



Map of the Sydney region

For the Ecology of Sydney Plant Species the Sydney region is defined as the Central Coast and Central Tablelands botanical subdivisions.

Ecology of Sydney plant species

Part 7b Dicotyledon families Proteaceae to Rubiaceae

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Abstract

Benson, Doug and McDougall, Lyn (National Herbarium of New South Wales, Royal Botanic Gardens, Sydney, Australia 2000. Email: doug.benson@rbgsyd.nsw.gov.au) 2000 Ecology of Sydney plant species: Part 7b Dicotyledon families Proteaceae to Rubiaceae. Cunninghamia 6(4) 1016–1202. Ecological data in tabular form are provided on 246 plant species of the families Proteaceae to Rubiaceae, 216 native and 30 exotics, occurring in the Sydney region, defined by the Central Coast and Central Tablelands botanical subdivisions of New South Wales (approximately bounded by Lake Macquarie, Orange, Crookwell and Nowra). Relevant Local Government Areas are Auburn, Ashfield, Bankstown, Bathurst, Baulkham Hills, Blacktown, Blayney, Blue Mountains, Botany, Burwood, Cabonne, Camden, Campbelltown, Canterbury, Cessnock, Concord, Crookwell, Drummoyne, Evans, Fairfield, Greater Lithgow, Gosford, Hawkesbury, Holroyd, Hornsby, Hunters Hill, Hurstville, Kiama, Kogarah, Ku-Ring-Gai, Lake Macquarie, Lane Cove, Leichhardt, Liverpool, Manly, Marrickville, Mosman, Mulwaree, North Sydney, Oberon, Orange, Parramatta, Penrith, Pittwater, Randwick, Rockdale, Ryde, Rylstone, Shellharbour, Shoalhaven, Singleton, South Sydney, Strathfield, Sutherland, Sydney City, Warringah, Waverley, Willoughby, Wingecarribee, Wollondilly, Wollongong, Woollahra and Wyong. The study area falls within the Sydney Basin IBRA Bioregion.

Families are: Proteaceae, Ranunculaceae, Resedaceae, Rhamnaceae, Rosaceae, Rubiaceae.

Data are derived from herbarium collections, literature and field observations. It is hoped that the many, often alarming gaps in the information available will stimulate much-needed research into the ecology of more of the species. Information is provided so far as available to us for each plant species in the following categories:

Life History: Growth form, vegetative spread, longevity, primary juvenile period (time from germination to fruiting), reproduction, flowering and fruiting times, fruit/seed type, dispersal, establishment and growth, fire response, interaction with other organisms.

Distribution: Status/origin (native/naturalised), botanical subregions, distribution in Sydney area, selected locations.

Habitat: Habitat, altitude, annual rainfall, typical local abundance, vegetation, substrate, exposure.

Conservation: Conservation status.

Introduction

The *Ecology of Sydney plant species* aims to provide ecological information on native and naturalised Sydney plants. Particular emphasis has been given to data that are relevant for ecologists and natural area managers, for people involved in bush regeneration, land rehabilitation and landscape design, for researchers in many fields and for a wide range of people who are interested in bushland and native plants. Species-specific information is also relevant to environmental impact assessment and to studies involving changes in drainage, water movement, wind exposure, nutrient conditions and fire regimes on plant species and plant communities. Information included covers growth form, flowering and fruiting times, longevity and maturation periods, pollination and seed dispersal data, distribution, habitat and plant community, as well as responses to fire and disturbance where available and is complementary to the descriptive texts in taxonomic handbooks such as the *Flora of New South Wales* (Harden 1990–93).

Part 7b of the *Ecology of Sydney plant species* covers the Dicotyledon families alphabetically from Proteaceae to Rubiaceae.

Part 8, Rutaceae to Zygophyllaceae will be published in 2001.

Methods

Part 7b follows the format used in Parts 1–7a (Benson & McDougall 1993, 1994, 1995, 1996, 1997, 1998, 1999). The Sydney region is defined as the Central Coast and Central Tablelands botanical subdivisions (i.e. approximately bounded by Lake Macquarie, Orange, Crookwell and Nowra) (Fig. 1). This is the area broadly covered by *Flora of the Sydney Region* (Carolin & Tindale 1993), with the exception that the Hunter Valley is not included here since it lies within the North Coast and Central Western Slopes subdivisions. Relevant Local Government Areas are Auburn, Ashfield, Bankstown, Bathurst, Baulkham Hills, Blacktown, Blayney, Blue Mountains, Botany, Burwood, Cabonne, Camden, Campbelltown, Canterbury, Cessnock, Concord, Crookwell, Drummoyne, Evans, Fairfield, Greater Lithgow, Gosford, Hawkesbury, Holroyd, Hornsby, Hunters Hill, Hurstville, Kiama, Kogarah, Ku-Ring-Gai, Lake Macquarie, Lane Cove, Leichhardt, Liverpool, Manly, Marrickville, Mosman, Mulwaree, North Sydney, Oberon, Orange, Parramatta, Penrith, Pittwater, Randwick, Rockdale, Ryde, Rylstone, Shellharbour, Shoalhaven, Singleton, South Sydney, Strathfield, Sutherland, Sydney City, Warringah, Waverley, Willoughby, Wingecarribee, Wollondilly, Wollongong, Woollahra and Wyong. The study area falls within the Sydney Basin IBRA bioregion.

The Sydney region, as defined here, includes approximately 3500 plant species, both native and naturalised. To deal effectively with this number, the work has been divided into parts each of approximately 350 species based on plant families beginning with ferns, Cycads and Gymnosperms, and then Dicotyledon and Monocotyledon families. Within these groups, families, genera and species are arranged alphabetically:

- Part 1: Ferns, Fern allies, Cycads and Conifers, Dicotyledon families Acanthaceae to Asclepiadaceae (*Cunninghamia* 3(2) 1993)
- Part 2: Dicotyledon families Asteraceae to Buddlejaceae (*Cunninghamia* 3(4) 1994)
- Part 3: Cabombaceae to Eupomatiaceae (*Cunninghamia* 4(2) 1995)
- Part 4: Fabaceae (*Cunninghamia* 4(4) 1996)
- Part 5: Flacourtiaceae to Myrsinaceae (*Cunninghamia* 5(2) 1997)
- Part 6: Myrtaceae (*Cunninghamia* 5(4) 1998)
- Part 7a: Nyctaginaceae to Primulaceae (*Cunninghamia* 6(2) 1999)
- Part 7b: Proteaceae to Rubiaceae** (*Cunninghamia* 6(4) 2000)
- Part 8: Rutaceae to Zygophyllaceae
- Part 9: Monocotyledon families
- Part 10: Monocotyledon families

For each species (and generally for subspecies) a data sheet is prepared incorporating life history, distribution and habitat data from specimens in the National Herbarium of New South Wales; this information is entered in a database together with data from literature sources both published and unpublished. References have been cited where appropriate but for unreferenced data responsibility has been assumed by the authors. A provisional compilation sheet with the available information is then prepared and distributed to interested persons for comments and additions/alterations. This compilation is then published in parts in the summer issue of *Cunninghamia*, with the subsequent long-term aim of producing a book at the completion of the ten parts. This will allow the incorporation of new and additional material.

Part 8, Rutaceae to Zygophyllaceae, is planned for publication in 2001, and any information that readers would like included should be sent to the authors by 30 June 2001.

Ecological review papers may be appropriate for families in future issues, particularly the major families e.g. Rutaceae, but papers would also be welcomed for smaller families. Authors interested in contributing such papers should contact the Scientific Editor.

Information categories

For each species or subspecies, information is presented under headings relating to different life-history aspects, each with further subdivisions. Emphasis has been given to understanding the species in its wild habitat. For this reason data on cultivation and artificial propagation, available in horticultural books, are generally not included. Likewise information on weed control is not given. Generally, the categories are broadly interpreted and since the project aims to stimulate further investigation, we welcome the addition of extra data on any other aspects of the plant's ecology.

A 'comments' section has been deliberately avoided — for all information retrieval purposes, all ecological material should be attributable to some life history aspect of the plant or its habitat although even with our broad categories there have been problems with 'Vegetation' and 'Substrate' sections for specialised lifeforms such as mistletoes. The main purpose of this information is to give a picture of the ecology of particular species as is currently known. It is not primarily for comparative purposes although it can be used in this way. One of our original aims was to demonstrate that closely related species may have different ecologies and that to generalise within genera for example rather than look at a particular species is an over simplification. We have also included reference to individualistic information resulting from specific research that will not necessarily be available for all species.

Similarly where we have observations on the effects of factors such as drought on particular species we have included these, though we have not included a category for 'drought' because of difficulties in definition. One of our aims is to be open-ended, to point out that there are many gaps in the ecological knowledge and to indicate areas and species where future work may be particularly useful.

Botanical nomenclature

Family/Genus/Species: Names currently recognised at the National Herbarium of NSW and mostly as used in *Flora of New South Wales*.

Common name: Names used in *Flora of New South Wales*.

Life history

Growth form: Brief description.

Source: *Flora of New South Wales*.

Vegetative spread: Indication of whether localised expansion or spread is possible from an individual by rhizome, stolon, rootsucker etc. Important in determining ability of species to colonise immediate local area. Does not include vegetative distance-dispersal which is included under Establishment & Growth (diaspore).

Source: Flora descriptions, Herbarium specimens, field observations.

Longevity: Average potential life-span under natural conditions — range in years where possible, indefinite, where death is not a result of inherent growth e.g. continued rhizomatous growth. Longevity may be shorter in cultivation. There are very few references in the literature to the longevity of species or records of individual plants, particularly of the longer-lived species, yet this is an important factor in assessing importance of recruitment and changes in plant communities.

Most of the estimates given are based on the authors' judgement, based on the shape, size and growth rates of individuals, and the authors' experience in the field over 25 years, together with any historical data available. The figures given are conservative and represent minimal average ages. The authors would not be surprised if much greater ages are achieved in many cases.

Source: literature, authors' assessment from field observations.

Primary juvenile period: time taken from germination to produce first fruits or spores. Gill (1975) uses the term for the period from germination to flowering but the period to fruit maturity is more significant ecologically. Secondary juvenile period is time taken for individual to recover to produce fruit after major damage e.g. from fire, but applicable only if species regularly resprouts. The time required to accumulate a seedbank sufficient to ensure reasonable recruitment in the event of mass mortality is also an important consideration. Primary and secondary juvenile periods should not be considered as absolute and they may vary spatially as a function of habitat factors (moisture availability, nutrients etc.) and temporally (e.g. climatic variation).

Source: literature, field observations.

Reproduction: for Angiosperms, reproduction is separated into:

Flowers: predominant flower colour, flowering period — range of months and, where possible, peak month based on frequency of herbarium collections. Pollination vectors.

Fruit: fruit shape and size, particularly with respect to potential dispersal agents. Maturation period. Seed size and number.

Source: Herbarium specimens, field observations, *Flora of New South Wales*, literature.

Establishment and growth: diaspore type (including vegetative), dispersal agent. Germination requirements: seedbank presence, dormancy, growth rates, seasonality, deciduousness etc. [notes on propagation in cultivation may be given where these imply similar behaviour under natural field conditions e.g. insights into seed germination inhibition].

Source: literature, field observations.

Fire response: general response of mature plant to fire, in particular whether it generally resprouts or is killed (see also Gill 1981, Gill & Bradstock 1992). Seedling recruitment associated with fire is included under establishment and growth. Entries such as 'probably killed' mean that a species has no obvious morphological characteristics likely to assist in surviving and resprouting following fire. While species that resprout after fire may be readily noted, the death of individuals may not be observed unless the occurrence of the species in the area was well known prior to the fire.

For a given species some populations may be capable of resprouting while other populations may be killed. This may explain cases where contradictory evidence has been given though response to fire in some species may depend on fire intensity.

In view of the limited information available for many species, the categories of Gill and Bradstock have not been applied at this stage.

Source: field observations, literature.

Interaction with other organisms: symbiosis, predators, diseases etc.

Source: mainly literature.

Distribution

Status/origin: native or naturalised, region of origin, source and date of introduction/naturalisation. Naturalised species indicated by an asterisk following the botanical name.

Source: *Flora of New South Wales*, literature.

Botanical subregions: occurrence of species in botanical subdivisions of NSW, other states and countries.

Source: National Herbarium of New South Wales.

Distribution in Sydney region: main geographic regions occupied by species.

Source: Herbarium specimen records.

Selected locations: restricted to about 10 localities for each taxon reflecting natural geographical range of species in the Sydney area. Earliest collection dates are given for some species, particularly exotic species. Recent collection sites indicated where possible. Locality data must be interpreted carefully. The record may be based on an old specimen or observation record and the species may no longer be present at the site. However a knowledge of the original distribution may be important in showing up particular habitat requirements of the species.

Source: Herbarium specimen records.

Habitat

Specific data refer to Sydney area unless stated otherwise.

Habitat: brief generalised description.

Source: Herbarium specimen records, field observations.

Altitude: approximate altitudinal range (m +/- 100 m) occupied by the species,

Source: Herbarium specimen records.

Annual rainfall: approximate annual rainfall range (mm +/- 100 mm) for sites occupied by the species.

Source: Bureau of Meteorology (1979).

