Post-fire recovery of woody plants in the New England Tableland Bioregion

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Abstract: The resprouting response of plant species to fire is a key life history trait that has profound effects on post-fire population dynamics and community composition. This study documents the post-fire response (resprouting and maturation times) of woody species in six contrasting formations in the New England Tableland Bioregion of eastern Australia. Rainforest had the highest proportion of resprouting woody taxa and rocky outcrops had the lowest. Surprisingly, no significant difference in the median maturation length was found among habitats, but the communities varied in the range of maturation times. Within these communities, seedlings of species killed by fire, mature faster than seedlings of species that resprout. The slowest maturing species were those that have canopy held seed banks and were killed by fire, and these were used as indicator species to examine fire immaturity risk. Finally, we examine whether current fire management immaturity thresholds appear to be appropriate for these communities and find they need to be amended.

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Introduction

Fire is a pervasive ecological factor that influences the evolution, distribution and abundance of woody plants (Whelan 1995; Bond & van Wilgen 1996; Bradstock et al. 2002). The resprouting response of plant species to fire is a key life history trait that has profound effects on post-fire population dynamics and community composition (Bellingham & Sparrow 2000, Bond & Midgley 2001). Hence, extensive efforts are being made to document the response of plants to fire in eastern Australia (e.g. Gill & Bradstock 1992; Benson & McDougall 1993, Clarke & Knox 2002, Walsh & McDougall 2004). Fire response classification systems have focused on whether a species is killed by fire or resprouts after fire, and whether seeds are stored in the canopy or in the soil (e.g. Gill & Bradstock 1992, Pausas et al. 2004). Whilst many factors such as fire season and intensity, plant physiological status and genetics can produce variable fire responses (e.g. Morrison & Renwick 2000, Wright & Clarke 2007) the response of species to a crown scorch fire can be useful in preliminary assessment of extirpation risks associated with fire regimes. Comparing the range of fire responses across habitats also informs models of ecological sorting and the potential for community shifts in response to changed fire regimes (e.g. Clarke & Knox 2002, Clarke et al. 2005, Pausas & Bradstock 2007).

Maturation times of new recruits for those plants killed by fire is also a critical biological variable in the context of fire regimes because this time sets the lower limit for fire intervals that can cause local population decline or extirpation (Keith 1996). Hence, fire intervals shorter than these maturation times pose an immaturity risk to populations of plants if they have no other means of persisting such as soil stored seed banks. These maturation times have been given the term 'primary juvenile period' (PJP) which refer to the time taken for seedlings to flower and produce viable seed. The primary juvenile period is particularly critical for those species that have a canopy stored seed bank because there is no mechanism, other than dispersal, by which populations can persist if the intervals between fires are shorter than the PJP (Gill & Bradstock 1992). For those plants that resprout the interval length between fires may seem to be of lesser importance; nevertheless, recruitment from seeds is required if long-term population decline is not to occur. In resprouting species both the PJP and the time taken for the resprouts to flower and produce fruits, secondary juvenile period, (SJP) is of consequence for maintenance of a seed supply.

The fire responses of shrubs on the New England Tablelands has been documented in grassy habitats by Knox and Clarke (2004), and the mesic forests by Campbell and Clarke (2006), whilst Clarke and Knox (2002) summarized the response of shrub species in four major formations. The aim of this study was to document the post-fire response (resprouting and maturation times) of woody species in six contrasting formations on the New England Tablelands in northern NSW. Firstly, we examined the resprouting ability of plants and whether the proportion of resprouters, variable and species killed by fire differed among habitats. Secondly, we examine the relationship between growth form and position of resprouting buds. Thirdly we examined maturation times and if there was a pattern of maturation time and resprouting ability. Finally, we discuss the implications of different fire regime intervals on plant populations and the role of management in ensuring population persistence in the face of changing fire regimes.

Methods

Study area

The study region is the New England Tableland (NET) Bioregion of eastern Australia with an altitudinal range of 750–1500 m (Thackway & Cresswell 1995). Six major vegetation formations that are prone to fire occur in the Bioregion; rainforest (RF) (Northern Warm Temperate Rainforest), wet sclerophyll forest (WSF) (Northern Escarpment Wet Sclerophyll Forests and Northern Escarpment Wet Sclerophyll Forest), dry sclerophyll forests (DSF) (New England Dry Scerophyll Forest, Northern Escarpment Dry Sclerophyll Forest and Northern Tableland Dry Sclerophyll Forest), grassy woodlands (GW) (Northern Grassy Woodlands), rocky outcrops heaths (RO) (Northern Montane Heaths) and wet heaths (WH) (Montane Bogs and Fens) (see Keith 2004). These broad groups form distinct floristic formations that are related to climate gradients, lithology and local physiography (Keith 2004). As a generalization, nutrient-poor siliceous soils provide habitats for scleromorphic shrub dominated woodlands and forests whilst the more fine-textured soils derived from metasediments and basalts support grassy woodlands and mesic forests (Benson & Ashby 2000). All habitats are prone to fires. Landscape scale fires in 2002 burnt into the more mesic wet sclerophyll forests and rainforests margins.

Field records

The fire response of woody species was recorded both quantitatively and qualitatively from direct observations of species in the post-fire environment for 489 taxa where their crowns had been burned. Repeated observations from independent fires were used to give a level of confidence in allocating species to fire response groups. In a few instances, fire response was inferred from root structures and comparing this with observations of closely related species. Post-fire observations were spread over several years using planned experimental, planned and unplanned fire from 1996 to 2008. Many species were observed in more than one or two formations. In these species the primary habitat in which they were recorded was used to allocate them to a habitat for trait analyses.

Growth forms, fire response groups, maturation and population status

The growth form of all woody species was determined from field observations, flora records and published records and summarized into seven groups corresponding to stem type and then height classes. The sprouting ability of at least five individuals (killed or resprouts) for at least two independent shrub populations were recorded where possible. Species could generally be classified into resprouters (70–100% of individuals in the population resprout) or obligate seeders (less than 30% of individuals resprout) (Gill & Bradstock 1992), although a third 'variable' resprouting class was also present (Clarke et al. 2005). In addition to data on resprouting, the position of resprouting and the type of seed bank was assessed for each species so they could be placed into one of the seven fire functional groups or syndromes of Gill and Bradstock (1992).

The minimum maturation times (time to seed set) of plants were observed from tagging seedling recruits in the post-fire environment or from observations of flowering and fruiting of species after fire. The mean time for primary juvenile period (PJP) and secondary juvenile period (SJP) was compared between growth form classes and resprouting class using a two factor ANOVA.

Vouchers and nomenclature

Identification of taxa was made in the field with verification against general field collections from the same reserve location in the NCW Beadle Herbarium (NE) at the University of New England. Less common species and taxa of uncertain status were also collected and lodged as vouchers in NE if flowering material was available. Several putative new taxa were also recorded and informal names have been allocated to these taxa. Nomenclature follows the latest printed version of the *Flora of New South Wales* (Harden 1990–3, 2002; Harden & Murray 2000) with the exception of those families that have recently changed names (Appendix 1) and where species names have changed (Appendix 2).

Results

Overview of regional coverage

Data on the fire response of 489 taxa were collected, of which 140 taxa had primary juvenile period (PJP) recorded and 105 taxa had secondary juvenile period (SJP) recorded (Appendix 3). Wet heath habitats had the lowest number of woody taxa fire responses (28) whilst the dry sclerophyll forest had the highest (170) (Table 1). Dry sclerophyll forest,

Table 1. Growth form classes showing the number of species observed after fire in each habitat, and the proportion (in brackets) resprouting. Variable species are grouped with the resprouting class. GW=Grassy woodland, DSF=Dry Sclerophyll Forest, RO=Rocky Outcrops, WH= Wet Heath, WSF=Wet Sclerophyll Forest, RF=Rainforest

Growth form				**Habitats**			
	GW	**DSF**	**RO**	**WH**	**WSF**	**RF**	**TOTAL**
Shrubs							
Sub-shrub (suffrutex)	5 (1)	9 (0.44)	0	4 (0.75)	0	0	18 (0.67)
Low shrub (<2m)	29 (0.69)	113 (0.60)	73 (0.19)	21 (0.81)	25 (0.72)	2 (1)	263 (0.53)
Tall shrub (>2m)	5 (0.60)	24 (0.58)	12 (0.33)	3 (1)	37 (0.54)	3 (1)	84 (0.56)
Climber							
Twiner (suffrutex)	2 (1)	6 (1)	0	0	4 (0.75)	0	12 (0.92)
Vine	0	0	0	0	7 (0.86)	13 (0.92)	20 (0.90)
Tree							
Small tree (< 10m)	3 (0.33)	9 (0.88)	3 (0)	0	16 (0.81)	23 (0.95)	54 (0.85)
Tree (> 10m)	1 (1)	9 (0.78)	0	0	7 (0.86)	21 (0.81)	38 (0.81)
All woody taxa	45 (0.73)	170 (0.63)	88 (0.21)	28 (0.82)	96 (0.65)	62 (0.90)	489 (0.62)

Table 2. Number of species in each habitat and resprouting class (Gill 1981)

Growth form				**Habitats**			
	GW	**DSF**	**RO**	**WH**	**WSF**	**RF**	**TOTAL**
Fire Response							
I. Killed, canopy-stored seed bank	0	3	3	1	1	0	8
II. Killed, soil-stored seed bank	9	54	62	4	24	4	157
III. Killed, no local seed bank	3	5	4	0	5	2	19
IV. Resprouts from root buds	2	4	1	0	8	5	20
V. Resprouts from basal buds	31	93	18	22	47	39	250
VI. Resprouts from stem buds	0	8	0	1	10	12	31
VI Resprouts from apical bud	0	3	0	0	1	0	4

grassy woodland, rocky outcrop and wet heath habitats have data records for almost all common shrub taxa recorded in these habitats. However, data on the wet sclerophyll forest and rainforest shrub taxa are less comprehensive as many more tree and shrubs occur in these habitats on the NE Tablelands (Table 1). In particular, the coverage of *Eucalyptus* is poor (19 species) because crown fires are rare in grassy and more mesic habitats.

