive to conspecifics, especially males
Source: Clemann (1997), P. Robertson pers. comm.

e) Other

- Nomadic, migratory, sedentary: Sedentary
- Mode of feeding: Primarily insectivore, up to 20-50% plant material
Source: Douch (1994), Clemann (1997)

THREATS

1. Clearing of Native Vegetation:

Rating (3)

P. Robertson and G. Brown pers. comm.

2. Timber Harvesting:

Rating (-)

3. Fuel Reduction Burning:

Rating (-)

4. Firewood Collection:

Rating (1)

P. Robertson pers. comm.

5. Unplanned Fire:

Rating (-)

6. Introduced Species:

Rating (2)

P. Robertson pers. comm.

7. Grazing/Trampling:

Rating (2)

P. Robertson pers. comm.

8. Pest Control:

Rating (-)

9. Road Construction and Maintenance:

Rating (1)

P. Robertson pers. comm.

10. Mining/Quarrying:

Rating (0)

P. Robertson pers. comm.

11. Eucalypt Dieback:

Rating (0)

P. Robertson pers. comm.

12. Recreation:

Rating (-)

13. Illegal Collecting/Harvesting:

Rating (0)

P. Robertson pers. comm.

14. Vandalism:

Rating (0)

P. Robertson pers. comm.

15. Dams/Impoundments:

Rating (2)

P. Robertson pers. comm.

Current Management:

The Swamp Skink is classified as "vulnerable" in Victoria (NRE 1999), and has been nominated for listing under the *Flora and Fauna Guarantee Act* 1988. There are no threat-ameliorating management prescriptions for this species within the Gippsland RFA region.

Species characteristics:

The Swamp Skink occurs in swampland and heathland vegetation in the Gippsland RFA region, but has been recorded in saltmarsh in other Victorian regions (Schulz 1985, Clemann 1997). This species shelters in burrows and under rocks and logs

(Robertson 1980, Smales 1981, Clemann 1997). Exposed logs may be used as basking sites as well as for shelter (Smales 1981). Sedge and tussock life-form vegetation is an important component of Swamp Skink habitat, providing shelter, and basking and foraging sites (Clemann 1997). The Swamp Skink is aggressively territorial and will actively exclude conspecifics from homesites, particularly in male-male confrontations (Robertson pers. comm., Clemann 1997). This lizard is primarily insectivorous, but considerable vegetable matter is also consumed (Douch 1994, Clemann 1997). A viviparous species, the Swamp Skink gives birth to two to six young in mid to late summer (Robertson 1980).

Distribution in the Gippsland RFA region:

Records of Swamp Skinks in the Gippsland region are highly disjunct and predominantly from coastal areas, extending from the Gippsland Lakes area in the east to Anderson Inlet in the west. Further inland, records exist from the vicinity of Rosedale. Of the 23 records of this species in the region, eight have been recorded from Wilsons Promontory National Park, and four from the Gippsland Lakes National Park. Ten records have come from privately-owned land, and there is one record from State forest.

Disturbances and potentially threatening processes operating in the Gippsland RFA region:

Major threats to the Swamp Skink are habitat loss caused by clearing and drainage of swamps (Robertson 1980, Smales 1981, Lumsden *et al.* 1991, Clemann 1997). Loss of habitat in the past as a result of this disturbance has caused population declines and localised extirpations (Robertson 1980). Gillespie *et al.* (1992) note that in East Gippsland the species appears to be dependent on late successional stages of riparian scrub and coastal heathland. They suggest inappropriate fire regimes and wildfires represent a threat, as does road construction, which could affect hydrological regimes. Habitat loss from grazing and trampling by domestic stock has had a deleterious impact on Swamp Skink populations in other regions (Robertson pers. comm.). Additional threats may include predation by exotic predators such as dogs, cats and foxes, and pollution of wetland habitat (Clemann 1997).

Lace Monitor

Varanus varius

RARITY

a) Geographic Range

- Classification of range size within Gippsland region: Large
- Distribution of records within the Gippsland region: Records spread throughout the Gippsland region, from the vicinity of Omeo in the north-east, to the vicinity of Inverloch in the south-west.
- Number of 5 minute grid cells recorded from: 78
Source: Atlas of Victorian Wildlife

b) Abundance

- Classification of abundance: Medium
- Population Estimate: Unknown
- Density: Unknown
- Home Range (ha): Males approximately 65
Source: Weavers (1993), P. Robertson pers. comm.

c) Habitat Specificity

- Classification of habitat specificity: Wide
- Vegetation types used in the region: Woodlands, wet and dry forests
Source: P. Robertson pers. comm.

DYNAMICS

Population Trend in Last Decade

- Increasing, stable or declined: Unknown
Source: P. Robertson pers. comm.