Typical local abundance: most frequent recordings (scale: dominant/frequent/occasional/rare)

Source: Herbarium specimen records.

Vegetation: main structural type with typical associated species where available.

Source: Herbarium specimen records, field observations, literature.

Substrate: geology, soil, moisture supply.

Soil nutrient rating scale: very fertile (high nutrient) (e.g. basalt soils)/ fertile (moderate nutrient)/ infertile (low nutrient)/ very infertile (very low nutrient) (e.g. sands).

Soil salinity scale: hypersaline/ saline/ brackish/ fresh.

Source: Herbarium specimen records, field observations, literature.

Exposure:

Exposure scale: exposed/ indifferent/ sheltered.

Shading scale: deep shade/ mid shade/ light shade/ no shade.

Source: Herbarium specimen records, field observations, literature.

Conservation

Conservation: national significance listing (Briggs & Leigh 1996), with current updating for Rare or Threatened Australian Plants (ROTAP) database maintained by NSW NPWS; inclusion on schedules of the NSW *Threatened Species Conservation Act 1995*; comments on regional significance and adequacy of conservation within Sydney area are based on authors' knowledge of the abundance of species and their primary occurrence in major conservation areas. These comments apply to the Sydney region; a species may be common or rare elsewhere. 'Probably' is used in many cases as it is the authors' views that a definite categorisation of 'adequately conserved' needs to be based on a better knowledge of the species' biology and distribution than we have at present for most species.

Source: Herbarium records, field observations, literature.

General comments on part 7b

Part 7b covers 246 plant species of the families Proteaceae to Rubiaceae, 216 native and 30 naturalised exotics.

Excluded from this work are a number of exotic species that do not appear to be truly naturalised in the Sydney region (*Potentilla anserina* subsp. *anserina*, *Rubus chloocladus*, *Rubus ursinus*, *Asperula arvensis*, *Galium divaricatum*).

General aspects of the ecology of the Proteaceae family are covered in the accompanying paper by Myerscough, Whelan and Bradstock (page 951) who include a list of research topics of potential interest. Other major plant groups in this part include *Pomaderris*, *Ranunculus* and Rubiaceae. Very little ecological work has been done on these groups.

Acknowledgements

The authors would like to thank Bob Makinson and Jocelyn Howell for their comments, Poul Kubiak who supplied his post-fire recordings, and especially Rod Roberts who assisted with proofreading and devoted many hours recording Herbarium data.

We also thank Tony Auld, Garry Chapple, Bob Coveny, Trevor Deane, Penny Farrant, Miguel Garcia, Gwen Harden, Ken Hill, Kirsten Knox, Alan Leishman, Tony Lewis, Charles Morris, Peter Myerscough, Robert Payne, Barbara Rice, Brett Summerell, Peter Weston and Marshall Wilkinson, for assistance, advice and information.

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Dicotyledon families Proteaceae to Rubiaceae

Banksia aemula

PROTEACEAE

Life history

Growth form: Shrub to 4 m high with spreading habit. *B. aemula* is similar to the very closely related *B. serrata* but has a club-shaped pollen-presenter and narrower leaves. The bark is more easily shed (e.g. after fire) than in *B. serrata* and exposed bark more foxy-brown with surface appearing to consist of embedded small spheres (P. Myerscough pers. comm.).

Vegetative spread: No.

Longevity: More than 100 years.

Primary juvenile period:

Flowers: Pale yellow to greenish cream, April–May. Flower spike produced at the end of the current year's shoot or on a short lateral shoot, the next year's shoots grow from immediately below the spike (Blake 1971). Source of nectar and pollen for Common Blossum Bat *Syconycteris australis* (Law 1994), Rainbow Lorikeet *Tricholossus haematodus* (Barker & Vestjens 1989), Scarlet Honeyeater *Myzomela sanguinolenta* (Barker & Vestjens 1990).

Fruit/seed: Woody capsules on a cone, opening spontaneously when mature or remaining closed until burnt (George, 1981). Winged seed: 40–47 mm long.

Dispersal, establishment & growth: Diaspore: seeds, gravity and short distance wind-dispersed. No dormancy mechanism (Heslehurst 1979), germination period 44 days (Simmons 1968), effective germination only in seeds exposed to temperatures up to 100°C; slow growth rate in step with slow rate of availability of nutrients in soil (Siddiqi et al. 1976).

Fire response: Resprouts from lignotubers; fire triggers release of seed from canopy-stored seedbank (Siddiqi et al. 1976), also resprouts with epicormic shoots after a burn seedlings are often seen, though few reach maturity (George 1981),

Interaction with other organisms: Host of Banksia Web-covering Borer *Xylorycta strigata* (Elliot & Jones 1986). Fungi that cause leaf spots are: *Asterina* sp., *Lineostroma banksiae*, *Phoma banksiae-integrifoliae*; *Cephaleuros virescens* causes algal leaf spot (B. Summerell pers. comm.).

Distribution

Status/origin: Native.

Botanical subregions: NC CC; Qld.

Distribution Sydney area: Coastal headlands, with inland occurrence at Agnes Banks.

Select locations: CC: Wybung Point (Lake Munmorah), Frazer Park, Bouddi NP, Agnes Banks NR, North Head, Centennial Park, Bellevue Hill, Rockdale (1898), La Perouse.

Habitat

Habitat: Old, leached sand deposits.

Altitude: 0–100 m

Annual rainfall: 800–1200 mm

Typical local abundance: Frequent–occasional.

Vegetation: Heath e.g. with *Monotoca elliptica*, *Xanthorrhoea resinifera*, *Corymbia gummifera*, *Allocasuarina distyla*, *Lambertia formosa*; Eastern Suburbs Banksia Scrub; woodland e.g. with *Eucalyptus sclerophylla*, *E. parramattensis*, *Leptospermum trinervium*, *Conospermum taxifolium*, *Ricinocarpos pinifolius* at Agnes Banks (Benson 1981).

Substrate: White, leached dune sand, often Pleistocene, low nutrients, well-drained.

Exposure: Full sun.

Conservation

Conservation: Reported from Munmorah SRA, Bouddi NP, Sydney Harbour NP (North Head), Botany Bay NP and Agnes Banks Nature Reserve. La Perouse is southern geographical limit. Major component of Eastern Suburbs Banksia Scrub and Agnes Banks Woodland Endangered Ecological Communities, listed under NSW *Threatened Species Conservation Act 1995*.

Banksia penicillata (*B. conferta* var. *penicillata*)

PROTEACEAE

Life history**Growth form:** Shrub to 4 m, without a lignotuber.**Vegetative spread:** No.**Longevity:** ?30–50 years.**Primary juvenile period:****Flowers:** Yellow, March–June**Fruit/seed:** Cone with more than 100 woody capsules usually remaining closed and retaining canopy-stored seedbank until burnt, but some opening spontaneously (George 1981). Winged seed 14–17 mm long.**Dispersal, establishment & growth:** Diaspore: winged seed, gravity-dispersed. Recruitment after fire or perhaps disturbance that bares soil.**Fire response:** Killed by fire, re-established from seed released from burnt cones.**Interaction with other organisms:**

Distribution**Status/origin:** Native.**Botanical subregions:** CC CT CWS.**Distribution Sydney area:****Select locations:** CC: Culoul Range. CT: Cullen Bullen, Ben Bullen SF, Newnes SF, Clarence, Bell.

Habitat**Habitat:** Rocky sandstone situations at the top and base of cliffs or steep slopes and around outcrops.**Altitude:** 500–1100 m**Annual rainfall:** 900–1100 mm**Typical local abundance:** Frequent–occasional.**Vegetation:** Sclerophyllous open-forest or woodland e.g. with *Eucalyptus sclerophylla*, *E. sieberi*, *E. radiata*, *E. piperita*, *Syncarpia glomulifera*, *Angophora bakeri*, *Leptospermum trinervium*; heathland e.g. with *Allocasuarina nana*.**Substrate:** Skeletal sandy soil over sandstone often associated with pagoda rock outcrops, low nutrients, well-drained.**Exposure:**

Conservation**Conservation:** Coded 3RC- on national rare species list (Briggs & Leigh 1996). Reported in Wollemi NP.

Banksia cunninghamii* subsp. *cunninghamii

PROTEACEAE

Life history**Growth form:** Tree or shrub to 6 m high, without a lignotuber.**Vegetative spread:** No.**Longevity:** ?30–50 years.**Primary juvenile period:****Flowers:** Yellow, dense in a spike-like arrangement 6–15 cm long on a woody stem,**Fruit/seed:** Woody capsules 10–14 mm long on a cone; seeds winged.**Dispersal, establishment & growth:** Diaspore: seed, released after fire or spontaneously, gravity or short-distance wind dispersed.**Fire response:** Killed (George 1981).**Interaction with other organisms:****Distribution****Status/origin:** Native.**Botanical subregions:** CC SC CT; Qld, Vic.**Distribution Sydney area:****Select locations:** CC: Boorai Creek, O'Hares Creek. CT: Rylstone, Newnes Plateau, Lithgow, Bell, Katoomba, Wentworth Falls, Jenolan R., Kanangra Walls, Fitzroy Falls.**Habitat****Habitat:** Sheltered slopes of gullies.**Altitude:** 200–1200 m**Annual rainfall:** 900–1400 mm**Typical local abundance:** Frequent.**Vegetation:** Eucalypt open-forest e.g. *Eucalyptus piperita*, *Angophora costata* with *Corymbia gummifera*, *Eucalyptus sieberi* (Keith 1994), *Eucalyptus oreades*, *E. mannifera*, *E. radiata*, *E. cypellocarpa*, *E. dalrympeana* in Upper Blue Mountains.**Substrate:** Sandstone, moist sands and sandy loams, shallow soil, well-drained (Keith 1994), low nutrients.**Exposure:** Sheltered sites.**Conservation****Conservation:** Reported from O'Hares Creek (Keith 1994), Blue Mountains NP, Kanangra Boyd NP.***Banksia ericifolia* var. *ericifolia***

PROTEACEAE

Life history**Growth form:** A shrub or small tree. Prostrate form genetically different (Auld & Morrison 1992). Appears to hybridize with *B. spinulosa* var. *spinulosa* (Harden 2000).**Vegetative spread:** No.**Longevity:** Medium. 25–60 years (D. Keith pers. comm.).**Primary juvenile period:** 8–9 years at Brisbane Water NP (Benson 1985), 5 years (Bradstock & O'Connell 1988), 5 years at Lane Cove (P. Kubiak pers. comm.), 4 years (at Wollangambe Wilderness) but no fertile fruits (R. Lembit (pers. comm.).**Flowers:** Golden-brown, April–August. Flowers produced at end of shoots more than 3 years old (Blake 1971). Buds open from top of the spike, downwards (Blake 1971). More nectar present at dawn than dusk; flowers visited by diurnal and nocturnal insects (Paton & Turner 1985). Pollinated by mammals and marsupials, *Rattus fuscipes*, *Antechinus stuartii* and birds. Flowers visited by Honeybees for nectar and pollen (Paton & Turner 1985), and native bees for pollen; birds: Eastern Spinebill *Acanthorhynchus tenuirostris*, Noisy Miner *Manorina melanocephala*, New Holland Honeyeater *Phylidonyris novaehollandiae*, and Brush Wattlebird *Anthochaera chrysoptera* feed on nectar (P. Kubiak pers. comm.), Yellow-faced Honeyeater *Lichenostomus chrysops*, Fuscous Honeyeater *Lichenostomus fuscus*; White-eared Honeyeater *Lichenostomus leucotis*, New Holland Honeyeater *Phylidonyris novaehollandiae*, White-cheeked Honeyeater *Phylidonyris nigra* feed on nectar (Barker & Vestjens 1990).**Fruit/seed:** Cone with capsules 15–20 mm long that develop up to a year after flowering. Seed weight 24.2 mg ± 1.0 (Hammill et al. 1998), winged seed 17–20 mm long, retained in capsules for several years as canopy-stored seedbank. Seed production is greater when cross-pollination occurs as opposed to self-pollination (Paton & Turner 1985).

Dispersal, establishment & growth: Diaspore: seed, gravity and short distance wind-dispersed. Average dispersal distance 7.6 m (Honig et al 1992). Limited spontaneous release of seed during inter-fire period (Keith 1991). Germinates without treatment. Germination 17 days at 15°C (Honig et al. 1992), 22 days at 24–31°C (Zammit & Westoby 1987b). Recruitment mainly after fire. Effective germination only in seeds exposed to temperatures up to 100°C; slow growth rate in step with slow rate of availability of nutrients in soil (Siddiqi et al 1976). Seedling establishment occurs during first year after fire (Bradstock & Auld 1987).

Fire response: Plants killed, seeds survive fire insulated from heat in thick woody follicles which open following fire. Seed release earlier and at a faster rate after high intensity fire than low intensity fire (Bradstock & Myerscough 1981). Seeds not released at temperatures less than 200°C; takes 45 days for half seed-store to fall after high intensity wildfire (Zammit & Westoby 1987b). Vigorous seedling regeneration usually follows fire. Seedlings show little capacity for rapid exploitation of any temporary increase of available nutrients after fire (Siddiqi et al. 1976). Internode number may be used as indicator of period since last burn (at least over 10–25 year time scale).