Resprouting in habitats and growth forms

Across all taxa observed resprouting was present in 62% of the woody flora but differed among habitats, growth forms and growth forms within habitats (Table 1). Overall the proportion of species resprouting was highest in the rainforest (90%) followed by wet heath (82%), grassy woodlands (73%), wet sclerophyll forests (65%), dry sclerophyll forest (63%) and rocky outcrop (21%). Resprouting response was very high in climber species (>90%) whilst shrub species had the lowest (53%). Shrub sprouting capacity varied within habitats; 70% in wet heath and grassy woodland; 33% in rocky outcrops. Taller shrubs in the wet sclerophyll forests also tended to have less resprouting ability than lower shrubs (Table 1).

Fire response syndromes in habitats

The most common fire syndrome was resprouting from basal stem buds (51%), followed by species regenerating only from seed with soil stored seed banks (32%), and then those resprouting via stem buds (Table 2). Species that had canopy stored seed banks and were killed by fire (<2%) and those resprouting from only apical buds (<1%) were not common in any landscape. In some habitats there were very few or no species with certain fire response syndromes. This included the absence of species with canopy held seed banks that were killed by fire in grassy woodlands and rainforests (Table 2) and the low number of species with stem and apical resprouting in grassy woodlands, rocky outcrops and rainforests (Table 1).

Fire response syndromes in growth forms

Fire response syndromes were very unevenly distributed among growth forms with only the tall shrub class having all syndromes present (Table 3). Sub-shrubs only had two syndromes present amongst the 18 species in that class. As expected the tree class had a number of species resprouting from stem buds. The vine class also had a high proportion of species resprouting from nodes along fallen stems after fires.

Table 3. Number of species observed in each growth form class across standardised fire syndrome classes (Gill & Bradstock 1992)

Growth form	**Habitats**							
Fire Response	**Sub-shrub**	**Low Shrub**	**Shrub**	**Twinner**	**Vine**	**Small Tree**	**Tree**	**TOTAL**
I. Killed, canopy-stored seed bank	0	1	4	0	0	1	2	8
II. Killed, soil-stored seed bank	6	107	31	1	2	6	4	157
III. Killed, no local seed bank	0	15	2	0	0	1	1	19
IV. Resprouts from root buds	0	6	5	1	1	7	0	20
V. Resprouts from basal buds	12	133	36	10	6	36	17	250
VI. Resprouts from stem buds	0	0	3	0	11*	3	14	31
VI Resprouts from apical bud	0	1	3	0	0	0	0	4

* Stem nodes from fallen vines

Table 4. Minimum, mean (bold) and maximum maturation times in years for shrub taxa.

	Habitats						
Maturation	**GW**	**DSF**	**RO**	**WH**	**WSF**	**RF**	**All**
Primary juvenile period (PJP)	4–4.7–5	2–4.8–10	2–5.1–9	4–5.1–7	1–4.7–7	-	1–4.9–10
Secondary juvenile period (SJP)	1–2.9–5	2–2.7–5	3–3.3–5	1–2.4–4	1–2.6–5	-	1–2.9–6

Table 5. Proportion of resprouting taxa in woody plants sampled at plot scales (0.1 ha) and at landscape scales.
Data for plot scales from Clarke et al. 2005. The lower proportion of resprouting recorded at landscapes scales is due to the relative rarity of obligate seeders vs resprouters.

Landscape Scale	**GW**	**DSF**	**RO**	**WH**	**WSF**
0.1 ha plot mean	92	78	38	90	89
Landscape	73	63	21	82	65
Difference	19	15	17	8	24

Maturation times

We collected fewer data on maturation for PJP and SJP than resprouting syndromes, with fewer data on maturation times for species found in wet sclerophyll forests and rainforests (Table 4). Summary data for shrub species showed no significant difference in mean maturation times among habitats ($F_{4, 132}$ = 1.08. $p > 0.1$), but a significant difference between mean maturation times for PJP vs SJP ($F_{1, 202}$ = 22.6. $p < 0.001$). Over all habitats shrubs had a mean PJP maturation time of 4.9 years and mean SJP of 2.9 years; the range of SJP maturation times was greater (Table 4). The PJP differed between resprouters and obligate seeders ($F_{1, 128}$ = 9.7. $p < 0.05$); 5.5 years compared to 4.8 years.

Field observations suggest rainfall influences PJP. In species with wide geographic ranges PJP was greater with lower annual rainfall e.g. the obligate seeder *Hakea macrorrhyncha* had a PJP of 4 years at Gibraltar Range (MAR >1400mm) whereas at Torrington its PJP was 7 years (MAR c. 800mm).

Discussion

Species and population variation in fire response

Overall, our data show how labile the resprouting trait is among the multiple lineages of the eudicot families, within genera and even within species. Within-species variation in the fire response may be due to the environment a plant occurs in or its genotype. Clear separation of these effects is not possible from field observations but genotypic inferences may be made where environmental constraints are thought to be similar. In general, most species in our study were readily assigned to either a resprouter or obligate seeder class with only a very small number of species exhibiting variation either within populations or between populations (see Appendix 3).

Gene based population differences in resprouting ability were suggested in several species (*Acacia venulosa, Correa* *reflexa, Dillwynia phylicoides, Dillwynia sieberi, Dodonaea viscosa, Eucalyptus oreades, Hardenbergia violacea, Kunzea bracteolata, Oxylobium arborescens*), whilst within population genetic variation was observed in *Hibbertia obtusifolia* and *Acacia ulicifolia*. In the case of *Hibbertia obtusifolia* an informally recognized species, (*H.* .sp. B) is killed by fire and is mainly restricted to rocky habitats whist *H. obtusifolia sensu stricto* is found in adjacent forest and strongly resprouts. Morphologically intermediate individuals are found in intermediate habitats and have mixed response to fire suggesting a strong genetic control. Variation in resprouting position was also detected between ecotypes of *Allocasuarina littoralis* with a form restricted to heaths resprouting from the base of stems whilst the forest form resprouted from stems. Differences were also recorded between populations of the forest tree *Eucalyptus oreades*. Following canopy fire populations on ridgetops resprouted (Gibraltar Range NP, Werrikimbi NP), while those in forest habitats (Carrai Plateau) were killed by fire.

Bioregional differences in resprouting ability are also apparent in our data, although many disparities may relate to poor taxonomic resolution of species. For example, a taxon known as *Epacris 'microphylla'* is recorded as being killed by fire in the Sydney Basin (SB) whereas it strongly resprouts throughout the NET Bioregion (NET). In this case there has been a long-standing misapplication of the name *E. 'microphylla'* in the NET Bioregion as this resprouting taxon is *E. gunnii*. In other cases closer examination of morphological and genetic difference may separate taxa that have contrasting resprouting abilities the two bioregions. Examples include *Acacia rubida* (SB resprout NET killed), *Bauera rubioides* (SB resprout NET killed), *Boronia ledifolia* (SB killed, NET resprouts), *Calytrix tetragona* (SB resprout NET killed), *Dillwynia sieberi* (SB killed NET resprouts), *Gompholobium latifolium* (SB resprout NET killed), *Goodia lotifolia* (SB killed NET resprouts), *Hibbertia acicularis* (SB killed NET resprouts), *Hibbertia linearis* (SB killed NET resprouts), *Kennedia rubicunda* (SB killed NET resprouts), *Olearia microphylla* SB killed NET resprouts), *Phyllota phylicoides* (SB killed NET resprouts), and *Sphaerolobium vimineum* (SB killed NET resprouts).We found examples where subspecies are known to have divergent traits, e.g. *Boronia anemonifolia* subsp. *variabilis* (NET killed), *Boronia anemonifolia* subsp. *anemonifolia* (SB resprouts), supporting the view that geographic differences are related to evolutionary divergence.

Landscape & community patterns of fire response

Whilst there is great variation in the ability to resprout among species, community patterns emerge when woody species are grouped into broad-scale vegetation types (Table 1, 2). The current study reinforces landscape patterns in woody species previously identified by Clarke & Knox 2002, Clarke et al. 2005, Campbell & Clarke 2006 where rocky outcrops and dry sclerophyll forest have the largest numbers of species killed by fire whereas those communities on more fertile soils have lower numbers of obligate seeding species.

Surprisingly, of the 62 rainforest taxa observed 90% were recorded as being resprouters, most of which have 'top kill' and resprout from basal buds as previously reported by Campbell and Clarke (2006). Of those tree species killed by fire many seem to be early successional species (*Dendrocnide*, *Polyscias*) but none show fire stimulated recruitment. Most rainforest vines resprouted from adventitious shoots at stem nodes when stems fall to the ground after fires. Adjacent, but more frequently burned, wet sclerophyll forests also had a high proportion of resprouting species present (65%) which is less than previously reported by Clarke et al. (2005) for the same region, but similar to that reported by Floyd in Ashton (1981) for *Eucalyptus pilularis* Wet Sclerophyll forest (WSF) forest. The difference is due to undersampling obligate seeding shrub species due to their patchy distribution. The obligate seeding species in WSF are mostly tall (2–3m) but relatively short-lived (< 20 yrs) shrubs that have fire stimulated recruitment; they include *Acacia irrorata, Asterolasia correifolia, Cassinia compacta, Correa lawrenciana* var. *glandulifera, Dodonaea megazyga, Hakea salicifolia, Logania albiflora, Olearia nernstii, Ozothamnus rufescens, Phebalium* Mt Ballow sp., *Persoonia media, Pimelea ligustrina* subsp. *hypericina, Prostanthera lasianthos, Pultenaea tarik, Solanum nobile,* and *Zieria arborescens*. Many of these species are also associated with rainforest margins which suggests that fire frequency influences their local distribution and abundance within the more mesic eucalypt forests.

Similar proportions of resprouting species (63%) also occur in the dry sclerophyll forests of the tablelands soils whilst grassy woodlands (73%) and the wet heaths (82%) supported much higher number of resprouting species. The rocky outcrops have low numbers of resprouters but very high numbers of obligate seeders; a pattern now well described in the literature (Clarke & Knox 2002, Clarke et al. 2005). In part, these landscape differences in fire response reflect the probability of crown fire return, but other factors such as site productivity and competitive interactions may also be important (Bellingham & Sparrow 2000, Clarke et al. 2005).