Population trend since discovery by Europeans

- Increasing, stable or declined: Unknown, possibly declined commensurate with broad-

scale clearing and fragmenting of native vegetation for agricultural and silvicultural purposes

Source: P. Robertson pers. comm.

SPATIAL DYNAMICS

a) Population variability

- Classification of population variability: Unknown
Source: P. Robertson pers. comm.

b) Dispersal

- Classification of powers of dispersal: Unknown
- Average distances dispersed: Unknown
- Maximum distance dispersed: Unknown
Source: P. Robertson pers. comm.

LIFE HISTORY PARAMETERS

a) Reproductive output

- Classification of reproductive output: Low
- Age of sexual maturity (yrs): Unknown
- Mean clutch/litter/brood size: 4-14
- Mean no of clutches/litters/broods per year: 1
- Time of year young born/hatch: Early spring
Source: Ehmann (1992), Green and King (1993), P. Robertson pers. comm.

b) Longevity

- Classification of lifespan: Probably long-lived
- Average lifespan (yrs): Unknown
- Maximum lifespan (yrs): Unknown
Source: Green and King (1993), P. Robertson pers. comm.

c) Morphology

Adult body size

- Weight (g): 1800-7000 (5100)
- Length (mm): Mean length 600 (snout-vent), maximum recorded 765 (snout-vent)
Source: Weavers (1988), Ehmann (1992), Weavers (1993)

d) Social organisation

- Colonial or non-colonial: Solitary
- Territoriality: Probably non-territorial
Source: Jenkins and Bartell (1980), P. Robertson pers. comm.

e) Other

- Nomadic, migratory, sedentary: Sedentary
- Diet: Carnivore; small mammals, reptiles, carrion, nestling birds, vertebrate eggs, insects
Source: Cogger (1996), G. Brown pers. comm., P. Robertson pers. comm.

THREATS

1. Clearing of Native Vegetation:

Rating (3)

Alexander (1997), P. Robertson pers. comm.

2. Timber Harvesting:

Rating (3)

Brown and Bennett (1995), Alexander (1997), P. Robertson pers. comm.

3. Fuel Reduction Burning:

Rating (2)

P. Robertson pers. comm.

4. Firewood Collection:

Rating (2)

Brown and Bennett (1995), P. Robertson pers. comm.

5. Unplanned Fire:

Rating (2)

P. Robertson pers. comm.

6. Introduced Species:

Rating (2)

Alexander (1997), P. Robertson pers. comm.

7. Grazing/Trampling:

Rating (1)

P. Robertson pers. comm.

8. Pest Control:

Rating (2)

Alexander (1997), P. Robertson pers. comm.

9. Road Construction and Maintenance:

Rating (1)

P. Robertson pers. comm.

10. Mining/Quarrying:

Rating (1)

P. Robertson pers. comm.

11. **Tree Dieback:**
Rating (2)
P. Robertson pers. comm.
12. **Recreation:**
Rating (1)
P. Robertson pers. comm.
13. **Illegal Collecting/Harvesting:**
Rating (1)
P. Robertson pers. comm.
14. **Vandalism:**
Rating (1)
P. Robertson pers. comm.
15. **Dams/Impoundments:**
Rating (0)
P. Robertson pers. comm.

Current Management:

The Lace Monitor is classified as "data deficient" in Victoria (NRE 1999). A forest management plan for the forest management areas (Tambo and Central Gippsland) included in the Gippsland RFA region are in preparation, and there are no species-specific threat-ameliorating management prescriptions for this species within the Gippsland RFA region.

Species characteristics:

The Lace Monitor is an opportunistic carnivore, foraging widely for carrion, mammals, birds, reptiles and arthropods. In some areas rabbits constitute at least a quarter of prey numbers in this lizard's diet (Weavers 1989). Small skinks are an important component of the diet of juvenile Lace Monitors (Alexander 1997). The Lace Monitor depends on large trees (living and dead) for foraging, basking and shelter (Silveira *et al.* 1997). It is semi-arboreal, often fleeing up trees when approached. It also uses trees to forage for bird eggs and nestlings (Green and King 1993). The Lace Monitor shelters in burrows, disused rabbit warrens or tree crevices and hollows (Green and King 1993). A complex ground layer with a high density of logs is believed to be beneficial for the survival of dispersing young (Alexander 1997). Eggs are laid in rotting stumps or termitaria (Ehmann 1992), and this species may be dependent on termitaria (P. Robertson pers. comm.). This species is often seen foraging in roadside remnants and networks of stream vegetation, its distribution seemingly correlated with connected systems of habitat (Brown and Bennett 1995). With a home range of approximately 65 hectares (Weavers 1993), the Lace Monitor requires large tracts of suitable habitat.