Interaction with other organisms: Moth larvae *Arotrophora* sp. reduce seed set (Zammit & Hood 1986). Shoot damage but not eaten by rabbits (P. Kubiak pers. comm.). Fungi *Capnodium salicinum* and *Chaetobolisia* sp. are found on the leaves and a *Botryosphaeria* sp. causes a canker disease (B. Summerell pers. comm.).

Distribution

Status/origin: Native.

Botanical subregions: CC SC CT ST.

Distribution Sydney area: Coast and Upper Blue Mountains.

Select locations: CC: Kulnura, Avalon, Wahroonga, Cheltenham, North Head, Centennial Park, La Perouse, Bundeena, Carrington Falls, Sublime Point. CT: Rylstone, Glen Davis, Newnes SF, Blackheath, Woodford, Robertson.

Habitat

Habitat: Ridges, hillsides, creekbanks.

Altitude: 0–1200 m **Annual rainfall:** 900–1600 mm

Typical local abundance: Frequent.

Vegetation: Open woodland e.g. with *Eucalyptus haemastoma*, *E. racemosa*, *Angophora hispida*; heath e.g. with *Allocasuarina nana*; coastal scrub e.g. with *Monotoca elliptica*, *Acacia suaveolens*, *Eriostemon australasius*, *Kunzea ambigua*.

Substrate: Sandy soil on Hawkesbury and Narrabeen Sandstones. Low-medium nutrient soils, periodically poorly-drained.

Exposure: Full sun.

Conservation

Conservation: Widespread, Rylstone is northern geographical limit. Appears to be adequately conserved, however, some populations could be threatened by frequent fires at less than 10 year intervals. Reported in Bouddi NP, Brisbane Water NP, Marramarra NP, Muogamarra Nature Reserve, Ku-ring-gai Chase NP, Garigal NP, Lane Cover NP, Sydney Harbour NP, Royal NP.

Banksia integrifolia* subsp. *integrifolia

PROTEACEAE

Coast Banksia

Life history**Growth form:** Tree to 16 m high, more rarely shrubby, with whorled leaves.**Vegetative spread:** Some root-suckering apparent in undisturbed adult populations if the roots are uncovered or disturbed (at Garie, Vacluse). Root suckering important for recruitment in dry sandy scrub at Elderslie.**Longevity:** long ? 100–150 years.**Primary juvenile period:****Flowers:** Pale yellow, January–June. Synchronous flowering. Honeybees, native bee, butterfly, and Eastern Spinebill *Acanthorhynchus tenuirostris* feed on nectar (P. Kubiak pers. comm.). Important source of nectar for honeyeaters in heathland (Pyke et al. 1993), foodplant of Fuscous Honeyeater *Lichenostomus fuscus* (Barker & Vestjens 1990), Flying Foxes feed on blossoms (NPWS 1992).**Fruit/seed:** Thick woody capsules on a cone; winged seeds 10–12 mm long, released from all capsules by May.**Dispersal, establishment & growth:** Diaspore: seed, gravity-dispersed, fire not necessary for seed shed. Requires day temperatures 14–21°C and night temperature 5–21°C for optimum germination, maximum germination 98% (Sonia & Heslehurst 1978).**Fire response:** Plants generally killed, though this may depend on age and fire intensity (Hazard & Parsons 1977, Fox 1988). Some plants resprouted and others killed after high intensity fire 1/94 (at Lane Cove, P. Kubiak pers. comm.). Root suckering after fire has not been reported.**Interaction with other organisms:** Larvae of moth *Xylorycta strigata* tunnel in the branches and feed on leaves (CSIRO 1991). Host to Cerambycid longicorn beetle *Paroplites australis* (Hawkeswood 1992b). Leaves of young plant eaten by wombat (Burns 1996). Blossoms eaten by Grey-headed Flying Fox *Pteropus poliocephalus*, Little Red Flying Fox *Pteropus scapulatus* (Eby 1995), Common Blossum Bat *Syconycteris australis* (Law 1994). Fungi recovered from leaves: *Asterina systema-solane*, *Capnodium salicinum*, *Episphaerella banksiae*, *Guignardia* sp., *Lembosia* sp., *Lineostroma banksiae*, *Pestalotiopsis* sp., *Plectosphaera banksiae*, *Vizella banksiae*, *Westea banksiae*; *Cephaleuros virescens* causes algal leaf spot (B. Summerell pers. comm.).**Distribution****Status/origin:** Native.**Botanical subregions:** NC CC SC CT NWP; Qld, Vic., Tas.**Distribution Sydney area:** Mainly coastal, with localised inland populations e.g. Elderslie.**Select locations:** CC: Norah Head, Woy Woy, Frenchs Forest, Manly, Rose Bay, Vacluse, Kurnell, Elderslie, Stanwell Park, Picton Lakes, Shellharbour, Berry. CT: Wingello.**Habitat****Habitat:** Consolidated sand dunes and along tidal inlets.**Altitude:** 0–700 m **Annual rainfall:** 900–1400 mm**Typical local abundance:** Frequent.**Vegetation:** Coastal woodland and low woodland e.g. with *Angophora costata*, *Corymbia gummifera*, *Eucalyptus botryoides*; scrub e.g. with *Monotoca elliptica*, *Leptospermum laevigatum*.**Substrate:** Sandy soil on consolidated sand dunes, alluvial sand, sandstones, low nutrients.**Exposure:** Full sun to light shade.**Conservation****Conservation:** Frequent in coastal sites, reported from Royal NP, Sydney Harbour NP, Ku-ring-gai Chase NP. Vulnerable in Western Sydney, where it is an important component of Elderslie Banksia scrub Endangered Ecological Community under NSW *Threatened Species Conservation Act 1995* (James et al 1999).

Banksia integrifolia subsp. ***monticola***

PROTEACEAE

(Banksia integrifolia var. *compar*)

Coast Banksia

Life history**Growth form:** Tree 5–25 m high, with rough bark; leaves whorled.**Vegetative spread:****Longevity:****Primary juvenile period:****Flowers:** Pale yellow, in a spike-like arrangement 5–12 cm long, March–April, September–November. Buds open from bottom to top of spike (McFarland 1985).**Fruit/seed:** Cone with woody capsules 8–15 mm long, each capsule with 2 winged seeds.**Dispersal, establishment & growth:** Diaspore: seed, released at maturity, gravity or short-distance wind-dispersed.**Fire response:** Resprouts from epicormic buds (George 1981). Generally killed but occasionally resprouts (R. Lembit pers. comm.).**Interaction with other organisms:**

Distribution**Status/origin:** Native.**Botanical subregions:** NC NT CT.**Distribution Sydney area:** Upper Blue Mountains.**Select locations:** CT: Mt Wilson, Victoria Falls, Blackheath.

Habitat**Habitat:** Steep slopes.**Altitude:** 700–1000 m**Annual rainfall:** 1200–1400 mm**Typical local abundance:** Occasional.**Vegetation:** Eucalypt open-forest and rainforest margins.**Substrate:** Clay soil on basalt, occasionally on sandstone, medium to high nutrients.**Exposure:**

Conservation**Conservation:** Blue Mountains population is at southern geographical limit.

Conservation status unknown.

Banksia marginata**PROTEACEAE****Life history**

Growth form: Spreading shrub or small tree to 12 m high. No lignotuber in Sydney populations but present in Victorian and Tasmanian populations. Occasionally hybridizes with *B. paludosa* where they grow together.

Vegetative spread: No.

Longevity:

Primary juvenile period: 5 years (at Lane Cove, P. Kubiak pers. comm.).

Flowers: Pale yellow, February–July. Flowers produced at the ends of shoots more than 3 years old (Blake 1971). Inflorescences with up to 1000 flowers, opening sequentially over several weeks; pollinated by nectar-feeding birds; plants self-compatible (Vaughton & Ramsey 1998). Flowers visited by Honeybee, butterfly, New Holland Honeyeater *Phylidonyris novaehollandiae* (P. Kubiak pers. comm.), Rainbow Lorikeet *Trichoglossus haematodus* (Barker & Vestjens 1989), Red Wattlebird *Anthochaera carunculata*, Yellow-faced Honeyeater *Lichenostomus chrysops*, White-plumed Honeyeater *Lichenostomus penicillatus*, Black-chinned Honeyeater *Melithreptus gularis*, Brown-headed Honeyeater *Melithreptus brevirostris*, New Holland Honeyeater *Phylidonyris novaehollandiae* (Barker & Vestjens 1990).

Fruit/seed: Woody capsules on a cone, often opening when mature but sometimes remaining closed until burnt; winged seeds 9–15 mm long. Seed weight 10.2 mg ± 0.4 (Hammill et al. 1998). Woody fruits develop about 6 months after flowering (Vaughton & Ramsey 1998). Pre-dispersal seed predation 20% (Northern Tablelands); viability of seed 98.8% (Williams & Clarke 1997).

Dispersal, establishment & growth: Diaspore: seed, gravity dispersed or short-distance wind-dispersed.

Fire response: Non-lignotuberous Sydney forms killed by fire, otherwise resprouts (George, 1981).

Interaction with other organisms: Host to Cup Moth larvae *Mecytha fasciata* (Common 1990). Host to Cerambycid longicorn beetle *Paroplites australis* (Hawkeswood 1992b). Wasp *Mesostoa kerri* causes stem galls (in S.A., Austin & Dangerfield 1998). Fungi recovered from leaves: *Acrospermum gaubae*, *Argopericonia elegans*, *Asterina systema-solare*, *Botryosphaeria banksiae*, *Cladosporium* sp., *Cooksonomyces banksiae*, *Dimerium banksiae*, *Episphaerella banksiae*, *Periconiella* sp., *Satchmopsis australiensis*, *Tryssoglobulus aspergilloides*, *Veronaea* sp. (B. Summerell pers. comm.).

Distribution

Status/origin: Native.

Botanical subregions: NC CC SC NT CT ST NWS CWS SWS SWP NWP; Vic., Tas., S.A.

Distribution Sydney area: Widespread

Select locations: CC: Berowra, Wahroonga, Manly, Rose Bay, Loftus, Sublime Point. CT: Newnes SF, Orange, Mt Lambie, Clarence, Blackheath, Oberon, Mt Werong, Berrima, Penrose.

Habitat

Habitat: Heath and woodland.

Altitude: 0–1200 m **Annual rainfall:** 800–1600 mm

Typical local abundance: Frequent.

Vegetation: Heath e.g. with *Banksia ericifolia*, *B. serrata*, *Lambertia formosa*, *Persoonia lanceolata*, *Angophora hispida*; woodland e.g. with *Eucalyptus sieberi*, *E. oreades*, *E. piperita*, *E. haemastoma*, *Corymbia gummifera*, *Eucalyptus stricta*, *E. mannifera*, *E. pauciflora*. Margin of upland mire (Kodala 1992).

Substrate: Sandy soils on sandstone, quartzite, granite, low nutrient, well-drained.

Exposure:

Conservation

Conservation: Probably adequately conserved in Sydney area. Reported from Marramarra NP, Muogamarra Nature Reserve, Ku-ring-gai Chase NP, Garigal NP, Lane Cove NP, Sydney Harbour NP, Royal NP, Blue Mountains NP.

Banksia oblongifolia**PROTEACEAE****Life history**

Growth form: Several-stemmed, up to 13 stems, shrub, to 3 m high, with lignotuber (Conran & Clifford 1987).

Vegetative spread: No.

Longevity: More than 60 years (D. Keith pers. comm.)

Primary juvenile period: More than 17 years (Keith 1996), more than 23 years (Zammit & Westoby 1987a).

Flowers: Pale yellow, dense in a spike-like arrangement 5–15 cm long on a woody stem, January–October, peak April–June. Honeybees and native bees feed on nectar and probably pollen; two species of ants, and birds Eastern Spinebill *Acanthorhynchus tenuirostris*, New Holland Honeyeater *Phylidonyris novaehollandiae*, Noisy Miner *Manorina melanocephala* fed on nectar (P. Kubiak pers. comm.).

Fruit/seed: Woody capsules 10–18 mm long, on a cone. Winged seeds 7–12 mm diam. (Conran & Clifford 1987), weight 12–24 mg (Westoby et al. 1990), held for several years as canopy-stored seedbank or until released following fire.

Dispersal, establishment & growth: Diaspore: seed, gravity and short distance wind-dispersed. Limited seed release from the canopy during the inter-fire period (Keith 1991). Germinates without treatment. (D. Keith pers. comm.). Slow growth rate Although able to grow on well-drained sites, it may be excluded by competition with *Banksia aemula* (Siddiqi et al. 1976).

Fire response: Stems killed, resprouts from lignotuber; seedling recruitment mainly after fire (Keith 1996). Seedlings show little capacity for rapid exploitation of any temporary increase in available nutrients after fire (Siddiqi et al. 1976). Secondary juvenile period 2 years; 4.5 years after high intensity fire 1/94 (at Lane Cove, P. Kubiak pers. comm.).

Interaction with other organisms: Fungi recovered from leaves: *Asterina systema-solare*, *Episphaerella banksiae*, *Lincostromea banksiae* (B. Summerell pers. comm.).

Distribution

Status/origin: Native.

Botanical subregions: NC CC CT CWS; Qld.