Invariably, the proportion of woody plants killed by crown fire measured at plot scales (< 1ha) (see Table 5) is lower than that recorded at landscape scales for the same Bioregion (Clarke et al. 2005). This is because obligate seeding species are more represented at the tail end of abundance frequency curves (see Clarke 2002). Hence, they are rarer in all landscapes and under-sampled in plots. Such scale effects suggest that fire regime exerts strong control on the localized presence of species in the landscape.

Maturation

Comprehensive data on maturation times for woody plants are critically important for the management of biodiversity because they reveal the immaturity risk posed by short fire intervals. Both within and among species variation in maturation times are driven by environmental and genotype factors which are not easily separated without manipulative or greenhouse experiments. One of the most striking examples of environmental control that has been observed in our region was the difference in the ability of an obligate seeding shrub (*Hakea macrorrhynca*) to flower and set fruits between populations of the same post-fire age at Torrington (MAR c. 800 mm) and those at Gibraltar Range (MAR > 1500 mm). After seven years of growth less than 5% of individuals had set fruit in the low rainfall site whilst at Gibraltar Range 99% of individuals had accumulated large numbers of fruits. Another example is the variation within populations of the obligate seeding shrub *Banksia marginata*. Plants at the margins of core habitats in forests had generally failed to accumulate seed banks after seven years post-fire but those at 'swamp' margins began to flower and set fruits within five years. Such population variation is under-estimated in our data because we record the shortest time to flowering and fruiting of an individual in populations, across all shrub species the minimum median maturation time for woody plants in the region was five years and ranged from one to 11 years which is broader than the range reported for the Sydney Basin (Benson 1985). Most data were collected from obligate seeding species and limited field observations suggest that the mean maturation rates of seedlings of resprouter species (5.5 yrs) is slower than obligate seeders (4.8 yrs). We found stronger evidence, however, that obligate seeders with a canopy held seed bank have longer PJP (6.2 yrs) than those that have soil-stored seed banks (4.7 yrs). Surprisingly we could not detect any habitat difference in maturation time although the range of PJP was wider in dry sclerophyll forests and rocky outcrop communities than other communities. Similarly, the secondary juvenile period in resprouters did not significantly vary among habitats but, on average, was much faster than the PJP.

Classification scheme and terminology

Classification schemes of the way species respond to fire are designed to help predict how populations and communities will respond to fire regimes (Whelan et al. 2002). Ideally this includes information on the 'vital attributes' of taxa which include dispersal, establishment and persistence such as that proposed by Noble and Slatyer (1980); however, such data are difficult to collect for comprehensive regional analyses. Instead, we use a simplified scheme that focuses on persistence ability (Gill 1981). The fire response scheme developed by Gill (1981) indicates whether taxa are killed by fire, and for those that resprout, where resprouting occurs. For those plants killed by fire it also indicates whether seed is held in canopy vs soil-stored seed banks but not where seeds are held in resprouting plants. It is not possible to identify from our data those species that only regenerate from sprouting, i.e. the so-called 'obligate resprouters'. Ascertaining obligate resprouting may be difficult because many environmental factors influence seed production, post-fire germination, and seedling emergence and survival. For example, several of the resprouting Ericacaceous species failed to establish seedlings in the first year post-fire but in the following years small numbers of seedlings were observed. We therefore think that whilst the term 'obligate resprouting' is appropriate, its application as a species trait needs careful long-term observation (see Clarke & Knox 2002). Overall, it appears that the number of species that lack any post-fire or fire interval recruitment from seeds is very low across the landscape and may only be restricted to a handful of species that are unable to set viable seed such as *Grevillea rhizomatosa* (Caddy & Gross 2006).

Application of Gill's resprouting scheme is sometimes problematic where taxa exhibit combinations of stem, basal and below ground resprouting. In particular many basal resprouting species also have resprouting from roots (e.g. *Acacia* spp.). Where this occurred we have used the lowest position of resprouting buds to allocate taxa to one of seven groups but in the appendix indicate that both forms of resprouting are possible. For global comparisons, the term 'top kill' is often used in savanna ecosystems to cover both those woody species that have basal and below ground resprouts although this term is rarely used in the sclerophyllous systems of eastern Australia.

The extent and intensity of recent fires on the escarpment of the Northern Tablelands of NSW allowed the categorization of many species in rainforests that would either be infrequently burned or where crowns of trees, shrubs and vines would rarely be burned. Categorization of rainforest shrubs and trees within the Gill scheme was simple where crowns had been burned, although for many larger rainforest trees it was difficult to find more than ten individuals where this had occurred. One group of plants that was difficult to assign to a Gill class were the vines (often lianas >2.5 cm dia) as they generally become detached from their support during fires and resprout from stems nodes where they have fallen after fires. These patterns are typical of vines as they vigorously resprout when they fall due to the production of adventitious roots and adventitious shoot buds (Fisher & Ewers 1991). Here we assign this resprouting capacity to 'stem' buds although most stems are situated on the ground and are also producing roots at stem nodes. Smaller vines, and scramblers, however, lack this capacity and generally resprout from basal stems or root tubers.

Conclusion – immaturity risk to plants from fire regimes

Our data highlight the range of fire responses to fire events across woody plants in the New England Tableland Bioregion and that communities differ in the composition of fire traits. Using these traits we can broadly assess the relative sensitivity of species and communities to projected fire frequencies that may be imposed through management or those that are likely without direct intervention. At the species level, a large number of taxa that are either listed or eligible for NSW State and/or Commonwealth under threatened species legislation and discussion of these threats will be covered elsewhere. More generally, across all community types, sequential fire intervals of less than five years are likely to cause local extirpations of fire killed species through adult deaths and exhaustion of either canopy or soil stored seed banks. Relatively large proportions (38%) of species fall into this obligate seeding group, although there are relatively few species of obligate seeding species with canopy held seed banks. Habitats that are particularly vulnerable to short fire intervals are rocky outcrops and the rainforest margins of wet sclerophyll forests with high concentrations of obligate seeders.

Table 6. Indicator species, primary juvenile period and minimum fire intervals that reduce immaturity risk for major vegetation classes in the New England Tableland Bioregion.
The current threshold recommendations of Kenny *et al.* (2004) are given. * 25 years recommended when *Callitris maclaeyana* is present otherwise 11 years.

Formation	Vegetation Classes (Keith 2004)	Indicator Species Gill Type I, II	Primary Juvenile Period (Years)	Immaturity Risk Threshold (years)	Current Thresholds
Wet Sclerophyll Forest	Northern Escarpment Wet Sclerophyll Forests	*Banksia integrifolia* subsp. *monticola*	8	11(25*)	25–60
		Hakea salicifolia	5		
		Persoonia media	6		
		Dodonaea megazyga	5		
		Callitris maclaeyana	25 (estimate)		
	Northern Tableland Wet Sclerophyll Forest	*Banksia integrifolia* subsp. *monticola*	8	11	10–50
		Hakea salicifolia	5		
		Persoonia media	5		
Dry Sclerophyll Forest	New England Dry Sclerophyll Forest	*Callitris oblonga*		11	5–50
		Banksia integrifolia var	8		
		monticola	8		
		Leucopogon biflorus	5		
		Acacia rubida	4		
	Northern Escarpment Dry Sclerophyll Forest	*Allocasuarina rigida*	5	9	7–30
		Banksia marginata	5		
		Hibbertia rhynchocalyx	6		
		Grevillea acerata	4		
		Acacia terminalis	5		
	Northern Tableland Dry Sclerophyll Forest	*Callitris endlicheri*	7	11	7–30
		Styphelia triflora	7		
		Grevillea triternata	6		
		Acacia burbidgeae	8		
Grassy Woodland	Northern Grassy Woodlands	*Acacia dealbata*	5	8	5–40
		Cassinia leptocephala	5		
Rocky Outcrop	Northern Montane Heaths (Eastern)	*Callitris monticola*	9	12	7–30
		Hakea macrorrhyncha	5		
		Brachyloma saxicola	8		
		Boronia angustisepala	5		
	Northern Montane Heaths (western)	*Hakea macrorrhyncha*	8	12	7–30
		Kunzea bracteolata	6		
		Leionema rotundifolium	8		
		Homoranthus binghiensis	9		
		Acacia triptera	8		
Wet Heaths	Montane Bogs and Fens	*Banksia marginata*	4	8	6–35
		Bauera rubioides	5		
		Sprengelia incarnata	5		

Fire interval thresholds have been suggested for major vegetation formations in NSW based on species that are likely to be most at risk to short fire intervals (Kenny et al. 2004). Our finer scale analysis of vegetation types (Table 6) shows that the minimum interval to avoid immaturity risk to vulnerable species ranges from 8 to 11 years in fire prone formations in the New England Tableland Bioregion. These thresholds have been derived by determining the longest PJP for obligate seeding species that do not retain seed through a fire event (Gill's class I) and allowing three additional years for sufficient seed to accumulate (Keith et al. 2002). Our results indicate that minimum thresholds in the New England Tableland Bioregion need to be slightly more conservative in comparison to similar vegetation formations in other areas of NSW as many New England Tableland species take longer to reach maturity and therefore require a longer minimum fire interval.

Kenny et al. (2004) indicate a minimum threshold of 25 years for Wet Sclerophyll Forests because the most sensitive species in the analyses of Kenny et al. (2004) were obligate seeding *Eucalyptus* spp. In the Northern Escarpment Wet Sclerophyll Forests, obligate seeding eucalypts are absent, but the obligate seeder gymnosperm *Callitris maclaeyana* occurs uncommonly. Data are not available for the maturation time of *Callitris maclaeyana*. However, in cultivation no fruits have been produced by 21 year old planting (Floyd pers. comm.). Therefore, in areas in which *Callitris maclaeyana* occurs, a threshold of 25 years is suggested and in where this species is absent a threshold of 11 years is recommended. Clearly, these fire interval thresholds are a starting point to develop fire regimes models that incorporate season, intensity and the 'mosaic' concept as advocated by those concerned with all biodiversity components (Clarke 2008).