Distribution in the Gippsland RFA region

Records of the Lace Monitor in the Gippsland RFA region are widespread and extend from around Omeo in the north-east to near Bunyip in the west and around Inverloch in the south-west. Numerous records exist from both the coast, and inland areas of the region. These records are spread across most types of land tenure, from privately-owned land, State forest, reserves, and state and national parks.

Disturbances and potentially threatening processes operating in the Gippsland RFA region

The Lace Monitor is threatened primarily by disturbances such as timber harvesting and clearing that involve the loss of large trees (living and dead), upon which this species depends for foraging, basking and shelter (Brown and Bennett 1995). These disturbances also result in habitat fragmentation, which is considered a threat to this species because of its large home range requirements, and tendency to use connected remnants. Fuel reduction burning and wildfire are regarded as a moderate threat to the Lace Monitor as they can result in loss of foraging, sheltering and nesting sites (Friend 1993, G. Brown pers. comm.). Other potentially threatening processes that may degrade habitat include tree dieback and grazing. Road construction removes and fragments habitat and may increase the possibility of roadkills, a not uncommon occurrence for this species (P. Robertson pers. comm.). Certain rabbit control methods such as

'ripping' burrows and destroying accumulations of logs and debris (that may harbour rabbits) could reduce available shelter and foraging opportunities (P. Robertson pers. comm.). Similarly, large reductions in rabbit numbers through control methods such as Rabbit Calicivirus Disease and baiting may deprive Lace Monitors of a vital food resource. This species is also susceptible to baits laid for other carnivores (G. Brown pers. comm.). The Lace Monitor exhibits dietary overlap with foxes and cats and is therefore in competition for food, although the impact of this is likely to be small (G. Brown and P. Robertson pers. comm.). In the past the Lace Monitor has been a target for illegal collection though presently this is considered a minor threat to this species (P. Robertson pers. comm.). Lace Monitors and their nests may be disturbed by recreational activities such as camping, and there is a small risk that people may kill the lizards during acts of vandalism (P. Robertson pers. comm.). Small Lace Monitors may be at risk from predation from introduced carnivores, and also habitat degradation leading to a decrease in small skink abundance, a primary food source (Alexander 1997).

Spencer's Skink

Pseudemoia spenceri

RARITY

a) Geographic Range

- Classification of range size within Gippsland region: Large
- Distribution of records within the Gippsland region: Records are widespread in the region, from the Murray River north-east of Benambra, to Wilsons Promontory in the south.
- Number of 5 minute grid cells recorded from: 58
Source: Atlas of Victorian Wildlife

b) Abundance

- Classification of abundance: Unknown
- Population Estimate: Unknown
- Density: Unknown
- Home Range (ha): Unknown
Source: P. Robertson pers. comm.

c) Habitat Specificity

- Classification of habitat specificity: Narrow
- Vegetation types used in the region: Confined to montane wet sclerophyll forest and subalpine woodland in areas of high rainfall, and wet forests in Wilsons Promontory National Park.
Source: Brown (1986), P. Robertson pers. comm.

DYNAMICS

Population Trend in Last Decade

- Increasing, stable or declined: Unknown
Source: P. Robertson pers. comm.

Population trend since discovery by Europeans

- Increasing, stable or declined: Unknown, possibly declined commensurate with broad-scale clearing of native vegetation for agricultural and silvicultural purposes
Source: G. Brown pers. comm.

SPATIAL DYNAMICS

a) Population variability

- Classification of population variability: Unknown
Source: P. Robertson pers. comm.

b) Dispersal

- Classification of powers of dispersal: Unknown
- Average distances dispersed: Unknown
- Maximum distance dispersed: Unknown
Source: P. Robertson pers. comm.

LIFE HISTORY PARAMETERS

a) Reproductive output

- Classification of reproductive output: Low
- Age of sexual maturity (yrs): Unknown
- Mean litter size: Viviparous, 1-4 young
- Mean no of litters per year: 1
- Time of year young born: Late summer
Source: Wilson and Knowles (1988), Ehmann (1992), P. Robertson pers. comm.

b) Longevity

- Classification of lifespan: Unknown
- Average lifespan (yrs): Unknown
- Maximum lifespan (yrs): Unknown
Source: P. Robertson pers. comm.

c) Morphology

Adult body size

- Weight (g): Unknown
- Length (mm): 55-65 (snout-vent), 155 (total)
Source: Wilson and Knowles (1988), Ehmann (1992), Cogger (1996)

d) Social organisation

- Colonial or non-colonial: Non-colonial, gregarious
- Territoriality: Probably non-territorial
Source: Webb (1985), Ehmann (1992)

e) Other

- Nomadic, migratory, sedentary: Sedentary
- Diet: Insectivore, takes variety of arthropod prey, including aerial/arboreal prey
Source: Brown (1986)

THREATS

1. Clearing of Native Vegetation:

Rating (2)

G. Brown pers. comm.

2. Timber Harvesting:

Rating (2)

Brown and Nelson (1993), G. Brown pers. comm.