Distribution Sydney area: Mainly coastal plateaus.

Select locations: CC: Kulnura, Bateau Bay, Agnes Banks, Hornsby, St Ives, Collaroy, Mosman, Vacluse, Neilsen Park, Kogarah, La Perouse, Lucas Heights, Waterfall, Appin, Bulli, Grose Vale. CT: Wentworth Falls.

Habitat

Habitat: Hillsides, ridges, poorly-drained sites.

Altitude: 0–1000 m **Annual rainfall:** 800–1600 mm

Typical local abundance: Occasional–frequent.

Vegetation: Heath e.g. with *Banksia ericifolia*, *Epacris microphylla*, *Lambertia formosa*; scrub e.g. with *Kunzea ambigua*, *Melaleuca nodosa*; woodland e.g. with *Eucalyptus sclerophylla*, *Angophora bakeri*.

Substrate: Sandy-clay or clay-loam soil on sandstone, sand or granite. Low nutrients, poorly drained.

Exposure: Full sun to light shade.

Conservation

Conservation: Widespread and probably adequately conserved. Reported from Royal NP, Sydney Harbour NP, Botany Bay NP, Ku-ring-gai Chase NP, Garigal NP.

Banksia paludosa**PROTEACEAE****Life history**

Growth form: A shrub to 1.5 m with many stems arising from a lignotuber, some populations are non lignotuberous. Occasionally hybridizes with *B. marginata* where they grow together.

Vegetative spread:

Longevity: More than 60 years (D. Keith pers. comm.).

Primary juvenile period:

Flowers: Golden brown, dense in a spike-like arrangement 7–13 cm long on a woody stem, pollination by mammals and birds. Inflorescences take 6–8 weeks to complete flowering; pollinator activity is needed, no self-pollination; natural pollen levels limit seed set (Whelan & Goldingay 1986). Pollinated by nectar-feeding birds and Honeybees (Goldingay & Whelan 1990), small ground-dwelling mammals, Sugar Glider (Carthew et al. 1988).

Fruit/seed: Woody capsules 9–18 mm long on a cone; winged seeds sometimes released at maturity but often held until fire. Seeds produced each year have high viability but this declines greatly by the second year of storage, mostly through insect attack (University of Wollongong 1985).

Dispersal, establishment & growth: Diaspore: seed, gravity or short distance wind-dispersed. Seedling recruitment mainly after fire (D. Keith pers. comm.), although seedling recruitment in absence of fire in non-lignotuberous populations has been noted (Hilltop Herbarium specimen).

Fire response: Stems killed, resprouts from lignotuber. Does not produce substantial flowering until the third year after fire with first seed crop in the fourth. Production of inflorescences was best in the 5 year old site and rather poor in the 14 year old site (Univ of Wollongong, 1985).

Interaction with other organisms: Fungi recovered from leaves: *Asterina systema-solare*, *Lineostroma banksiae* (B. Summerell pers. comm.).

Distribution

Status/origin: Native.

Botanical subregions: CC SC CT ST.

Distribution Sydney area: Woronora Plateau and Blue Mountains.

Select locations: CC: Centennial Park, Maroubra, La Perouse, Helensburgh, Maddens Plains, Bulli, Cordeaux Dam, Dapto. CT: Newnes SF, Mt Banks, Wentworth Falls, Hill Top, Mittagong, Robertson, Bundanoon, Penrose, Budderoo.

Habitat

Habitat: Escarpments, plateaus, ridge crests.

Altitude: 0–1200 m **Annual rainfall:** 900–1600 mm

Typical local abundance: Frequent.

Vegetation: Woodland e.g. with *Eucalyptus piperita*, *E. sieberi*, *E. punctata*, *E. sparsifolia*, *Corymbia gummifera*, *Angophora costata*; heath e.g. with *Banksia oblongifolia*, *Epacris microphylla*, *Hakea teretifolia*.

Substrate: Sandy loam on sandstone, low nutrients, well-drained.

Exposure: Full sun to light shade.

Conservation

Conservation: Probably adequately conserved. Reported in Blue Mountains NP, Nattai NP. Northern geographical limit on the Tablelands is Newnes State Forest and on the coast is Centennial Park–La Perouse, though now extinct there.

Banksia robur

PROTEACEAE

Life history

Growth form: Shrub about 1m high with several stems arising from a lignotuber.

Hybridizes with *B. oblongifolia*.

Vegetative spread: No.

Longevity: More than 60 years (D. Keith pers. comm.).

Primary juvenile period:

Flowers: Greenish, dense in a spike-like arrangement 10–17 cm long on a woody stem, at any time of year, peaks December–January, May–July. Number of flowers per inflorescence 2676 ± 704 (Clifford 1993).

Fruit/seed: Woody capsules 10–16 mm long on a cone. Up to 100 capsules, sometimes more, retained as canopy-stored seedbank (George 1981). Winged seeds released following fire, germination 22 days (Cavanagh 1974). 44 % plants were seed-sterile in a SE Queensland population (Clifford 1993).

Dispersal, establishment & growth: Diaspore: seed, gravity or short distance wind-dispersed. Seedling recruitment mainly after fire (D. Keith pers. comm.).

Fire response: Stems killed, resprouts from lignotuber, secondary juvenile period 2 years; limited spontaneous seed release during the interfire period (Keith 1991).

Interaction with other organisms: Fungi recovered from leaves: *Asteria sysema-solare*, *Trichopeltis* sp. (B. Summerell pers. comm.).

Distribution

Status/origin: Native.

Botanical subregions: NC CC; Qld.

Distribution Sydney area: Coast, north from Wollongong.

Select locations: CC: Tuggerah, Kariong, Wondabyne, Manly, Rose Bay, Botany Swamp, Kurnell, Waterfall, Stanwell Tops, Darkes Forest, Cordeaux Dam.

Habitat

Habitat: Permanently damp sites on plateaus.

Altitude: 0–500 m **Annual rainfall:** 1200–800 mm

Typical local abundance: Frequent.

Vegetation: Wet heath and sedgeland e.g. with *Sprengelia incarnata*, *Gleichenia dicarpa*, *Leptocarpus tenax*.

Substrate: Sandy or peaty swamps on Hawkesbury Sandstone or sand dunes, low nutrients.

Exposure: Full sun.

Conservation

Conservation: Wollongong is the southern geographical limit. Reported in Brisbane Water NP, Ku-ring-gai Chase NP, Sydney Harbour NP. Not conserved in Garigal NP although one population is close to the boundary; vulnerable in bushland edges near development where it is easily out-competed by regrowth of weeds after fire (e.g. now extinct at Forestville Park, L.McD.).

Banksia serrata**PROTEACEAE****Life history**

Growth form: Tree or large shrub to 10 m high, usually with one main stem and warty bark; leaves are toothed, 5–20 cm long.

Vegetative spread: No.

Longevity: 100 years.

Primary juvenile period: More than 9 years (Benson 1985).

Flowers: Creamy grey, dense in a spike-like arrangement 7–15 cm long on a woody stem, November–May, peak December. New Holland and White-cheeked Honeyeaters feed on nectar (Armstrong 1991), Bell Minor *Manorina melanophrys*, White-cheeked Honeyeater *Phylidonyris nigra* feed on flowers (Barker & Vestjens 1990). Native bees, ants, and Rainbow Lorikeet *Trichoglossus haematodus* feed on nectar and/or pollen (P. Kubiak pers. comm.). Blossoms eaten by Grey-headed Flying Fox *Pteropus poliocephalus* and Little Red Flying Fox *Pteropus scapulatus* (Eby 1995), Common Blossum Bat *Syconycteris australis* (Law 1994).

Fruit/seed: Woody capsules 25–35 mm long on a cone, forming a canopy-stored seedbank; winged seeds released following fire. Seed weight 77.5 mg ± 1.4; seeds dispersed up to 4 m along the ground during 1 hour with assistance of strong wind; dispersal significantly greater for release height of 2 m compared with 1 m (Hammill et al. 1998).

Dispersal, establishment & growth: Diaspore: seed, gravity or short distance wind-dispersed. Seeds germinate without treatment. Optimal temperature for germination 18–24° C, with maximum germination 60% (Sonia & Heslehurst 1978).

Fire response: Resprouts from epicormic shoots or from the lignotuber depending on severity of burn. Juvenile plants become fire-tolerant 5–7 years old; minimum lignotuber diameter required to survive a low intensity fire 4 cm, and high intensity fire 5 cm (Bradstock & Myerscough 1988). Secondary juvenile period 2–3 years (Bradstock & Auld 1987), about 3.5 years after high intensity fire 1/94 (at Lane Cove, P. Kubiak pers. comm.).

Interaction with other organisms: Host to Cup Moth larvae *Mecytha fasciata* (Common 1990), Banksia Web-covering Borer *Xylorycta strigata* and Banksia Borer *Cyria imperialis* (Elliot & Jones 1986). Larvae of moth *Xylorycta strigata* tunnel in the branches and feed on leaves (CSIRO 1991). Host to Cerambycid longicorn beetle *Paroplitis australis* (Hawkeswood 1992b). Fungi recovered from leaves: *Asteria systema-solare*, *Elsinoe banksiae* (causing scab disease), *Lineostroma banksiae*, *Phomopsis* sp., *Tetraploa* sp., *Vizella banksiae*; *Cephaleuros birescens* causes algal leaf spot (B. Summerell pers. comm.).

Distribution

Status/origin: Native.

Botanical subregions: NC CC SC CT; Qld, Vic., Tas.

Distribution Sydney area: Widespread on coast and Upper Blue Mountains.

Select locations: CC: Howes Valley, Agnes Banks, Cowan, Cheltenham, Frenchs Forest, Curl Curl, Centennial Park, Kurnell, Grose Vale, Burragorang Lookout, Nepean Dam. CT: Newnes SF, Mt Wilson, Mt Tomah, Blackheath, Robertson.

Habitat

Habitat: Heath and woodland on sandstones and hind-dunes.

Altitude: 0–1000 m **Annual rainfall:** 800–1400 mm

Typical local abundance: Frequent.

Vegetation: Woodland e.g. with *Corymbia eximia*, *C. gummifera*, *Eucalyptus sieberi*, *E. agglomerata*, *E. piperita*, with sclerophyll shrub understorey.

Substrate: Sandy soil on sandstone, dune sand, low nutrients, well-drained.

Exposure: Full sun to light shade.

Conservation

Conservation: Probably adequately conserved. Reported in Bouddi NP, Brisbane Water NP, Marramarra NP, Muogamarra Nature Reserve, Ku-ring-gai Chase NP, Dalrymple Hay NR, Garigal NP, Lane Cove NP, Sydney Harbour NP, Royal NP, Blue Mountains NP, Gardens of Stone NP.

Banksia spinulosa* var. *collina

PROTEACEAE

Life history

Growth form: Multistemmed shrub to 3 m high, with lignotuber. Two varieties are recognised but some populations do not readily fit the descriptions.

Vegetative spread: No.

Longevity:

Primary juvenile period:

Flowers: Yellow or golden, dense in a spike-like arrangement 6–15 cm long, April–September. Flower spike produced at end of shoots more than 3 years old (Blake 1971). Important source of nectar for honeyeaters in heathland (Pyke et al. 1993).

Fruit/seed: Woody capsules 10–24 mm long on a cone as canopy-stored seedbank; winged seeds released following fire.

Dispersal, establishment & growth: Diaspore: seed, gravity or short distance wind-dispersed.

Fire response: Stems killed, resprouts from lignotuber.

Interaction with other organisms: Crimson Rosella *Platycercus elegans* and Yellow-tailed Black Cockatoo *Calyptorhynchus funereus* damage inflorescences (McFarland 1985).

Distribution

Status/origin: Native.

Botanical subregions: NC CC NT CT; Qld.

Distribution Sydney area: North from Broken Bay.

Select locations: CC: Mellong Range, Morisset, Tuggerah, Somersby, Gosford. CT: Mt Wilson.

Habitat

Habitat:

Altitude: 0–1100 m **Annual rainfall:** 1000–1400 mm

Typical local abundance: Frequent.

Vegetation: Heath and woodland.

Substrate: Sandy soil on sandstone, low nutrients.

Exposure:

Conservation

Conservation: Hawkesbury River is southern geographical limit. Reported in Bouddi NP. Conservation status unknown.

Banksia spinulosa* var. *spinulosa**PROTEACEAE****Life history**

Growth form: Multistemmed shrub to 3 m high, with a lignotuber. Clinal change to *B. spinulosa* var. *collina* between Sydney and Newcastle.

Vegetative spread: No.

Longevity: 50–100 years.

Primary juvenile period:

Flowers: Yellow or golden, dense in a spike-like arrangement 6–15 cm long. Inflorescences with up to 1000 flowers; individuals may not flower every year (Carthow 1993). Buds open from top of the spike, downwards (Blake 1971). Inflorescences take 6–8 weeks to finish flowering; more flowers may be open during the day than during night; pollinator activity is needed, no self-pollination; pollen levels do not limit seed set (Whelan & Goldingay 1986). Pollinated by mammals and birds; visited by Sugar Glider *Petaurus breviceps*, Eastern Pygmy Possum *Cerartetus nanus*, Brown Antechinus *Antechinus stuartii*, Eastern Spinebill *Acanthorhynchus tenuirostris*, Honeybee *Apis mellifera* and several species of moths; mammals are more effective pollinators than Eastern Spinebills and insects (Carthow 1993b). Important source of nectar for honeyeaters in heathland (Pyke et al. 1993). Flowers visited by Honeybees, 3–4 species of native bees feeding on pollen and nectar; flies, 2 species of ants and birds Eastern Spinebill *Acanthorhynchus tenuirostris*, Noisy Miner *Manorina melanocephala* fed on nectar (P. Kubiak pers. comm.).