For those species that resprout, the consequences of repeated short interval fires are poorly known and rarely factored into species' risk assessment. Limited data on three commonly occurring resprouting shrubs shows that up to 15% of populations are killed by fire (Knox & Clarke 2006), hence seedling recruitment must occur to maintain current populations. Our study has predictably shown that seedlings of resprouters are slower to mature, but their ability to resprout prior to this maturation remains unknown. Similarly, whilst many rainforest shrubs and trees show 'tolerance' to a fire event, through vigorous resprouting, it is not known if recurrent fire causes mortality and recruitment failure. These topics are fertile ground for further research, not only in the NET Bioregion, but throughout fire prone south-eastern Australia.

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Appendix 1:

Recent changes to family placement of various genera compared with Flora of New South Wales (Harden 1990–3, 2002; Harden & Murray 2000)

Genus	New family placement used here as in APG III	Family as in *Flora of NSW*
Acrotriche	Ericaceae	Epacridaceae
Bauera	Cunoniaceae	Baueraceae
Brachychiton	Malvaceae	Sterculiaceae
Brachyloma	Ericaceae	Epacridaceae
Breynia	Phyllanthaceae	Euphorbiaceae
Chloanthes	Lamiaceae	Chloanthaceae
Commersonia	Malvaceae	Sterculiaceae
Doryphora	Atherospermataceae	Monimiaceae
Epacris	Ericaceae	Epacridaceae
Eustrephus	Asparagaceae	Luzuriagaceae
Geitonoplesium	Xanthorrhoeaceae	Luzuriagaceae
Keraudrenia	Malvaceae	Sterculiaceae
Lasiopetalum	Malvaceae	Sterculiaceae
Leucopogon	Ericaceae	Epacridaceae
Lissanthe	Ericaceae	Epacridaceae
Melichrus	Ericaceae	Epacridaceae
Monotoca	Ericaceae	Epacridaceae
Myoporum	Scrophulariaceae	Myoporaceae
Phyllanthus	Phyllanthaceae	Euphorbiaceae
Pseudanthus	Picrodendraceae	Euphorbiaceae
Sprengelia	Ericaceae	Epacridaceae
Styphelia	Ericaceae	Epacridaceae
Tetratheca	Elaeocarpaceae	Tremandraceae
Trema	Cannabaceae	Ulmaceae
Trochocarpa	Ericaceae	Epacridaceae
Tylophora	Apocynaceae	Asclepiadaceae

Appendix 2.

Nomenclatural changes to species names used in the *Flora of New South Wales* (Harden 1990–3, 2002; Harden & Murray 2000).

New name used here	Name in *Flora of NSW*
Akama paniculata	*Caldcluvia paniculosa*
Agiortia cicatricata	*Leucopogon cicatricatus*
Epacris gunnii	*Epacris microphylla*
Harmogia densifolia	*Babingtonia densifolia*
Kardonia odontocalyx	*Babingtonia odontocalyx*
Melaleuca linearis	*Callistemon linearis*
Melaleuca pallida	*Callistemon pallidus*
Melaleuca pityoides	*Callistemon pityoides*
Melaleuca williamsii	*Callistemon pungens*
Melaleuca paludicola	*Callistemon sieberi*
Myrsine howittiana	*Rapanea howittiana*
Myrsine variabilis	*Rapanea variabilis*
Philotheca epilosa	*Philotheca myoporoides* subsp. *epilosa*
Pittosporum multiflorum	*Citriobatus pauciflorus*
Homalanthus populifolius	*Omalanthus populifolius*
Pittosporum spinescens	*Citriobatus pauciflorus*
Spyridium scortechinii	*Cryptandra scortechinii*
Trema tomentosa var. *viridis*	*Trema aspera*

Appendix 3.

List of taxa and their habitats, fire response, primary juvenile period, secondary juvenile period and growth form.
Habitats – GW=Grassy woodland, DSF=Dry Sclerophyll Forest, RO=Rocky Outcrops, WH= Wet Heath, WSF=Wet Sclerophyll Forest, RF=Rainforest

Family	**Species**	**Habitats**	Gill	PJP	SJP	**Growth Form**
Anacardiaceae	*Euroschinus falcatus* var. *falcatus*	RF, WSF	VI			Tree
Apiaceae	*Platysace ericiodes*	DSF	V		2	Sub-shrub
Apiaceae	*Platysace lanceolata*	DSF	II	3	2	Sub-shrub
Apiaceae	*Xanthosia pilosa*	DSF	V		2	Sub-shrub
Apocynaceae	*Alyxia ruscifolia*	RF. WSF	V			Low shrub
Apocynaceae	*Marsdenia rostrata*	RF	VI			Vine
Apocynaceae	*Tylophora paniculata*	RF	VI			Vine
Araliaceae	*Astrotricha longifolia* s.l.	DSF	V		2	Low shrub
Araliaceae	*Astrotricha roddii*	RO	V			Low shrub
Araliaceae	*Cephalaralia cephalobotrys*	RF	VI			Vine
Araliaceae	*Polyscias elegans*	RF, WSF	II			Tree
Araliaceae	*Polyscias murrayi*	RF	V			Small tree
Araliaceae	*Polyscias sambucifolia* subsp. A (sens. Fl. NSW)	GW, DSF, WSF	IV		2	Tall shrub
Asteraceae	*Cassinia compacta*	WSF	II	5		Low shrub
Asteraceae	*Cassinia laevis*	GW	II			Low shrub
Asteraceae	*Cassinia lepschii*	DSF, RO	V		4	Low shrub
Asteraceae	*Cassinia leptocephala* subsp. *leptocephala*	GW	II	5		Low shrub
Asteraceae	*Cassinia quinquefaria*	DSF, GW	II		4	Low shrub
Asteraceae	*Cassinia straminea*	DSF	II			Low shrub
Asteraceae	*Cassinia telfordii*	WSF	II	5		Low shrub
Asteraceae	*Olearia alpicola*	WSF, DSF	V			Low shrub
Asteraceae	*Olearia covenyi*	WSF	V	6	3	Low shrub
Asteraceae	*Olearia cydoniifolia*	WSF, RF	V			Low shrub
Asteraceae	*Olearia gravis*	DSF	II	2		Low shrub
Asteraceae	*Olearia microphylla*	GW, DSF	V		3	Low shrub
Asteraceae	*Olearia myrsinoides*	DSF, GW	V		2	Low shrub
Asteraceae	*Olearia nernstii*	WSF	II	4		Low shrub
Asteraceae	*Olearia oppositifolia*	WSF, DSF, GW	V	7	3	Low shrub
Asteraceae	*Olearia phlogopappa*	DSF, WH	II			Low shrub
Asteraceae	*Olearia ramosissima*	GW, DSF	V			Low shrub
Asteraceae	*Olearia rosmarinifolia*	GW	V			Low shrub
Asteraceae	*Olearia* sp. aff. *elliptica*	DSF, GW	V			Low shrub
Asteraceae	*Olearia viscidula*	GW, DSF	V		2	Low shrub
Asteraceae	*Ozothamnus adnatus*	GW	II			Low shrub
Asteraceae	*Ozothamnus diosmifolius*	DSF, GW, WSF	IV			Low shrub
Asteraceae	*Ozothamnus diosmifolius*	RO, DSF	II	4		Low shrub
Asteraceae	*Ozothamnus obcordatus (*obligate seeding pops.*)*	RO	II			Low shrub
Asteraceae	*Ozothamnus obcordatus (*resprouting pops.*)*	GW	V			Low shrub
Asteraceae	*Ozothamnus rufescens*	WSF, RF	II	5		Low shrub
Asteraceae	*Ozothamnus* sp. 'Basket swamp'	WH	V	5		Low shrub
Atherospermataceae	*Doryphora sassafras*	RF, WSF	V			Tree
Berberidopsidaceae	*Berberidopsis beckleri*	RF	II			Vine
Bignoniaceae	*Pandorea pandorana*	RF, WSF	V			Vine
Cannabaceae	*Trema tomentosa* var. *viridis*	WSF	V			Tall shrub
Casuarinaceae	*Allocasuarina brachystachya*	WH, DSF	V	7		Tall shrub
Casuarinaceae	*Allocasuarina inophloia*	DSF	VI			Small tree
Casuarinaceae	*Allocasuarina littoralis*	WSF, DSF, GW	VI			Tall shrub
Casuarinaceae	*Allocasuarina littoralis* (Swamp form)	WH	V		3	Tall shrub
Casuarinaceae	*Allocasuarina rigida* subsp. *rigida*	RO, DSF	I	5		Tall shrub
Casuarinaceae	*Allocasuarina torulosa*	WSF, DSF	VI			Tree
Celastraceae	*Celastrus subspicatus*	RF	II			Tall shrub
Celastraceae	*Denhamia celastroides*	RF	V			Small tree
Celastraceae	*Maytenis bilocularis*	RF, WSF	V			Small tree
Celastraceae	*Maytenus silvestris*	WSF	V			Small tree