3. Fuel Reduction Burning:

Rating (2)

P. Robertson pers. comm.

4. Firewood Collection:

Rating (2)

P. Robertson pers. comm.

5. Unplanned Fire:

Rating (1)

P. Robertson pers. comm.

6. Introduced Species:

Rating (0)

G. Brown pers. comm.

7. Grazing/Trampling:

Rating (0)

P. Robertson pers. comm.

8. Pest Control:

Rating (0)

P. Robertson pers. comm.

9. Road Construction and Maintenance:

Rating (1)

P. Robertson pers. comm.

10. Mining/Quarrying:

Rating (0)

P. Robertson pers. comm.

11. Tree Dieback:

Rating (2)

P. Robertson pers. comm.

12. Recreation:

Rating (1)

P. Robertson pers. comm.

13. Illegal Collecting/Harvesting:

Rating (0)

P. Robertson pers. comm.

14. Vandalism:

Rating (0)

P. Robertson pers. comm.

15. Dams/Impoundments:

Rating (0)

P. Robertson pers. comm.

Current Management:

Spencer's Skink is not considered threatened in Victoria (NRE 1999). A forest management plan for the forest management areas (Tambo and Central Gippsland) included in the Gippsland RFA region is currently in preparation, and there are no species-specific threat-ameliorating management prescriptions for this species within the Gippsland RFA region.

Species characteristics:

Spencer's Skink is a small shuttling heliotherm confined to montane wet sclerophyll forest or subalpine woodland in areas of high rainfall (Brown 1986). This lizard displays the greatest arboreal

nature of any scincid in south-eastern Australia, and is well adapted for this lifestyle with well-developed pentadactyle limbs and a general dorso-ventral flattening of the body (Webb 1985, Brown 1986). Spencer's Skink has been observed basking up to 75 m above the ground (Rawlinson 1974). It occurs in highest densities in mature forests with an abundance of suitable sun-drenched bask sites, particularly stags (Brown and Nelson 1993, Kutt 1993). Important habitat characteristics for this species include elevated perches, especially dead standing timber that emerges through the canopy (Webb 1985, Ehmann 1992, Brown and Nelson 1993), logs and other fallen debris, and tree trunks with many splits and crevices in which to shelter and forage (Ehmann 1992), and large sunny patches in which to bask. This latter requirement is frequently lacking in medium-aged regrowth forest because of the dense canopy, and Spencer's Skink is virtually absent in these areas (Brown and Nelson 1993). This skink often displays a gregarious nature and numerous individuals have been observed basking on one log at the same time (Webb 1985). Logs are used by this species for overnight and overwinter shelter (Webb 1985), and winter aggregations have been observed (Wilson and Knowles 1988, Ehmann 1992). Spencer's Skink is a wide-ranging opportunistic forager, and a large proportion of the diet of this species consists of soft-bodied aerial and/or arboreal arthropods (Brown 1986). These are uncommon prey for a small scincid, and reflect the vertical distribution of this lizard (Brown 1986). A viviparous species, Spencer's Skink mates in late summer and gives birth to one to four young in late summer (Wilson and Knowles 1988, Ehmann 1992).

Distribution in the Gippsland RFA region

Records of Spencer's Skink in the Gippsland RFA region are widespread and extend from Rams Head Range near the Murray River in the north-east of the region to Wilsons Promontory in the south. In the west of the region records exist from Bunyip, and in the east to near Timbarra. Most of the records are from the northern half of the region. Records exist from a range of land tenures, including national parks, State forest and other public land, and privately-owned land.

Disturbances and potentially threatening processes operating in the Gippsland RFA region

Spencer's Skink is threatened primarily by processes such as timber harvesting and clearing that involve the loss of large trees (living and dead), upon which this species depends for foraging, basking and shelter sites. Firewood collection removes fallen logs and debris, which are also important habitat components of this species. Wildfire is likely to result in loss of habitat in the short-term although it may help create habitat in the longer term. The impact of prescribed fire on Spencer's Skink is unknown. However, too frequent burning will result in removal of fallen logs and debris, important components of the species habitat. Timber harvesting may be beneficial in the short-term as it creates basking and foraging habitat and may lead to an increase in population size. However, subsequent regrowth may preclude solar penetration to such an extent that these populations decline (Brown and Nelson 1993).