Fruit/seed: Woody capsules 10–24 mm long on a cone as canopy-stored seedbank; winged seeds weigh 8–15 mg, released following fire, or rarely, spontaneously (George 1981).

Dispersal, establishment & growth: Diaspore: seed, gravity or short distance wind-dispersed. Seeds germinate readily, without treatment.

Fire response: Resprouts from lignotuber, secondary juvenile period 3 years. Following spring fire more than 10% seeds germinated, survival of seedlings for next 1.5 years 5% (Whelan & Tait 1995).

Interaction with other organisms: Fungi recovered from leaves: *Asterina systema-solare*, *Cooksonomyces banksiae*, *Periconiella banksiae* (B. Summerell pers. comm.).

Distribution

Status/origin: Native.

Botanical subregions: CC SC CT ST; Qld.

Distribution Sydney area: Coast and adjacent plateaus south of Hawkesbury River, and Blue Mountains.

Select locations: CC: Duffys Forest, Hornsby, Epping, Agnes Banks, Springwood, Kogarah, Condell Park, Nortons Basin, Maddens Plain, Kangaroo Valley. CT: Newnes Plateau, Mt Banks, Kurrajong Heights, Wentworth Falls, Kanangra Walls, Kowmung River, Carrington Falls, Fitzroy Falls, Penrose SF.

Habitat

Habitat: Sandstone plateaus.

Altitude: 0–1200 m

Annual rainfall: 700–1400 mm

Typical local abundance: Frequent.

Vegetation: Woodland e.g. with *Eucalyptus haemastoma*, *E. sieberi*, *E. punctata*, *E. piperita*, *E. sclerophylla*, *Angophora bakeri*, *Corymbia gunnifera*, *E. parramattensis*, *Melaleuca decora*; heath e.g. with *Angophora hispida*, *Petrophile sessilis*, *Hakea sericea*.

Substrate: Generally deep sandy clay soils on sandstone, granite, shale, low nutrients, with periodic water logging.

Exposure: Full sun, shading by other shrubs appears to cause deterioration and lack of flowering.

Conservation

Conservation: Probably adequately conserved. Marramorra NP, Muogamarra Nature Reserve, Ku-ring-gai Chase NP, Garigal NP, Dalrymple Hay Nature Reserve, Lane Cove NP, Sydney Harbour NP.

Conospermum ellipticum

PROTEACEAE

Life history

Growth form: Erect shrub 50–80 cm high. Intermediate forms between *Conospermum ellipticum* and *C. taxifolium* found growing in same areas.

Vegetative spread:

Longevity: 25–60 years (D. Keith pers. comm.).

Primary juvenile period:

Flowers: Cream to white, tubular.

Fruit/seed: Hairy nut 2–3 mm long, with ring of hairs probably serving positional function in soil (B. Rice pers. comm.), weight 2 mg, shed at maturity.

Dispersal, establishment & growth: Diaspore: nut. No special morphology for dispersal (Westoby et al 1990). Soil-stored seedbank, recruitment mainly after fire (D. Keith pers. comm.).

Fire response: Resprouts from subterranean buds (D. Keith pers. comm.).

Interaction with other organisms:

Distribution

Status/origin: Native.

Botanical subregions: CC SC.

Distribution Sydney area: Mainly coastal.

Select locations: CC: Bouddi NP, Cape Solander, Loftus, Bulli.

Habitat

Habitat: Restricted to wet heaths (Morrison et al. 1994).

Altitude: 0–100 m **Annual rainfall:** 1200–1400 mm

Typical local abundance: Occasional to frequent.

Vegetation: Wet heath e.g. with *Allocasuarina distyla*, *Leptospermum* sp., *Lasiopetalum* sp., *Banksia serrata*.

Substrate: Shallow sandy soil on sandstone, low nutrients, poorly-drained.

Exposure: Full sun.

Conservation

Conservation: Reported from Bouddi NP (the northern geographical limit), Royal NP.

Conospermum ericifolium

PROTEACEAE

Life history

Growth form: Erect shrub 50–80 cm high Intermediate forms between *Conospermum ericifolium* and *C. taxifolium* found growing in same areas.

Vegetative spread: No.

Longevity:

Primary juvenile period: Less than 2 years (P. Kubiak pers. comm.).

Flowers: Cream to white, tubular, spring. Peak flowering 4–5 years after high intensity fire 1/94; flowers visited for nectar by Honeybees, two species of native bees, 4 species of beetles, bugs and moths (P. Kubiak pers. comm.).

Fruit/seed: Hairy nut 2–3 mm long, with ring of hairs probably serving positional function in soil (B. Rice pers. comm.), weight 2 mg, shed at maturity.

Dispersal, establishment & growth: Diaspore: nut. No special morphology for dispersal (Westoby et al. 1990).

Fire response: Killed after high intensity fire 1/94 (at Narrabeen Lake, P. Kubiak pers. comm.).

Interaction with other organisms:

Distribution

Status/origin: Native.

Botanical subregions: CC SC.

Distribution Sydney area: Mainly coastal, Toukley to Port Jackson.

Select locations: CC: Girrakool, Bouddi NP, Maroota.

Habitat

Habitat: Plateaus.

Altitude: 0–150 m **Annual rainfall:** 900–1200 mm

Typical local abundance: Occasional to frequent.

Vegetation: Heath and shrubby woodland e.g. with *Corymbia gummifera*, *Eucalyptus haemastoma*, *Angophora hispida*, *Banksia serrata*, *B. ericifolia*, *Angophora hispida*, *Boronia ledifolia*, *Grevillea buxifolia*, *Hakea propinqua*.

Substrate: Shallow sandy soil on sandstone, low nutrients, periodically poorly-drained.

Exposure: Full sun to light shade.

Conservation

Conservation: Conservation adequacy unknown, Kariong is northern geographical limit.

Reported in Bouddi NP, Brisbane Water NP. Vulnerable in Western Sydney (James et al. 1999).

Conospermum longifolium subsp. **angustifolium**

PROTEACEAE

Life history

Growth form: Undershrub or shrub to 2 m high, finely hairy.

Vegetative spread:

Longevity:

Primary juvenile period:

Flowers: Cream to white, tubular, July–October peak September.

Fruit/seed: Hairy nut 2–3 mm long, December. Probably shed at maturity (P. Myerscough pers. comm.).

Dispersal, establishment & growth: Diaspore: nut.

Fire response:

Interaction with other organisms:

Distribution

Status/origin: Native.

Botanical subregions: CC.

Distribution Sydney area: Lower Georges River–Waterfall–Appin.

Select locations: CC: Canterbury, Deadmans Creek, Como, Engadine, Audley, Wedderburn, Picton.

Habitat

Habitat: Stony ridges or upper slopes.

Altitude: 0–200 m **Annual rainfall:** 900–1200 mm

Typical local abundance: Frequent–occasional.

Vegetation: Woodland e.g. with *Persoonia pinifolia*, *Hakea sericea*, *Kunzea ambigua*; heath e.g. with *Banksia ericifolia*, *Petrophile pulchella*, *Acacia myrtifolia*, *Grevillea sericea*.

Substrate: Sandy soils, sandy clay or laterite gravel over sandstone, low nutrients.

Exposure: Full sun to light shade.

Conservation

Conservation: Local endemic, restricted to Lower Georges River–Waterfall–Appin (Harden 2000). Conservation status unknown. Reported in Royal NP.

Conospermum longifolium* subsp. *longifolium**PROTEACEAE****Life history**

Growth form: Undershrub or shrub to 2 m high, finely hairy.

Vegetative spread:

Longevity:

Primary juvenile period:

Flowers: Cream to white, tubular, June–October, peak September. Possibly pollinated by beetles, flies, native bees, and bugs (P. Kubiak pers. comm.).

Fruit/seed: Hairy nut 2–3 mm long, with ring of hairs probably serving positional function in soil (B. Rice pers. comm.), weight 5 mg. Probably shed at maturity (P. Myerscough pers. comm.), September–October.

Dispersal, establishment & growth: Diaspore: nut. No special morphology for dispersal (Westoby et al. 1990).

Fire response: Resprouts from ground level or below (at Bantry Bay after high intensity fire 12/1990, L.McD.). Secondary juvenile period less than 1 year after high intensity fire 1/94 (at Narrabeen Lake, P. Kubiak pers. comm.).

Interaction with other organisms:

Distribution

Status/origin: Native.

Botanical subregions: CC SC CT CWS.

Distribution Sydney area: Mainly Newcastle–Port Jackson.

Select locations: CC: Wollombi, Wisemans Ferry, Cowan, Ingleside, Belrose, Manly.

CT: Cambewarra.

Habitat

Habitat: Stony ridges or slopes.

Altitude: 0–200 m **Annual rainfall:** 800–1400 mm

Typical local abundance: Frequent.

Vegetation: Open-forest and woodland e.g. with *Corymbia gummifera*, *Eucalyptus oblonga*, *E. sieberi*, *Allocasuarina torulosa*, *Xylomelum pyriforme*; scrub e.g. with *Angophora hispida*; heath.

Substrate: Sandy soils, low nutrients.

Exposure: Full sun to light shade.

Conservation

Conservation: Conservation status unknown. Reported in Ku-ring-gai Chase NP.

Conospermum longifolium subsp. *mediale*

PROTEACEAE

Life history

Growth form: Undershrub or shrub to 2 m high, finely hairy.**Vegetative spread:****Longevity:****Primary juvenile period:****Flowers:** Cream to white, tubular, August–February, peak December.**Fruit/seed:** Hairy nut 2–3 mm long, December. Probably shed at maturity (P. Myerscough pers. comm.).**Dispersal, establishment & growth:** Diaspore: nut.**Fire response:****Interaction with other organisms:** A fungus *Mycosphaerella* sp. has been recovered from leaf spots (B. Summerell pers. comm.).

Distribution

Status/origin: Native.**Botanical subregions:** CC SC CT.**Distribution Sydney area:** Mainly Blue Mountains.**Select locations:** CC: Putty, Berambing, Springwood, Glenbrook, Buxton, Cambewarra. CT: Hill Top, Robertson, Belanglo.

Habitat

Habitat: Rocky ridgetops or upper slopes.**Altitude:** 200–600 m **Annual rainfall:** 700–1600 mm**Typical local abundance:** Rare–occasional.**Vegetation:** Open-forest e.g. with *Corymbia eximia*, *C. gummifera*, *E. sieberi*, *E. sclerophylla*, *E. piperita*, *E. globoidea* and shrubby understorey — *Lambertia formosa*, *Persoonia levis*, *P. linearis*, *Hakea sericea*, *Banksia serrata*, *Grevillea arenaria*, *G. buxifolia*.**Substrate:** Sandy, stoney soil over sandstone, low nutrients, well-drained.**Exposure:**

Conservation

Conservation: Conservation status unknown. Reported in Blue Mountains NP.**Conospermum taxifolium**

PROTEACEAE

Life history

Growth form: Erect shrub 50–80 cm high. Hybrids with *C. ericifolium* or *C. ellipticum* occur rarely where there are intermediate habitats (Morrison et al. 1994).**Vegetative spread:** No.**Longevity:** 25–60 years (D. Keith pers. comm.).**Primary juvenile period:** 4 years (Benson 1985, D. Keith pers. comm.).**Flowers:** Cream to greyish white, tubular, August–January, peak September. Insect-pollinated.**Fruit/seed:** Hairy nut 2–3 mm long, weight 1.4 mg, shed at maturity.**Dispersal, establishment & growth:** Diaspore: nut. Seeds with 100% dormancy, persistent soil-stored seedbank, estimated half-life 2 yrs (Auld et al. 2000). Recruitment mainly after fire (D. Keith pers. comm.). A vigorous coloniser species on deep sand at Agnes Banks.**Fire response:** Resprouted vigorously after high intensity fire at Mellong, and upper Blue Mountains. Resprouts (D. Keith pers. comm.). Killed by fire and re-establishes from soil-stored seed though some capable of resprouting from base of stem (depending on fire intensity?) (M. Fox pers. comm.).**Interaction with other organisms:**

Distribution

Status/origin: Native.**Botanical subregions:** NC CC SC NT CT ST CWS NWP; Qld, Vic.**Distribution Sydney area:** Widespread, coast and Blue Mountains.**Select locations:** CC: Ku-ring-gai Chase NP, Agnes Banks, La Perouse, Wattamolla, Helensburgh, Bargo. CT: Newnes Plateau, Mount Hay, Wentworth Falls, Hill Top, Mittagong.

Habitat

Habitat: Coastal headlands, ridgetops, shallow valleys.

Altitude: 0–1200 m **Annual rainfall:** 800–1400 mm

Typical local abundance: Frequent–occasional.