Family	**Species**	**Habitats**	Gill	PJP	SJP	**Growth Form**
Cunoniaceae	*Ackama paniculata*	RF	V			Tree
Cunoniaceae	*Bauera rubioides*	WH, DSF	II	6		Low shrub
Cunoniaceae	*Callicoma serratifolia*	RF, WSF	V		5	Tree
Cunoniaceae	*Ceratopetalum apetalum*	RF	V, VI			Tree
Cunoniaceae	*Schizomeria ovata*	RF	V, VII			Tree
Cupressaceae	*Callitris endlicheri*	DSF, RO	I	7		Tree
Cupressaceae	*Callitris monticola*	RO, DSF	I	9		Tall shrub
Cupressaceae	*Callitris oblonga* subsp. *parva*	DSF	I	8		Tall shrub
Dilleneaceae	*Hibbertia acicularis s.l.*	DSF, GW	V		3	Low shrub
Dilleneaceae	*Hibbertia aspera*	WSF, DSF	V			Low shrub
Dilleneaceae	*Hibbertia cistoidea*	DSF	V			Low shrub
Dilleneaceae	*Hibbertia dentata*	WSF	V, VI			Vine
Dilleneaceae	*Hibbertia empetrifolia*	WSF	V		1	Low shrub
Dilleneaceae	*Hibbertia linearis*	GW	V			Low shrub
Dilleneaceae	*Hibbertia obtusifolia s.l.*	DSF, GW, WSF	V		4	Low shrub
Dilleneaceae	*Hibbertia rhynchocalyx*	DSF, WSF	II	5		Low shrub
Dilleneaceae	*Hibbertia riparia* (Gibraltar Range form)	DSF	V			Low shrub
Dilleneaceae	*Hibbertia riparia* (Grassy woodlands form)	GW	V			Low shrub
Dilleneaceae	*Hibbertia riparia s.l.*	DSF, GW, WSF	V		2	Low shrub
Dilleneaceae	*Hibbertia scandens* var. *glabra*	WSF	VI		2	Vine
Dilleneaceae	*Hibbertia scandens* var. *scandens*	WSF	V		2	Vine
Dilleneaceae	*Hibbertia serpyllifolia*	DSF	V			Low shrub
Dilleneaceae	*Hibbertia* sp. aff. *obtusifolia*	DSF	II	6		Low shrub
Dilleneaceae	*Hibbertia* sp. aff. *rufa*	WH	V			Low shrub
Dilleneaceae	*Hibbertia* sp. B sens. Fl. Nsw	RO	II	8		Low shrub
Dilleneaceae	*Hibbertia vestita s.l.*	WH, WSF	V			Low shrub
Dilleneaceae	*Hibbertia villosa*	RO, DSF	II	5		Low shrub
Ebenaceae	*Diospyros australis*	RF	V			Small tree
Elaeocarpaceae	*Aristotelia australasica*	RF	V			Vine
Elaeocarpaceae	*Elaeocarpus reticulatus*	WSF, DSF	V			Small tree
Elaeocarpaceae	*Sloanea woollsii*	RF	II			Tree
Elaeocarpaceae	*Tetratheca thymifolia*	DSF	II	7		Low shrub
Ericaceae	*Acrotriche aggregata*	WSF, RF	V			Tall shrub
Ericaceae	*Agiortia cicatricata*	RO	II			Low shrub
Ericaceae	*Brachyloma daphnoides* subsp. *glabrum*	DSF, GW	V		3	Low shrub
Ericaceae	*Brachyloma saxicola*	RO	II	8		Low shrub
Ericaceae	*Epacris breviflora*	WH	V			Low shrub
Ericaceae	*Epacris longiflora*	DSF, WH	II	4		Low shrub
Ericaceae	*Epacris microphylla = gunnii*	DSF	V		2	Low shrub
Ericaceae	*Epacris obtusifolia*	WH	II	5		Low shrub
Ericaceae	*Leucopogon attenuatus*	DSF	V			Low shrub
Ericaceae	*Leucopogon biflorus*	RO, DSF	II	5		Low shrub
Ericaceae	*Leucopogon hookeri*	GW, DSF	V			Low shrub
Ericaceae	*Leucopogon lanceolatus* subsp. *lanceolatus*	WSF, DSF, GW	V	6	3	Tall shrub
Ericaceae	*Leucopogon melaleucoides*	DSF	V		2	Tall shrub
Ericaceae	*Leucopogon microphyllus* var. *pilibundus*	DSF, RO	II	4		Low shrub
Ericaceae	*Leucopogon muticus*	DSF, RO	II			Low shrub
Ericaceae	*Leucopogon neo-anglicus*	RO, DSF	II	5		Low shrub
Ericaceae	*Leucopogon* sp. aff. *apressus*	RO, DSF	II	4		Low shrub
Ericaceae	*Leucopogon* sp. aff. *fraseri*	GW, WSF	V			Low shrub
Ericaceae	*Leucopogon virgatus*	DSF	V			Low shrub
Ericaceae	*Lissanthe strigosa* subsp. *subulata*	GW, DSF	IV		2	Low shrub
Ericaceae	*Melichrus erubescens*	DSF	II			Low shrub
Ericaceae	*Melichrus procumbens*	DSF	V			Low shrub
Ericaceae	*Melichrus urceolatus*	DSF, GW	V		2	Low shrub
Ericaceae	*Monotoca scoparia*	DSF, GW, WSF	V	6	2	Tall shrub
Ericaceae	*Sprengelia incarnata*	WH	II	5		Low shrub
Ericaceae	*Styphelia perileuca*	RO, DSF	II			Low shrub

Family	**Species**	**Habitats**	Gill	PJP	SJP	**Growth Form**
Ericaceae	*Styphelia triflora*	DSF	II	7		Tall shrub
Ericaceae	*Trochocarpa laurina*	WSF	V			Small tree
Ericaceae	*Trochocarpa montana*	WSF, RF	V			Tall shrub
Escalloniaceae	*Anopteris macleayanus*	RF	V			Small tree
Euphorbiaceae	*Amperea xiphoclada* var. *xiphoclada*	DSF	V		2	Sub-shrub
Euphorbiaceae	*Claoxylon australe*	RF, WSF	V			Small tree
Euphorbiaceae	*Homalanthus nutans*	WSF	V			Low shrub
Euphorbiaceae	*Homalanthus populifolius*	RF, WSF	V			Tall shrub
Euphorbiaceae	*Ricinocarpus speciosus*	DSF	V			Tall shrub
Eupomatiaceae	*Eupomatia laurina*	RF, WSF	V			Tall shrub
Fabaceae-Faboideae	*Almaleea cambagei*	WH	V		3	Low shrub
Fabaceae-Faboideae	*Aotus ericiodes*	DSF	V		2	Low shrub
Fabaceae-Faboideae	*Aotus subglauca* var. *subglauca*	DSF	V	4	2	Low shrub
Fabaceae-Faboideae	*Bossiaea neo-anglica*	DSF, WSF	V		2	Low shrub
Fabaceae-Faboideae	*Bossiaea obcordata*	DSF	V			Low shrub
Fabaceae-Faboideae	*Bossiaea prostrata*	GW	V			Low shrub
Fabaceae-Faboideae	*Bossiaea rhombifolia* subsp. *rhombifolia*	DSF, RO	II			Low shrub
Fabaceae-Faboideae	*Bossiaea scortechinii*	DSF, GW, WSF	V	5		Low shrub
Fabaceae-Faboideae	*Davesia villifera*	DSF	II	3		Low shrub
Fabaceae-Faboideae	*Daviesia acicularis*	RO, DSF	II	2		Low shrub
Fabaceae-Faboideae	*Daviesia elliptica*	DSF, WSF	II			Tall shrub
Fabaceae-Faboideae	*Daviesia genistifolia*	GW	V			Low shrub
Fabaceae-Faboideae	*Daviesia latifolia*	GW, DSF, WSF	V	5		Tall shrub
Fabaceae-Faboideae	*Daviesia mimosoides* subsp. *mimosoides*	DSF	V			Tall shrub
Fabaceae-Faboideae	*Daviesia nova-anglica*	DSF	II	5		Low shrub
Fabaceae-Faboideae	*Daviesia ulicifolia* subsp. *ulicifolia*	GW, DSF	II			Low shrub
Fabaceae-Faboideae	*Daviesia umbellulata*	DSF	II	4		Low shrub
Fabaceae-Faboideae	*Desmodium rhytidophyllum*	GW, DSF	V			Twinner
Fabaceae-Faboideae	*Dillwynia phylicoides*	DSF	V			Low shrub
Fabaceae-Faboideae	*Dillwynia phylicoides*	DSF, RO	II	5		Low shrub
Fabaceae-Faboideae	*Dillwynia rupestris*	RO, DSF	II	5		Tall shrub
Fabaceae-Faboideae	*Dillwynia sericea*	DSF	II			Low shrub
Fabaceae-Faboideae	*Dillwynia sieberi*	GW	V		3	Low shrub
Fabaceae-Faboideae	*Dillwynia sieberi*	GW, DSF	II	5		Low shrub
Fabaceae-Faboideae	*Glycine clandestina*	DSF	V		2	Twinner
Fabaceae-Faboideae	*Gompholobium heugelii*	DSF	V		3	Low shrub
Fabaceae-Faboideae	*Gompholobium heugelii*	DSF	II			Sub-shrub
Fabaceae-Faboideae	*Gompholobium inconspicum*	DSF	II			Sub-shrub
Fabaceae-Faboideae	*Gompholobium latifolium*	DSF	II	3		Low shrub
Fabaceae-Faboideae	*Gompholobium uncinatum*	DSF	II	5		Sub-shrub
Fabaceae-Faboideae	*Gompholobium virgatum* var. *aspalathoides*	DSF	II			Low shrub
Fabaceae-Faboideae	*Goodia lotifolia* var. *lotifolia*	WSF	IV		4	Tall shrub
Fabaceae-Faboideae	*Hardenbergia violacea*	DSF, GW	V	5	3	Twinner
Fabaceae-Faboideae	*Hardenbergia violacea* (obligate seeder pop.)	WSF, DSF	II			Twinner
Fabaceae-Faboideae	*Hovea apiculata*	RO	II	4	3	Low shrub
Fabaceae-Faboideae	*Hovea graniticola*	RO	II	6		Low shrub
Fabaceae-Faboideae	*Hovea heterophylla*	GW, DSF	V		3	Sub-shrub
Fabaceae-Faboideae	*Hovea lanceolata*	RO, DSF	II	4		Low shrub
Fabaceae-Faboideae	*Hovea pedunculata*	RO, DSF	II	3		Low shrub
Fabaceae-Faboideae	*Indigofera adesmiifolia*	GW, DSF	V		5	Low shrub
Fabaceae-Faboideae	*Indigofera australis*	RO, DSF, WSF, GW	IV		4	Low shrub
Fabaceae-Faboideae	*Jacksonia scoparia*	GW, DSF, WSF	V	4	2	Tall shrub
Fabaceae-Faboideae	*Kennedia rubicunda*	DSF	V	3		Twinner
Fabaceae-Faboideae	*Lezpedeza juncea* subsp. *sericea*	GW	V		3	Sub-shrub
Fabaceae-Faboideae	*Mirbelia confertiflora*	RO	V		3	Tall shrub
Fabaceae-Faboideae	*Mirbelia pungens*	RO	II	2		Low shrub
Fabaceae-Faboideae	*Mirbelia rubiifolia*	DSF, RO	II	3		Low shrub
Fabaceae-Faboideae	*Mirbelia speciosa* subsp. *speciosa*	RO, DSF	II	6		Low shrub