Vegetation: Coastal heath e.g. with *Westringia fruticosa*, *Melaleuca armillaris*; montane heath e.g. with *Allocasuarina nana*, *Eucalyptus apiculata*; woodland e.g. with *Eucalyptus sclerophylla*, *E. piperita*, *E. sieberi*, *E. sparsifolia*.

Substrate: Shallow sandy soils on sandstone and old dunes, low nutrients.

Exposure: Exposed to mountain and sea winds, full sun.

Conservation

Conservation: Reported in Bouddi NP, Brisbane Water NP, Ku-ring-gai Chase NP, Garigal NP, Lane Cove NP, Sydney Harbour NP, Blue Mountains NP.

Conospermum tenuifolium**PROTEACEAE****Life history**

Growth form: Spreading shrub to 30 cm high and up to 4 m across, with stems rising from a woody base, forming tangled grass-like masses. Leaves long, narrow, curly and wiry.

Vegetative spread: No.

Longevity:

Primary juvenile period:

Flowers: Bluish or lilac or pinkish-white, tubular, September–January, peak October. Insect-pollinated.

Fruit/seed: Hairy nut 2–3 mm long, October–November. Probably shed at maturity (P. Myerscough pers. comm.).

Dispersal, establishment & growth: Diaspore: nut.

Fire response: Resprouts (at Leura).

Interaction with other organisms:

Distribution

Status/origin: Native.

Botanical subregions: CC SC CT.

Distribution Sydney area: Widespread in Blue Mountains, scattered on coast.

Select locations: CC: Mangrove Mountain, Manly, Botany Swamp, Waterfall, Darkes Forest, Bulli, Bargo, Cambewarra. CT: Mount Coricudgy, Blackheath, Katoomba, Wentworth Falls, Moss Vale, Fitzroy Falls.

Habitat

Habitat: Ridgetops, slopes, creekbanks.

Altitude: 0–1000 m **Annual rainfall:** 900–1400 mm

Typical local abundance: Frequent–occasional.

Vegetation: Heath, woodland and open-forest e.g. with *Eucalyptus sieberi*, *E. piperita*, *E. sclerophylla*, *Corymbia gummifera*.

Substrate: Sandy soil over sandstone, low nutrients, sometimes moist, soaks.

Exposure:

Conservation

Conservation: Rare and probably inadequately conserved in Gosford area, rare in Ku-ring-gai Chase NP. Reported in Brisbane Water NP.

Grevillea acanthifolia* subsp. *acanthifolia

PROTEACEAE

Life history

Growth form: Shrub to 1–1.5 m high, with divided leaves, most closely related to *G. rivularis*; hybridises naturally with *G. laurifolia* (Makinson 2000) to form *G. x gaudichaudii* (R. Makinson pers. comm.).

Vegetative spread: No.

Longevity:

Primary juvenile period:

Flowers: Silver to reddish grey, mauve-pink to red, September–May, peak October–January.

Fruit/seed: Hairy capsule 9–11 mm long, with reddish brown stripes or blotches and 1–2 winged seed, released at maturity. Likely to have a food body for ant-dispersal (J. Howell pers. comm.).

Dispersal, establishment & growth: Diaspore: seed, recruitment mainly after fire. Seedling density under fire-killed plants 9–25 per m² (at Lithgow).

Fire response: Resprouts in wettest situations but killed elsewhere e.g. 60% mortality recorded at Lithgow. Re-establish from soil-stored seed.

Interaction with other organisms:

Distribution

Status/origin: Native.

Botanical subregions: CT.

Distribution Sydney area: Upper Blue Mountains.

Select locations: CT: Lithgow, Bell, Blackheath, Katoomba, Wentworth Falls.

Habitat

Habitat: Swampy areas or wet rock shelves, or on stream banks.

Altitude: 900–1100 m **Annual rainfall:** 900–1400 mm

Typical local abundance: Frequent.

Vegetation: Swampy heath e.g. with *Leptospermum lanigerum*, *L. myrtifolium*, *Gahnia filifolia*, *G. subequaeglumis*, *Baumea rubiginosa*, *B. acuta*, *Xyris gracilis*, *Lepyrodia scariosa*, *L. anarthria*.

Substrate: Sand or peat on sandstone, low nutrients, impeded drainage.

Exposure: Full sun.

Conservation

Conservation: Local endemic, conservation status unknown.

Grevillea arenaria* subsp. *arenaria

PROTEACEAE

Life history

Growth form: Single-trunked shrub 1–4 m high, with simple leaves; there are two forms: silky form from Bents Basin to Yerranderie and villous form south from Wombeyan Caves; may occasionally hybridize with *G. rosmarinifolia*, *G. lanigera*, *G. mucronulata* (Makinson 2000).

Vegetative spread: No.

Longevity:

Primary juvenile period:

Flowers: Red, pink or orange, often green or yellow at base, all months but mainly August–November. July–November, mainly bird-pollinated (Makinson 2000).

Fruit/seed: Hairy, ribbed capsule 12–22 mm long, with 1–2 winged seed, released at maturity.

Dispersal, establishment & growth: Diaspore: seed. Likely to have a food body for ant-dispersal (J. Howell pers. comm.).

Fire response: Killed, regenerates from soil-stored seed (Makinson 2000).

Interaction with other organisms: Flowers eaten by Crimson Rosella *Platyercus elegans* (Lepschi 1993).

Distribution

Status/origin: Native.

Botanical subregions: CC SC ST.

Distribution Sydney area: Widespread.

Select locations: CC: Yarramundi, Nepean Dam, Nattai. CT: Wombeyan Caves, Barbers Creek.

	Habitat
Habitat: Near creeks or cliffs, rocky hillsides.	
Altitude: 0–900 m	Annual rainfall: 800–1200 mm
Typical local abundance: Frequent.	
Vegetation: Open woodland; shrubland e.g. with <i>Acacia chalkerii</i> .	
Substrate: Gravelly loam, dark clay loam, on granite, limestone or alluvium; on limestone at Wombeyan Caves.	
Exposure: Full sun to light shade.	
	Conservation
Conservation: Conservation status unknown.	

Grevillea arenaria* subsp. *canescens**PROTEACEAE**

	Life history
Growth form: Single-trunked shrub 1–3 m high, or suckering shrub to 1 m high ; leaves velvety on lower surface.	
Vegetative spread: Occasional suckering.	
Longevity:	
Primary juvenile period:	
Flowers: Red, pink or orange, often green or yellow at base, all months but mainly August–November. Mainly bird-pollinated (Makinson 2000).	
Fruit/seed: Hairy, ribbed capsule 12–22 mm long, with 1-2 winged seed released at maturity.	
Dispersal, establishment & growth: Diaspore: seed, soil-stored seedbank. Likely to have a food body for ant-dispersal (J. Howell pers. comm.).	
Fire response: Mostly killed, regenerates from soil-stored seed; sometimes resprouts from rhizomes (Makinson 2000).	
Interaction with other organisms:	
	Distribution
Status/origin: Native.	
Botanical subregions: CT ST NWS CWS NWP.	
Distribution Sydney area: Western Blue Mountains.	
Select locations: CT: Rylstone, Winburndale, Bathurst, Glen Davis, Mt Cookem, Blackheath, Jenolan Caves, Kanangra, Kowmung River, Abercrombie River, .	

	Habitat
Habitat: Steep slopes, rocky areas.	
Altitude: 700–1000 m	Annual rainfall: 600–1200 mm
Typical local abundance: Occasional–frequent.	
Vegetation: Woodland e.g. with <i>Eucalyptus blakelyi</i> , <i>E. rossi</i> , <i>E. polyanthemos</i> , <i>E. punctata</i> .	
Substrate: Dry clayey or gravelly clay soil, sandy soils on conglomerate, granite, Devonian quartzite, basalt.	
Exposure:	
	Conservation
Conservation: Conservation status unknown.	

Grevillea aspleniifolia

PROTEACEAE

Life history

Growth form: Spreading shrub 1–5 m high, to 4 m across, with hairy branchlets and long narrow leaves which are often serrated. Sometimes confused with *G. longifolia* (Makinson 2000).

Vegetative spread:

Longevity:

Primary juvenile period:

Flowers: Pinkish to purplish, mainly September–March. July–November (Makinson 2000).

Fruit/seed: Hairy capsule with reddish brown stipes or blotches, with one deeply wrinkled, 1–2 winged seeds (McGillivray & Makinson 1993), released at maturity.

Dispersal, establishment & growth: Diaspore: seed, wind-dispersed locally. Likely to have a food body for ant-dispersal (J. Howell pers. comm.).

Fire response: Mostly killed (R. Makinson pers. comm.).

Interaction with other organisms:

Distribution

Status/origin: Native.

Botanical subregions: CC CT ST.

Distribution Sydney area: Warragamba and Nattai catchments.

Select locations: CC: Kedumba Valley, Burragorang Valley, Nattai River, Warragamba, Picton, Yerranderie. CT: Hill Top.

Habitat

Habitat: Open, rocky sites on ridges, or moist sites near streams.

Altitude: 0–500 m **Annual rainfall:** 800–900 mm

Typical local abundance: Rare to frequent.

Vegetation: Open-forest e.g. with *Eucalyptus sclerophylla*, *E. piperita*, *E. agglomerata*, *Angophora costata*; woodland e.g. with *Eucalyptus punctata*, *E. eugenioides*, *E. fibrosa*, *Allocasuarina stricta*; moist situations e.g. with *Casuarina cunninghamiana*, *Prostanthera incana*.

Substrate: Shallow sandy soil or sandy loam on sandstone or shale, low nutrients, well-drained.

Exposure: Medium shade to full sun.

Conservation

Conservation: Reported from Blue Mountains NP, Nattai NP, conservation status unknown.

Grevillea baueri* subsp. *baueri

PROTEACEAE

Life history

Growth form: Low bushy shrub to 1 m high.

Vegetative spread: No.

Longevity:

Primary juvenile period:

Flowers: Red to pink with cream or yellow, July–November, mainly bird-pollinated (Makinson 2000).

Fruit/seed: Hairy capsule 14 mm long, 1–2 seed released at maturity.

Dispersal, establishment & growth: Diaspore: seed, gravity-dispersed. Likely to have a food body for ant-dispersal (J. Howell pers. comm.).

Fire response: Killed, regenerates from soil-stored seed (Makinson 2000).

Interaction with other organisms: Grazed by stock (Herbarium record).

Distribution

Status/origin: Native.

Botanical subregions: CC SC CT.

Distribution Sydney area: Camden–Picton–Mittagong area.

Select locations: CC: Appin, Buxton. CT: Hill Top, Aylmerton, Mittagong, Berrima, Belanglo SF, Wombeyan Caves.

Habitat

Habitat: Roadside, hillsides.

Altitude: 500–900 m **Annual rainfall:** 800–1000 mm

Typical local abundance: Frequent–occasional.

Vegetation: Open forest e.g. with *Eucalyptus macarthurii*, *E. radiata*, *Banksia marginata*, *Hakea dactyloides*, *Lomatia ilicifolia*; open-woodland e.g. with *Eucalyptus sieberi*; scrubland.

Substrate: Sandy soils on sandstone, low nutrients.

Exposure:

Conservation

Conservation: Appin is the northern geographical limit

Grevillea buxifolia* subsp. *buxifolia
PROTEACEAE

Grey Spider Flower

Life history

Growth form: Shrub 1-2 m high.

Vegetative spread: No.

Longevity: 10–20 years.

Primary juvenile period: 8 years (Benson 1985), about 2 years after high intensity fire 1/94 (at Lane Cove, P. Kubiak pers. comm.).

Flowers: Rusty brown to faun, mainly July–November, sporadic in other months (Makinson 2000). May be pollinated by large native bees seeking nectar and possibly smaller ones gathering pollen (P. Kubiak pers. comm.). Peak flowering 4–5 years after high intensity fire 1/94.

Fruit/seed: Hairy capsule 18–22 mm long (Makinson 2000), with 1–2 seeds; seed weight 62.5 mg ± 3.1 (Morris 2000), 53 mg (Auld & Denham 1999), weight 50–75 mg, seed with an elaiosome (lipid body)(Auld 1995, Westoby et al. 1990), released at maturity, January–March.

Dispersal, establishment & growth: Diaspore: seed, with food body ant-adapted for dispersal (Westoby et al. 1990, Rice & Westoby 1981). Small ants *Iridomyrmex*, *Pheidole* sp., *Crematogaster* sp. individuals working together move seed up to 20 cm and remove the elaiosome in pieces, or large solitary ants *Aphaenogaster* sp., *Thyridophonera* sp. may drag the seeds to their nests; thus, up to 20% of seed may escape predation by native mammals e.g. Bush Rat *Rattus fuscipes*, Swamp Wallaby *Wallabia bicolor* (Auld 1995). Strongly pulsed pattern of post-fire germination; no breaking of seed dormancy by heating (Auld & Tozer 1995).

Germination experiment showed that: untreated seeds did not germinate; germination mostly 30–40 days after treatment; smoke treatment increased amount of germination (40%); heat treatment alone induced 10–13% germination; smoke treatment plus heat treatment resulted in at least 60% germination; scarification of unsmoked, heat-treated seed increased germination; water uptake occurred rapidly in both scarified and unscarified seeds, mostly within 24 hrs and water loss was equally rapid on drying (Morris 2000), heat effect increased in presence of smoke and smoke effect increased in presence of heat, with smoke having the most influence (Kenny 2000).

Fire response: Killed and re-establishes from soil-stored seed.

Interaction with other organisms: Shoot damage by rabbits but not eaten (P. Kubiak pers. comm.). Fungus *Placoasterella baileyi* causes leaf spot (B. Summerell pers. comm.). Pre-dispersal seed predation more than 30% by weevils *Cydmaea dorsalis* (Auld & Denham 2001b).

Distribution

Status/origin: Native.

Botanical subregions: CC SC CT.

Distribution Sydney area: Coast and adjacent plateaus.

Select locations: CC: Putty, Mt Yengo, Somersby, Cowan, Berowra, Kenthurst, Galston, Cheltenham, St Ives, Belrose, Frenchs Forest, Manly, Como, Waterfall, Appin, Springwood.

Habitat

Habitat: Ridges, slopes.

Altitude: 0–400 m

Annual rainfall: 900–1400 mm

Typical local abundance: Occasional–frequent.

Vegetation: Woodland e.g. with *Eucalyptus haemastoma*, *E. sieberi*, *Corymbia gummifera*, *Angophora bakeri*, *Banksia oblongifolia*, *B. serrata*; heath e.g. with *Banksia ericifolia*, *Grevillea linearifolia*, *G. sericea*, *Persoonia levis*, *Leptospermum trinervium*.

Substrate: Skeletal sandy soils over sandstone, low nutrients, well-drained.

Exposure:

Conservation

Conservation: Probably adequately conserved. Reported in Brisbane Water NP, Marramarra NP, Ku-ring-gai Chase NP, Garigal NP, Lane Cove NP, Sydney Harbour NP, Royal National Park.

Grevillea buxifolia* subsp. *ecorniculata

PROTEACEAE

Life history**Growth form:** Shrub 1-2 m high, with simple leaves.**Vegetative spread:****Longevity:****Primary juvenile period:****Flowers:** Grey, mainly July–November, insect-pollinated (Makinson 2000).**Fruit/seed:** Hairy capsule 18–22 mm long, with 1–2 seeds, released at maturity. Seed with food body (J. Howell pers. comm.).**Dispersal, establishment & growth:** Diaspore: seed, with a short waxy elaiosome (Makinson 2000), ant-dispersed locally (J. Howell pers. comm.).**Fire response:** Probably killed, regenerates from soil-stored seed (Makinson 2000).**Interaction with other organisms:****Distribution****Status/origin:** Native.**Botanical subregions:** CC.**Distribution Sydney area:** Putty–Gospers Mountain–Wollombi.**Select locations:** CC: Putty, Mt Yengo, Mt White, Wollombi.**Habitat****Habitat:** Ridges, upper slopes.**Altitude:** 0–700 m**Annual rainfall:** 1000–1400 mm**Typical local abundance:** Frequent.**Vegetation:** Open-forest with shrubby understorey e.g. with *Astrotricha* sp., *Cooperookia barbata*, *Persoonia levis*, *Leptospermum trinervium*.**Substrate:** Skeletal sandy soils over sandstone, low nutrients.**Exposure:****Conservation****Conservation:** Local endemic, confined to area between Putty, Gospers Mountain and Wollombi, conservation status unknown.***Grevillea caleyi***

PROTEACEAE

Life history**Growth form:** Open spreading shrub usually 1–4 m high, hairy branchlets, deeply divided leaves, and reddish, hairy young foliage.**Vegetative spread:** No.**Longevity:** Some plants may live 20–30 years but high mortality in populations 12–15 years after fire (Auld et al. 1991).**Primary juvenile period:** 2–4 years (Auld & Denham 2001a).**Flowers:** Red, mainly July–February. Most likely pollinators are honeyeaters: New Holland, White Cheeked, White Eared, Little Wattlebirds and Eastern Spinebills; may also be self-compatible (Scott et al. 1995).**Fruit/seed:** Hairy capsule 17–21 mm long, with reddish brown stripes or blotches, mature summer, 1 (rarely 2) seeds released at maturity with limited dispersal beneath parent at maturity; seeds without wings. Seeds without an elaiosome (Auld 1995). Seeds heavy (the largest of all *Grevillea* species) (McCormack & O'Neil 1993), weight 318–351 mg (Auld & Denham 2001b.)**Dispersal, establishment & growth:** Diaspore: seed, gravity-dispersed at maturity. No known dispersal agents; seed viability is high 69–95%, dormancy 93%, and buried seed with seasonal secondary dormancy is relatively long-lived (Auld et al. 2000), estimated half-life 6–10 years, but with combined effects of pre- and post-dispersal predation very little seed is added to the soil-stored seedbank for at least 4–6 years after fire (Auld et al. 2000, Scott et al. 1995, Auld & Denham 2001a,b). Hard-coated seed, germinates after heat and mechanical damage, though responds poorly after control burns (Scott 1986). Seed production generally increases up to 8–10 years and declines after 10–15 years (Auld & Denham 2001a).**Fire response:** Killed and re-establish from soil-stored seed. Responds best to high intensity fire. Requires minimum fire-free period 8–12 years for conservation; areas unburnt 20–25 years need monitoring — if adults have died and there is no seedling recruitment, consideration should be given to burning (Auld & Scott 1996).

Interaction with other organisms: Predispersal seed predators are weevils *Cydnaea dorsalis* (12–26% loss) and probably parrots (Auld, Bradstock & Keith 1991, Auld & Denham 2001b); seed predation post-dispersal 82–100%, 91–100% from 2–5 years after fire, mostly by Bush Rat *Rattus fuscipes* (35–68% seed loss) and Swamp Wallaby *Wallabia bicolor* (31–65% seed loss) (Auld & Denham 2001a, Scott et al. 1995), known to suffer high levels of seed losses to native mammals in areas unburnt for greater than 10 years (Auld & Denham 1999). Black ants feed on nectar (L.McD.)

Distribution

Status/origin: Native.

Botanical subregions: CC.

Distribution Sydney area: Terrey Hills to Belrose.

Select locations: CC: Terrey Hills, Belrose.

Habitat

Habitat: Extremely restricted, specific to lateritic sandstone ridgetops (A. Auld pers. comm.).

Altitude: 200 m

Annual rainfall: 1200 mm

Typical local abundance: Rare–frequent.

Vegetation: Open-forest–woodland e.g. with *Eucalyptus capitellata*, *Corymbia gummifera*, *Eucalyptus sieberi* with understorey dominated by plants of Proteaceae and Fabaceae families; see Duffys Forest Community of Benson and Howell (1994).

Substrate: Residual cappings of ironstone soils — clayey soil of lateritic sandstone ridgetops.

Exposure:

Conservation

Conservation: Local endemic, listed as Endangered (Schedule 1) NSW *Threatened Species Conservation Act 1995*, coded 2ECi on national rare species list (Briggs & Leigh 1996).

Endangered by road widening, too frequent burning and competition from exotic species (Scott et al. 1995). Reported in Ku-ring-gai Chase NP, Garigal NP.

Grevillea capitellata (*G. diffusa* subsp. *diffusa* 'Robust Form')

PROTEACEAE

Life history

Growth form: Low or prostrate shrub to 0.5 m high, with simple leaves and a distinctly rusty brown hairy covering on the new growth, which distinguishes it from *G. diffusa*.

Vegetative spread:

Longevity:

Primary juvenile period:

Flowers: Deep crimson to black-maroon, July–December; pollinator not known (Makinson 2000).

Fruit/seed: Capsule 18 mm long, with 1–2 seed released at maturity.

Dispersal, establishment & growth: Diaspore: seed. Likely to have a food body for ant-dispersal (J. Howell pers. comm.).

Fire response: Killed and regenerates from soil-stored seed or sometimes may possibly resprout from lignotuber or basal suckers (Makinson 2000).

Interaction with other organisms:

Distribution

Status/origin: Native.

Botanical subregions: CC.

Distribution Sydney area: Woronora Plateau.

Select locations: CC: Bulli, Mt Keira, Mt Ousley, Cordeaux Dam.

Habitat

Habitat:

Altitude: 0–400 m

Annual rainfall: 1400–1600 mm

Typical local abundance: Frequent.

Vegetation: Woodland e.g. with *Eucalyptus sieberi*, *E. piperita*, *E. racemosa*, *Corymbia gummifera*; heath e.g. with *Banksia ericifolia*, *Hakea* sp., *Grevillea oleoides*, species of Restionaceae.

Substrate: Sandy soils over sandstone or pebbly ironstone.

Exposure:

Conservation

Conservation: Local endemic, restricted to plateau behind Illawarra escarpment. Conservation status unknown.

Grevillea diffusa* subsp. *constablei

PROTEACEAE

Life history

Growth form: Spreading to erect shrub 1–2 m high; possible genetic influence from *G. linearifolia* or *G. sericea* (Makinson 2000).

Vegetative spread:

Longevity:

Primary juvenile period:

Flowers: Dark crimson to dark burgundy. Flowers August–?November; bird- and probably also insect-pollinated (Makinson 2000).

Fruit/seed: Capsule 11–16 mm long, with 1–2 seed released at maturity.

Dispersal, establishment & growth: Diaspore: seed. Likely to have a food body for ant-dispersal (J. Howell pers. comm.).

Fire response: Probably killed (R. Makinson pers. comm.).

Interaction with other organisms:

Distribution

Status/origin: Native.

Botanical subregions: CC.

Distribution Sydney area: Waterfall to Helensburgh and Georges River.

Select locations: CC: Waterfall, Royal NP.

Habitat

Habitat: Woodland, often near creeks.

Altitude: 0–100 m **Annual rainfall:** 900–1400 mm

Typical local abundance:

Vegetation: Open-forest, woodland.

Substrate: Sandy loam soils.

Exposure: Shade.

Conservation

Conservation: Restricted local endemic, conservation status not known. Reported in Royal NP.

Grevillea diffusa* subsp. *diffusa

PROTEACEAE

Life history

Growth form: Low dense spreading shrub usually less than 50 cm high, with hairy branchlets; known to hybridize with *G. sericea* (Makinson 2000).

Vegetative spread:

Longevity:

Primary juvenile period:

Flowers: Dark red, or rarely green and brown, July–October, peak September. Bird- and probably also insect-pollinated (Makinson 2000).

Fruit/seed: Capsule 11–16 mm long, with 1–2 seed released at maturity.

Dispersal, establishment & growth: Diaspore: seed. Likely to have a food body for ant-dispersal (J. Howell pers. comm.).

Fire response: Killed, regenerates from soil-stored seed (Makinson 2000).

Interaction with other organisms:

Distribution

Status/origin: Native.

Botanical subregions: CC.

Distribution Sydney area: Woronora Plateau.

Select locations: CC: Leumeah, Appin, Wedderburn, Audley, Lucas Heights, Helensburgh.

Habitat

Habitat: Low ridges and slopes (Makinson 2000).

Altitude: 0–200 m **Annual rainfall:** 1000–1600 mm

Typical local abundance: Occasional–frequent.

Vegetation: Open-forest, shrubby woodland e.g. with *Angophora costata*, *Eucalyptus piperita*; dry heath e.g. with *Angophora hispida*.

Substrate: Sandy to loamy soils on sandstone, low nutrients.

Exposure:

Conservation

Conservation: Restricted local endemic. Reported in Royal NP. Conservation status not known.

Grevillea diffusa* subsp. *filipendula**PROTEACEAE****Life history**

Growth form: Low spreading shrub to 1 m high. Occasionally hybridises with *G. linearifolia* (Makinson 2000).

Vegetative spread: No.

Longevity:

Primary juvenile period:

Flowers: Scarlet to light burgundy, May–October, peak July. Bird and probably also insect-pollinated (Makinson 2000).

Fruit/seed: Capsule 11–16 mm long, with 1–2 seed released at maturity, October–November; seed weight 23.5 mg ± 1.1 (Morris 2000).

Dispersal, establishment & growth: Diaspore: seed. Likely to have a food body for ant-dispersal (J. Howell pers. comm.). Germination experiment showed that: untreated seeds did not germinate; germination mostly 30–40 days after treatment; germination commenced earlier in smoked seeds; smoke treatment increased amount of germination (40%); heat treatment alone induced 10–13% germination; smoke treatment plus heat treatment resulted in at least 60% germination; water uptake occurred rapidly in both scarified and unscarified seeds, mostly within 24 hrs and water loss was equally rapid on drying (Morris 2000).

Fire response: Killed. Regenerates from soil-stored seed (Makinson 2000).

Interaction with other organisms:

Distribution

Status/origin: Native.

Botanical subregions: CC.

Distribution Sydney area: Gosford area.

Select locations: CC: Calga, Mt White, Mooney Mooney, Killcare.

Habitat

Habitat: Rocky sites, shallow soil.

Altitude: 0–200 m **Annual rainfall:** 1200–1400 mm

Typical local abundance: Frequent.

Vegetation: Open-forest and woodland e.g. with *Corymbia gummifera*, *C. eximia*, *Eucalyptus haemastoma*, *Banksia serrata*; occasionally heath e.g. with *Allocasuarina distyla*.