Family	**Species**	**Habitats**	Gill	PJP	SJP	**Growth Form**
Fabaceae-Faboideae	*Oxylobium arborescens* (Gibraltar Range form)	DSF	V		4	Low shrub
Fabaceae-Faboideae	*Oxylobium arborescens (Tall form)*	RO, DSF	II			Tall shrub
Fabaceae-Faboideae	*Phyllota phylicoides*	DSF	V	4	3	Low shrub
Fabaceae-Faboideae	*Podolobium aestivum*	DSF	V		3	Low shrub
Fabaceae-Faboideae	*Podolobium ilicifolium*	DSF, GW, WSF	IV		2	Low shrub
Fabaceae-Faboideae	*Pultanaea tarik*	WSF, DSF	II	5		Tall shrub
Fabaceae-Faboideae	*Pultenaea campbellii*	GW	IV		3	Low shrub
Fabaceae-Faboideae	*Pultenaea daphnoides*	DSF	II			Low shrub
Fabaceae-Faboideae	*Pultenaea dentata*	WH	II			Sub-shrub
Fabaceae-Faboideae	*Pultenaea foliolosa*	DSF	V	7	4	Low shrub
Fabaceae-Faboideae	*Pultenaea* sp. Girraween	WH	V			Low shrub
Fabaceae-Faboideae	*Pultenaea linophylla*	DSF, GW	II	3		Low shrub
Fabaceae-Faboideae	*Pultenaea microphylla*	GW	V		3	Low shrub
Fabaceae-Faboideae	*Pultenaea polifolia*	DSF	II			Low shrub
Fabaceae-Faboideae	*Pultenaea pycnocephala*	DSF, RO	II	5		Low shrub
Fabaceae-Faboideae	*Pultenaea retusa*	DSF	II			Low shrub
Fabaceae-Faboideae	*Sphaerolobium vimineum*	WH	V		1	Sub-shrub
Fabaceae-Faboideae	*Zornia dyctiocarpa* var. *dyctiocarpa*	GW, DSF	V			Sub-shrub
Fabaceae-Mimosoideae	*Acacia adunca*	RO, DSF	II			Tall shrub
Fabaceae-Mimosoideae	*Acacia barringtonensis*	DSF	IV		3	Tall shrub
Fabaceae-Mimosoideae	*Acacia beadleana*	RO	V		3	Low shrub
Fabaceae-Mimosoideae	*Acacia betchei*	DSF	II			Tall shrub
Fabaceae-Mimosoideae	*Acacia binervata*	WSF	V			Tall shrub
Fabaceae-Mimosoideae	*Acacia blakei* subsp. *diphylla*	WSF	II			Small tree
Fabaceae-Mimosoideae	*Acacia brownii*	DSF	V			Low shrub
Fabaceae-Mimosoideae	*Acacia brunioides* subsp. *brunioides*	DSF	II	4		Low shrub
Fabaceae-Mimosoideae	*Acacia burbidgeae*	DSF	II	8		Low shrub
Fabaceae-Mimosoideae	*Acacia buxifolia* subsp. *pubiflora*	DSF	V	5	2	Low shrub
Fabaceae-Mimosoideae	*Acacia dealbata*	WSF, DSF, GW	II	5		Small tree
Fabaceae-Mimosoideae	*Acacia diphylla*	RF	II			Tall shrub
Fabaceae-Mimosoideae	*Acacia falciformis*	RO, DSF, WSF, GW	IV		3	Tall shrub
Fabaceae-Mimosoideae	*Acacia filicifolia*	WSF, DSF	IV	5	5	Small tree
Fabaceae-Mimosoideae	*Acacia fimbriata*	GW, DSF	II	4		Small tree
Fabaceae-Mimosoideae	*Acacia floribunda*	WSF	V			Tall shrub
Fabaceae-Mimosoideae	*Acacia granitica*	RO	II	5		Tall shrub
Fabaceae-Mimosoideae	*Acacia gunnii*	DSF, GW	V			Low shrub
Fabaceae-Mimosoideae	*Acacia hispidula*	RO, DSF	II			Low shrub
Fabaceae-Mimosoideae	*Acacia implexa*	DSF, GW	IV		5	Tall shrub
Fabaceae-Mimosoideae	*Acacia irrorata* subsp. *irrorata*	WSF	II			Small tree
Fabaceae-Mimosoideae	*Acacia juncifolia* subsp. *juncifolia*	DSF	V			Small tree
Fabaceae-Mimosoideae	*Acacia latisepala*	RO	II	6		Tall shrub
Fabaceae-Mimosoideae	*Acacia leptoclada*	DSF	V			Low shrub
Fabaceae-Mimosoideae	*Acacia longifolia* subsp. *longifolia*	DSF, WSF	II	6		Tall shrub
Fabaceae-Mimosoideae	*Acacia macnuttiana*	DSF	II			Tall shrub
Fabaceae-Mimosoideae	*Acacia maidenii*	RF, WSF	V			Small tree
Fabaceae-Mimosoideae	*Acacia melanoxylon*	RF, WSF	IV			Small tree
Fabaceae-Mimosoideae	*Acacia mitchellii*	DSF	II	5		Low shrub
Fabaceae-Mimosoideae	*Acacia myrtifolia*	DSF, WSF	II	4		Low shrub
Fabaceae-Mimosoideae	*Acacia neriifolia*	RO, DSF, GW	IV			Small tree
Fabaceae-Mimosoideae	*Acacia nova-anglica* ms	RO, DSF, WSF, GW	IV		4	Small tree
Fabaceae-Mimosoideae	*Acacia obtusifolia*	DSF, WSF	V	4		Low shrub
Fabaceae-Mimosoideae	*Acacia penninervis* var. *penninervis*	DSF	II			Tall shrub
Fabaceae-Mimosoideae	*Acacia pruinosa*	DSF	V			Tall shrub
Fabaceae-Mimosoideae	*Acacia pycnostachya*	RO, DSF	V			Small tree
Fabaceae-Mimosoideae	*Acacia rubida*	DSF	II	4		Tall shrub
Fabaceae-Mimosoideae	*Acacia suaveolens*	DSF	II	3		Low shrub
Fabaceae-Mimosoideae	*Acacia terminalis*	DSF	II	5		Tall shrub
Fabaceae-Mimosoideae	*Acacia torringtonensis*	RO, DSF	II	4		Low shrub

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Fabaceae-Mimosoideae	*Acacia triptera*	RO, DSF	II	8		Tall shrub
Fabaceae-Mimosoideae	*Acacia ulicifolia*	RO, DSF, GW, WSF	II	3		Low shrub
Fabaceae-Mimosoideae	*Acacia venulosa*	DSF	V			Low shrub
Fabaceae-Mimosoideae	*Acacia venulosa* (obligate seeding pop.)	RO, DSF	II	5		Low shrub
Fabaceae-Mimosoideae	*Acacia viscidula*	GW	V			Low shrub
Fabaceae-Mimosoideae	*Acacia viscidula*	RO, DSF	II			Low shrub
Fabaceae-Mimosoideae	*Acacia williamsiana*	RO	IV			Small tree
Goodeniaceae	*Goodenia ovata*	WSF	II		2	Low shrub
Xanthorrhoeacae	*Gietonoplesium cymosum*	WSF	IV			Twinner
Lamiaceae	*Chloanthes parviflora*	RO	II			Low shrub
Lamiaceae	*Prostanthera incisa*	WSF	II			Tall shrub
Lamiaceae	*Prostanthera lasianthos*	WSF	II			Tall shrub
Lamiaceae	*Prostanthera nivea*	RO	II	3		Low shrub
Lamiaceae	*Prostanthera nivea* var. *nivea*	RO	II	3		Low shrub
Lamiaceae	*Prostanthera 'ovalifolia'*	WSF	II			Tall shrub
Lamiaceae	*Prostanthera saxicola*	RO	II	3		Low shrub
Lamiaceae	*Prostanthera scutellarioides* (Carrai form)	WH	V		1	Low shrub
Lamiaceae	*Prostanthera scutellarioides* (Gibraltar Range form)	DSF	V		3	Low shrub
Lamiaceae	*Prostanthera* sp. aff. *howelliae*	DSF	V		4	Low shrub
Lamiaceae	*Prostanthera teretifolia*	RO	II	8		Low shrub
Lamiaceae	*Westringia amabilis*	DSF	II	4		Low shrub
Lamiaceae	*Westringia eremicola*	DSF	V			Low shrub
Lauraceae	*Cinnamomum oliveri*	RF, WSF	V			Tree
Lauraceae	*Cryptocarya foveolata*	RF, WSF	V			Small tree
Lauraceae	*Cryptocarya glaucescens*	RF, WSF	V			Small tree
Lauraceae	*Cryptocarya meisneriana*	RF, WSF	V			Small tree
Lauraceae	*Cryptocarya rigida*	RF, WSF	V		6	Small tree
Lauraceae	*Endiandra muelleri*	RF, WSF	V			Tree
Lauraceae	*Endiandra sieberi*	RF, WSF	V			Tree
Lauraceae	*Litsea reticulata*	RF	II			Tree
Asparagaceae	*Eustrephus latifolius*	WSF	IV			Vine
Loganiaceae	*Logania albiflora*	WSF	II	5		Tall shrub
Loganiaceae	*Logania* sp. aff. *albiflora* (narrow leaves, rocky habitat)	DSF	V			Low shrub
Malvaceae	*Brachychiton populneus* subsp. *populneus*	GW	V			Tree
Malvaceae	*Commersonia amystia*	RO	II	3		Low shrub
Malvaceae	*Commersonia breviseta*	RO	II	4		Low shrub
Malvaceae	*Keraudrenia hillii* var. *hillii*	RO	II	5		Low shrub
Malvaceae	*Lasiopetalum macrophyllum*	WSF	V			Low shrub
Meliaceae	*Dysoxylum fraserianum*	RF	V			Tree
Meliaceae	*Synoum glandulosum*	WSF, RF	V			Low shrub
Menispermaceae	*Sarcopetalum harveyanum*	WSF, RF	V			Twinner
Monimiaceae	*Hedycarya angustifolia*	WSF, RF	V		6	Small tree
Monimiaceae	*Palmeria scandens*	RF	VI			Vine
Monimiaceae	*Wilkiea heugeliana*	RF	V			Small tree
Myrsinaceae	*Myrsine howittiana*	WSF	V			Small tree
Myrsinaceae	*Myrsine variabilis*	WSF	V			Small tree
Myrtaceae	*Acmena smithii*	RF, WSF	VI			Tree
Myrtaceae	*Archirhodomyrtus beckleri*	RF, WSF	V		6	Small tree
Myrtaceae	*Baeckea omissa*	WH	V	4	1	Low shrub
Myrtaceae	*Calytrix tetragona*	RO	II	6		Low shrub
Myrtaceae	*Eucalyptus acaciiformis*	DSF	V			Small tree
Myrtaceae	*Eucalyptus brunnea*	DSF	VI			Tree
Myrtaceae	*Eucalyptus caliginosa*	DSF	VI			Tree
Myrtaceae	*Eucalyptus cameronii*	WSF	VI			Tree
Myrtaceae	*Eucalyptus campanulata*	WSF	VI			Tree
Myrtaceae	*Eucalyptus codonocarpa*	RO	V		5	Tall shrub
Myrtaceae	*Eucalyptus laevopinea*	DSF	VI			Tree
Myrtaceae	*Eucalyptus ligustrina*	DSF	VI			Small tree

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Myrtaceae	*Eucalyptus microcorys*	WSF	VI			Tree
Myrtaceae	*Eucalyptus nobilis*	WSF	II			Tree
Myrtaceae	*Eucalyptus notabilis*	WSF, DSF	VI			Tree
Myrtaceae	*Eucalyptus obliqua*	WSF, DSF	VI			Tree
Myrtaceae	*Eucalyptus olida*	DSF	V			Small tree
Myrtaceae	*Eucalyptus oreades*	DSF	I			Tree
Myrtaceae	*Eucalyptus prava*	RO	V		5	Small tree
Myrtaceae	*Eucalyptus pyrocarpa*	DSF	VI			Tree
Myrtaceae	*Eucalyptus radiata* subsp. *sejuncta*	DSF	VI			Tree
Myrtaceae	*Eucalyptus saligna*	WSF	VI			Tree
Myrtaceae	*Eucalyptus williamsiana*	DSF	VI			Tree
Myrtaceae	*Harmogia densifolia*	RO	V			Low shrub
Myrtaceae	*Homoranthus biflorus*	RO	II			Low shrub
Myrtaceae	*Homoranthus binghiensis*	RO	II	9		Low shrub
Myrtaceae	*Homoranthus croftianus*	RO	II			Low shrub
Myrtaceae	*Homoranthus lunatus*	RO	II			Low shrub
Myrtaceae	*Kardomia odontocalyx*	RO	II	8		Low shrub
Myrtaceae	*Kunzea bracteolata* (obligate seeder pop.)	RO	I	6		Low shrub
Myrtaceae	*Kunzea bracteolata* (resprouter pop.)	RO	V			Low shrub
Myrtaceae	*Kunzea obovata*	RO	II			Low shrub
Myrtaceae	*Kunzea opposita*	RO	I			Low shrub
Myrtaceae	*Kunzea parvifolia*	DSF, GW	II			Low shrub
Myrtaceae	*Leptospermum arachnoides*	WH	V		3	Low shrub
Myrtaceae	*Leptospermum brevipes*	RO, DSF, GW	V		3	Tall shrub
Myrtaceae	*Leptospermum divaricatum*	RO, DSF	V			Low shrub
Myrtaceae	*Leptospermum gregarium*	WH	V		3	Low shrub
Myrtaceae	*Leptospermum minutifolium*	WH	V		3	Low shrub
Myrtaceae	*Leptospermum novae-angliae*	RO, DSF	V	8	3	Low shrub
Myrtaceae	*Leptospermum petersonii*	RO, DSF	V			Tall shrub
Myrtaceae	*Leptospermum polygalifolium* subsp. *montanum*	WSF	V		2	Tall shrub
Myrtaceae	*Leptospermum polygalifolium* subsp. *transmontanum*	DSF, WSF	V		2	Tall shrub
Myrtaceae	*Leptospermum trinervium*	DSF	VI		2	Tall shrub
Myrtaceae	*Lophostemon confertus*	RF, WSF	VI			Tree
Myrtaceae	*Melaleuca linearis*	DSF	V			Low shrub
Myrtaceae	*Melaleuca pallida*	WH	V			Tall shrub
Myrtaceae	*Melaleuca paludicola*	WH	V		4	Low shrub
Myrtaceae	*Melaleuca pityoides*	WH	V			Low shrub
Myrtaceae	*Melaleuca sp nov./comboynensis*	RO	V			Low shrub
Myrtaceae	*Melaleuca* sp. aff. *comboynensis* ('Big Red')	RO	V		3	Low shrub
Myrtaceae	*Melaleuca* sp. aff. *flavovirens* (Torrington)	DSF	V	10		Low shrub
Myrtaceae	*Melaleuca williamsii*	DSF	V			Low shrub
Myrtaceae	*Micromyrtus sessilis*	RO, DSF	V			Low shrub
Myrtaceae	*Rhodamnia rubescens*	RF, WSF	IV			Small tree
Olacaceae	*Olax stricta*	DSF, RO	V			Tall shrub
Oleaceae	*Notelaea linearis*	WSF, RF	V			Tall shrub
Oleaceae	*Notelaea microcarpa* var. *microcrpa*	WSF, DSF, GW	V			Tall shrub
Oleaceae	*Notelaea* sp. A	WSF, DSF	V			Tall shrub
Oleaceae	*Notelaea venosa*	WSF, RF	V			Small tree
Phyllanthaceae	*Breynia oblongifolia*	WSF	V			Low shrub
Phyllanthaceae	*Phyllanthus gunnii*	WSF	V			Low shrub
Phyllanthaceae	*Phyllanthus subcrenulatus*	GW	V			Sub-shrub
Phyllanthaceae	*Phyllanthus virgatus*	DSF	V			Sub-shrub
Phyllanthaceae	*Synostemon hirtellus*	DSF	II	5		Low shrub
Picrodendraceae	*Pseudanthus pauciflorus*	RO	II	4		Low shrub
Pittosporaceae	*Billardiera scandens*	DSF, WSF, GW	V			Twinner
Pittosporaceae	*Bursaria spinosa* subsp. *spinosa*	GW	V		5	Tall shrub
Pittosporaceae	*Hymenosporum flavum*	RF, WSF	V			Small tree
Pittosporaceae	*Pittosporum multiflorum*	RF, WSF	IV			Small tree

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Pittosporaceae	*Pittosporum revolutum*	RF, WSF	V			Small tree
Pittosporaceae	*Pittosporum spinescens*	RF, WSF	IV			Low shrub
Pittosporaceae	*Pittosporum undulatum*	RF, WSF	V			Small tree
Pittosporaceae	*Rhytidosporum diosmoides*	DSF, GW	V		3	Twinner
Pittosporaceae	*Rhytidosporum procumbens*	GW	V	5	3	Twinner
Polygalaceae	*Comesperma defoliatum*	WH	V			Sub-shrub
Polygalaceae	*Comesperma ericinum*	DSF, RO	II	2		Low shrub
Polygalaceae	*Comesperma retusum*	WH	V			Sub-shrub
Escalloniaceae	*Polyosma cunninghamii*	RF	V			Small tree
Proteaceae	*Banksia integrifolia* subsp. *monticola*	WSF, DSF, GW	I	8		Small tree
Proteaceae	*Banksia marginata*	WH	I	4		Low shrub
Proteaceae	*Banksia spinulosa* subsp. *collina*	DSF	V			Low shrub
Proteaceae	*Banksia spinulosa subsp. neoanglica*	DSF, WH	V	6	2	Tall shrub
Proteaceae	*Conospermum burgessiorium*	DSF	II	5		Low shrub
Proteaceae	*Conospermum taxifolium*	DSF, WH	V		4	Low shrub
Proteaceae	*Grevillea acanthifolia* subsp. *stenomera*	WH	V		4	Low shrub
Proteaceae	*Grevillea acerata*	DSF	II	4		Low shrub
Proteaceae	*Grevillea beadleana*	RO	II			Low shrub
Proteaceae	*Grevillea floribunda* subsp. *floribunda*	DSF	V			Low shrub
Proteaceae	*Grevillea guthrienana*	RO	II			Low shrub
Proteaceae	*Grevillea juniperina* subsp. *allojohnsonii*	GW, DSF	V			Low shrub
Proteaceae	*Grevillea rhizomatosa*	WSF, DSF	IV		5	Low shrub
Proteaceae	*Grevillea scotechenii* subsp. *sarmentosa*	DSF	V			Low shrub
Proteaceae	*Grevillea triternata*	DSF, RO	II	6		Low shrub
Proteaceae	*Grevillea viridiflava*	DSF, WH	V		4	Low shrub
Proteaceae	*Hakea eriantha*	WSF, DSF, GW	V	5		Tall shrub
Proteaceae	*Hakea laevipes* subsp. *graniticola*	DSF	V	5	3	Low shrub
Proteaceae	*Hakea macrorrhyncha*	RO	I	5		Small tree
Proteaceae	*Hakea microcarpa*	WH	V	5	2	Low shrub
Proteaceae	*Hakea salicifolia* subsp. *salicifolia*	WSF	I	5		Tall shrub
Proteaceae	*Isopogon petiolaris*	DSF	V	4	4	Low shrub
Proteaceae	*Lomatia arborescens*	WSF	V			Small tree
Proteaceae	*Lomatia fraseri*	DSF, WSF	V			Low shrub
Proteaceae	*Lomatia silaifolia*	WSF, DSF, GW	V		1	Low shrub
Proteaceae	*Orites excelsa*	RF, WSF	II			Small tree
Proteaceae	*Persoonia acuminata*	WSF	V			Low shrub
Proteaceae	*Persoonia chamaepeuce*	DSF	V		4	Low shrub
Proteaceae	*Persoonia conjuncta*	WSF	II			Tall shrub
Proteaceae	*Persoonia cornifolia*	DSF	V			Tall shrub
Proteaceae	*Persoonia fastigiata*	DSF	V			Low shrub
Proteaceae	*Persoonia linearis*	WSF	VI			Tall shrub
Proteaceae	*Persoonia media*	WSF, RF	II	6		Small tree
Proteaceae	*Persoonia oleoides*	WSF, DSF	V			Tall shrub
Proteaceae	*Persoonia procumbens*	DSF	V			Low shrub
Proteaceae	*Persoonia rufa*	DSF, RO	II	6		Low shrub
Proteaceae	*Persoonia sericea*	DSF, WSF	V			Low shrub
Proteaceae	*Persoonia tenuifolia*	DSF	V		4	Low shrub
Proteaceae	*Persoonia terminalis* subsp. *terminalis*	RO	II			Low shrub
Proteaceae	*Petrophile canescens*	DSF	V		3	Low shrub
Proteaceae	*Stenocarpus salignus*	RF	V			Small tree
Proteaceae	*Telopea aspera*	DSF	V		2	Low shrub
Quintiniaceae	*Quintinia seiberi*	RF	V, VI			Tree
Ranunculaceae	*Clematis aristata*	WSF, RF	V			Vine
Ranunculaceae	*Clematis glycinoides*	WSF, RF	II			Vine
Rhamnaceae	*Cryptandra amara* var. *floribunda*	RO	II	3		Low shrub
Rhamnaceae	*Cryptandra amara* var. *longfolia*	GW	V		3	Low shrub
Rhamnaceae	*Pomaderiris* (long Point small leaf)	GW, DSF	II			Tall shrub
Rhamnaceae	*Pomaderris andromedifolia*	RO	II			Low shrub

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Rhamnaceae	*Pomaderris angustifolia*	DSF	II			Low shrub
Rhamnaceae	*Pomaderris betulina*	DSF	II			Low shrub
Rhamnaceae	*Pomaderris eriocephala*	GW	V			Low shrub
Rhamnaceae	*Pomaderris lanigera*	DSF, WSF	II			Low shrub
Rhamnaceae	*Pomaderris nitidula*	WSF, RF	II			Low shrub
Rhamnaceae	*Pomaderris prunifolia*	GW	II			Low shrub
Rhamnaceae	*Spyridium scortechinii*	RO, DSF	II	4		Low shrub
Ripogoneaceae	*Ripogonum discolor*	RF	VI			Vine
Rosaceae	*Rubus moluccanus*	RF, WSF	VI			Vine
Rosaceae	*Rubus mooreii*	RF	VI			Vine
Rosaceae	*Rubus parvifolius*	WSF, DSF	V			Twinner
Rubiacae	*Psychotria loniceroides*	WSF, RF	V			Small tree
Rubiaceae	*Coprosma hirtella*	WSF	V			Low shrub
Rubiaceae	*Coprosma quadrifida*	WSF	V			Small tree
Rubiaceae	*Psychotria loniceroides*	WSF, RF	V			Small tree
Rutaceae	*Acronychia oblongifolia*	RF	V			Tree
Rutaceae	*Asterolasia asteroscophora* subsp. *asteroscophora*	DSF	II	4		Low shrub
Rutaceae	*Asterolasia correifolia*	WSF	II	4		Tall shrub
Rutaceae	*Boronia algida*	DSF	V		2	Low shrub
Rutaceae	*Boronia anemonifolia* subsp. *variablis*	RO	II			Low shrub
Rutaceae	*Boronia anethifolia*	RO	II	3		Low shrub
Rutaceae	*Boronia angustisepala*	RO, DSF	II	5		Low shrub
Rutaceae	*Boronia bolivensis*	RO	II	5		Low shrub
Rutaceae	*Boronia granitica*	RO	II	6		Low shrub
Rutaceae	*Boronia ledifolia*	DSF	V		2	Low shrub
Rutaceae	*Boronia microphylla*	DSF, WH	V		2	Low shrub
Rutaceae	*Boronia polygalifolia*	WH, DSF, GW	V		1	Low shrub
Rutaceae	*Correa lawrenciana* var. *glandulifera*	WSF	II	5		Tall shrub
Rutaceae	*Correa reflexa* (resprouter green flowered)	GW	V			Low shrub
Rutaceae	*Correa reflexa* (obligate seeder red flowered)	DSF	II	5		Low shrub
Rutaceae	*Crowea exaltata* subsp. *magnifolia*	DSF, RO	II			Low shrub
Rutaceae	*Eriostemon australasius* subsp. *australasius*	RO	II	5		Low shrub
Rutaceae	*Leionema ambiens*	RO	II			Low shrub
Rutaceae	*Leionema dentatum*	RO	II	5		Low shrub
Rutaceae	*Leionema rotundifolium*	RO	II	8		Low shrub
Rutaceae	*Leionema rotundifolium*	RO, DSF	V			Low shrub
Rutaceae	*Medicosma cunninghamii*	RF, WSF	V			Tree
Rutaceae	*Melicope hayesii*	RF, WSF	V			Tree
Rutaceae	*Melicope micrococca*	RF, WSF	V			Tree
Rutaceae	*Phebalium glandulosum* subsp. *eglandulosum*	RO	II	8		Low shrub
Rutaceae	*Phebalium squamulosum* subsp. *squamulosum*	RO, DSF	II	5		Low shrub
Rutaceae	*Phebalium* sp. Mt Ballow	WSF	II			Tall shrub
Rutaceae	*Phebalium woombye*	RO	II	5		Low shrub
Rutaceae	*Philotheca epilosa*	RO	II	7		Low shrub
Rutaceae	*Zieria arborescens*	WSF	II			Tall shrub
Rutaceae	*Zieria aspalathoides*	RO, DSF	II	4		Low shrub
Rutaceae	*Zieria cytisoides*	RO, DSF	V			Low shrub
Rutaceae	*Zieria laevigata*	RO	II	3		Low shrub
Rutaceae	*Zieria odorifera*	RO	V			Low shrub
Rutaceae	*Zieria smithii* subsp. *smithii*	WSF	II	5		Tall shrub
Santalaceae	*Choretrum candollei*	DSF	V			Low shrub
Santalaceae	*Choretrum pauciflorum*	RO	II			Low shrub
Santalaceae	*Exocarpos cupressiformis*	GW, WSF	V			Small tree
Santalaceae	*Exocarpos strictus*	DSF	V			Small tree
Santalaceae	*Leptomeria acida*	DSF	II			Tall shrub
Sapindaceae	*Dodonaea boroniifolia*	DSF, RO	II			Low shrub
Sapindaceae	*Dodonaea hirsuta*	RO	II	6		Low shrub
Sapindaceae	*Dodonaea megazyga*	WSF	II	5		Tall shrub

Family	**Species**	**Habitats**	Gill	PJP	SJP	**Growth Form**
Sapindaceae	*Dodonaea triquetra*	GW, DSF, WSF	V			Low shrub
Sapindaceae	*Dodonaea viscosa* subsp. Black Fruits	DSF, GW	V			Low shrub
Sapindaceae	*Dodonaea viscosa* subsp. *spatulata*	DSF, RO	II			Low shrub
Scrophulariaceae	*Myoporum betcheanum*	RF	II			Tall shrub
Smilacaceae	*Smilax australis*	WSF, RF	V			Vine
Smilacaceae	*Smilax glyciphylla*	DSF, WSF	V			Twinner
Solanaceae	*Duboisia myoporoides*	RF	V			Small tree
Solanaceae	*Solanum aviculare*	WSF, RF	II	1		Tall shrub
Solanaceae	*Solanum curvicuspe*	WSF, RF	V		2	Tall shrub
Solanaceae	*Solanum densevestitum*	WSF	V			Low shrub
Solanaceae	*Solanum nobile*	WSF, RF	II	3		Tall shrub
Solanaceae	*Solanum prinophylllum*	WSF, RF	II	3		Low shrub
Thymelaeaceae	*Pimelea curviflora* var. *divergens*	GW	V		1	Sub-shrub
Thymelaeaceae	*Pimelea ligustrina* subsp. *hypericina*	WSF	II	5		Tall shrub
Thymelaeaceae	*Pimelea linifolia* subsp. *collina*	DSF, RO, WH	II	3		Low shrub
Thymelaeaceae	*Pimelea linifolia* subsp. *linifolia*	DSF, GW	V		3	Low shrub
Thymelaeaceae	*Pimelea neo-anglica*	DSF, GW	V			Low shrub
Thymelaeaceae	*Pimelea sp. 'Long Point'*	GW	II			Low shrub
Trimeniaceae	*Trimenia moorei*	RF	VI			Vine
Urticaceae	*Dendrocnide excelsa*	RF	II			Tree
Vitaceae	*Cissus hypoglauca*	RF	VI			Vine
Vitaceae	*Tetrastigma nitens*	RF	IV			Vine
Winteraceae	*Tasmannia insipida*	WSF, RF	V			Low shrub
Winteraceae	*Tasmannia stipitata*	WSF, RF	IV			Tall shrub
Xanthorrhoeaceae	*Xanthorrhoea sp.* Gibraltar Range	WSF	VII			Tall shrub
Xanthorrhoeaceae	*Xanthorrhoea glauca* subsp. *angustifolia*	DSF	VII		2	Tall shrub
Xanthorrhoeaceae	*Xanthorrhoea johnsonii*	DSF	VII		2	Tall shrub
Zamiaceae	*Macrozamia plurinervia*	DSF	VII			Low shrub