Substrate: Shallow sandy soils over sandstone, low nutrient soil.

Exposure:

Conservation

Conservation: Restricted local endemic, conservation status unknown.

Grevillea divaricata (*G. rosmarinifolia* var. *divaricata*)

PROTEACEAE

Life history**Growth form:** Low shrub to 0.4 high. Known only from the Type collection made in 1823, N of Bathurst (Harden 1991).**Vegetative spread:** Herbarium specimen appears to be rhizomatous or lignotuberous and capable of stem-basal suckering (Makinson 2000).**Longevity:****Primary juvenile period:****Flowers:** Colour not known, probably red, or red and cream, April and spring, primarily bird-pollinated (Makinson 2000).**Fruit/seed:** Fruit and seed not known (Makinson 2000).**Dispersal, establishment & growth:** Likely to have a food body for ant-dispersal (J. Howell pers. comm.).**Fire response:** Not known.**Interaction with other organisms:**

Distribution**Status/origin:** Native.**Botanical subregions:** CT.**Distribution Sydney area:** Bathurst.**Select locations:** CT: Bathurst (1823).

Habitat**Habitat:** Dry open-forest.**Altitude:** 700 m**Annual rainfall:** 600 mm**Typical local abundance:** Frequent.**Vegetation:** Eucalypt open-forest**Substrate:****Exposure:**

Conservation**Conservation:** Possibly extinct north of Bathurst where the last collection was in 1823.***Grevillea evansiana*** (*G. diffusa* subsp. *evansiana*)

PROTEACEAE

Life history**Growth form:** Low dense spreading shrub rarely more than 0.5 m high.**Vegetative spread:** No.**Longevity:****Primary juvenile period:****Flowers:** Blackish red or rarely white, August–December, peak September. Pollinator unknown (Makinson 2000).**Fruit/seed:** Capsule 12 mm long, with 1–2 winged seed (Makinson 2000) released at maturity, January.**Dispersal, establishment & growth:** Diaspore: seed. Likely to have a food body for ant-dispersal (J. Howell pers. comm.).**Fire response:** Probably killed, regenerates from soil-stored seed (Makinson 2000).**Interaction with other organisms:**

Distribution**Status/origin:** Native.**Botanical subregions:** CT.**Distribution Sydney area:** East of Rylstone.**Select locations:** CT: Rylstone, Olinda, Currant Mountain Gap, Kandos.

Habitat**Habitat:** Ridges, rocky areas.**Altitude:** 600–800 m**Annual rainfall:** 700–800 mm**Typical local abundance:** Frequent.**Vegetation:** Eucalypt open-forest to woodland e.g. with *Eucalyptus sparsifolia*, *E. rossii*; heath e.g. with *Leptospermum parvifolium*, *L. sphaerocarpum*, *L. arachnoides*, *Calytrix tetragona*, *Leucopogon muticus*.

Substrate: Sandy soils over sandstone, low nutrients.

Exposure: Full sun to light shade.

Conservation

Conservation: Restricted local endemic, known only from an area east of Rylstone (Makinson 2000), listed as Vulnerable (Schedule 2) NSW *Threatened Species Conservation Act 1995*, and coded 2VC- on national rare species list (Briggs & Leigh 1996). Reported in Wollemi NP.

Grevillea floribunda* subsp. *floribunda

PROTEACEAE

Seven Dwarfs Grevillea

Life history

Growth form: Erect shrub 0.4–2 m high, with simple leaves; with lignotuber or rhizome (Makinson 2000).

Vegetative spread:

Longevity:

Primary juvenile period:

Flowers: Greenish yellow, with rusty brown hairs, May–November; primarily bird-pollinated (Makinson 2000).

Fruit/seed: Capsule, with 1–2 seed released at maturity.

Dispersal, establishment & growth: Diaspore: seed. Likely to have a food body for ant-dispersal (J. Howell pers. comm.).

Fire response: Variable, some populations resprout from rhizomes or lignotubers (Makinson 2000).

Interaction with other organisms:

Distribution

Status/origin: Native.

Botanical subregions: NT CT NWS CWS SWS NWP SWP; Qld, ?*Vic.

Distribution Sydney area: North from Bathurst.

Select locations: CT: Kelso.

Habitat

Habitat: Rocky situations.

Altitude: 750 m

Annual rainfall: 600–650 mm

Typical local abundance: Rare.

Vegetation: Eucalypt open-forest, woodland or shrubland.

Substrate: Sandy or clay soils over granite or sandstone, low nutrients.

Exposure:

Conservation

Conservation: Conservation status unknown.

Grevillea humilis* subsp. *humilis (*G. linearifolia* 'Northern form')

PROTEACEAE

Life history**Growth form:** Low erect or rarely spreading shrub to 1 m high, with simple leaves.**Vegetative spread:** Rhizomatous.**Longevity:****Primary juvenile period:****Flowers:** Pink or white, August–November, insect-pollinated (Makinson 2000).**Fruit/seed:** Capsule 8–11 mm long, with 1–2 seed released at maturity.**Dispersal, establishment & growth:** Diaspore: seed. Likely to have a food body for ant-dispersal (J. Howell pers. comm.).**Fire response:** Resprouts from rhizomes and regenerates from seed (Makinson 2000).**Interaction with other organisms:**

Distribution**Status/origin:** Native.**Botanical subregions:** NC CC.**Distribution Sydney area:** Lower Hunter region.**Select locations:** CC: Morisset, Cooranbong (locations from Makinson 2000).

Habitat**Habitat:** Slopes, flats, seasonally waterlogged areas (Makinson 2000).**Altitude:** 0–200 m**Annual rainfall:** 1000–1200 mm**Typical local abundance:****Vegetation:** Eucalypt woodland.**Substrate:** Heavy loam or clay loam soils (Makinson 2000).**Exposure:**

Conservation**Conservation:** Morisset–Cooranbong population is at southern geographical limit.

Conservation status unknown.

Grevillea imberbis (*G. linearifolia* 'Kanangra/Braidwood form')

PROTEACEAE

Life history**Growth form:** Prostrate to low shrub 0.2–0.4 m high.**Vegetative spread:** Rhizomatous.**Longevity:****Primary juvenile period:****Flowers:** White to pale pink, August–February; presumed insect-pollinated (Makinson 2000).**Fruit/seed:** Fruit not known.**Dispersal, establishment & growth:** Diaspore: seed. Likely to have a food body for ant-dispersal (J. Howell pers. comm.).**Fire response:** Regenerates from basal suckers and rhizomes, possibly also from seed (Makinson 2000).**Interaction with other organisms:**

Distribution**Status/origin:** Native.**Botanical subregions:** CT ST.**Distribution Sydney area:** Kanangra Walls.**Select locations:** CT: Mt Seymour (Kanangra Tops).

Habitat**Habitat:****Altitude:** 600–1000 m**Annual rainfall:** 900–1000 mm**Typical local abundance:** Frequent.**Vegetation:** Moist low heath or heathy woodland margins (Makinson 2000).**Substrate:** Skeletal sandy soils over sandstone sheets (Makinson 2000), low nutrients.**Exposure:**

Conservation**Conservation:** Poorly known, conservation status unknown, Kanangra is northern geographical limit.

Grevillea johnsonii

PROTEACEAE

Life history

Growth form: Single-stemmed shrub 2–4.5 m high, with simple leaves; Olde and Marriott report rhizomes (Makinson 2000).

Vegetative spread:

Longevity:

Primary juvenile period:

Flowers: Red to orange, mainly spring.

Fruit/seed: Hairy capsule 12–16 mm long, bird-pollinated (Makinson 2000), with 1–2 seed released at maturity.

Dispersal, establishment & growth: Diaspore: seed. Likely to have a food body for ant-dispersal (J. Howell pers. comm.).

Fire response: Probably killed. Regenerates mainly from soil-stored seed (Makinson 2000).

Interaction with other organisms: Fungi *Placoasterella baileyi*, *Seimatosporium grevilleae* cause leaf spot diseases (B. Summerell pers. comm.).

Distribution

Status/origin: Native.

Botanical subregions: CT CWS.

Distribution Sydney area: Capertee Valley.

Select locations: CT: Mt Gundangaroo, Canobla Gap.

Habitat

Habitat: Rocky places.

Altitude: 400–700 m **Annual rainfall:** 600–700 mm

Typical local abundance: Frequent–occasional.

Vegetation: Scrub e.g. with *Beyeria viscosa*, *Muehlenbeckia rhyticarya*.

Substrate: Sandy soil on sandstone, low nutrients.

Exposure:

Conservation

Conservation: Coded 2RCi on national rare species list (Briggs & Leigh 1996).

Grevillea juniperina* subsp. *juniperina (includes *G. trinervis*)

PROTEACEAE

Life history

Growth form: Prickly shrub 0.5–1.5 m high, with needle-like leaves; hybridises with *G. mucronulata* in Pitt Town area (Makinson 2000).

Vegetative spread: No.

Longevity:

Primary juvenile period:

Flowers: Red, yellow, pale orange or greenish, sporadic flowering, July–October; bird-pollinated (Makinson 2000).

Fruit/seed: Capsule 10–18 mm long, with 1–2 seed released at maturity, October–November; seed weight 20.8 mg \pm 1.4 (Morris 2000).

Dispersal, establishment & growth: Diaspore: seed, soil-stored seedbank. Likely to have a food body for ant-dispersal (J. Howell pers. comm.). Germination experiment showed that: germination in untreated seeds 5–13%; germination mostly 30–40 days after treatment; smoke treatment increased amount of germination (x 6 with smoke alone); smoke treatment plus heat treatment resulted in at least 60% germination; heat treatment alone increased germination x 4; scarification significantly increased germination in unsmoked and unheated seeds; water uptake occurred rapidly in both scarified and unscarified seeds, mostly within 24 hrs and water loss was equally rapid on drying (Morris 2000). Tendency to colonise mechanically disturbed areas (Makinson 2000).

Fire response: Killed, regenerates from soil-stored seed only (Makinson 2000).

Interaction with other organisms: Important in ornamental horticulture, parent of many ornamental hybrids (Makinson 2000).

Distribution

Status/origin: Native.

Botanical subregions: CC.

Distribution Sydney area: Western Sydney.

Select locations: CC: Pitt Town, Windsor, Castlereagh NR, St Marys, Mt Druitt, Doonside.

Habitat

Habitat: Roadsides, ungrazed semi-cleared land.

Altitude: 0–50 m

Annual rainfall: 700–800 mm

Typical local abundance: Occasional–frequent.

Vegetation: Cumberland Plain Woodland, Castlereagh Woodland e.g. with *Eucalyptus tereticornis*, *E. sideroxylon*, *E. eugenioides*, *E. fibrosa*, *E. moluccana*, *Melaleuca decora*, *Bursaria spinosa*, *Acacia falcata*, *Dillwynia tenuifolia*.

Substrate: Clay-loam soils on Wianamatta shale to Tertiary alluvium transition areas, medium–low nutrients.

Exposure: Full sun.

Conservation

Conservation: Local endemic, restricted to the western part of the Cumberland Plain.

Listed as Vulnerable (Schedule 2) NSW *Threatened Species Conservation Act 1995*. Vulnerable in Western Sydney (James et al. 1999).

Grevillea juniperina* subsp. *sulphurea

PROTEACEAE

Life history

Growth form: Dense, prickly, weakly erect shrub to 2 m high, very variable; may intergrade with *G. juniperina* subsp. *trinervis* in southern and western Blue Mountains (Makinson 2000).

Vegetative spread: No.

Longevity:

Primary juvenile period:

Flowers: Dull yellow to apricot-orange, mostly August–September; bird-pollinated (Makinson 2000).

Fruit/seed: Capsule 10–18 mm long, with 1–2 seed released at maturity.

Dispersal, establishment & growth: Diaspore: seed, soil-stored seedbank. Likely to have a food body for ant-dispersal (J. Howell pers. comm.).

Fire response: Killed, regenerates from soil-stored seed (Makinson 2000).

Interaction with other organisms:

Distribution**Status/origin:** Native.**Botanical subregions:** CT ST.**Distribution Sydney area:** Coxs River, Berrima–Tallong.**Select locations:** CT: Coxs River, Berrima, Paddys River, Barbers Creek.**Habitat****Habitat:** Creekbanks.**Altitude:** 600–900 m **Annual rainfall:** 800–900 mm**Typical local abundance:** Occasional.**Vegetation:** Riparian scrub e.g. with *Leptospermum* sp.**Substrate:** Gravelly alluvium.**Exposure:****Conservation****Conservation:** Several populations e.g. at Towrang, Canyonleigh and Tallong are in marginal and remnant bushland and under considerable threat; possibly extinct at Coxs River (Makinson 2000).***Grevillea juniperina* subsp. *trinervis*****PROTEACEAE****Life history****Growth form:** Spreading low prickly shrub 0.5–1.2 (–2) m high; intergrades with subsp. *sulphurea*, with identification sometimes difficult (Makinson 2000).**Vegetative spread:****Longevity:****Primary juvenile period:****Flowers:** Dull orange to yellow, or red, mostly August–December; bird-pollinated (Makinson 2000).**Fruit/seed:** Capsule 10–18 mm long, with 1–2 seed released at maturity.**Dispersal, establishment & growth:** Diaspore: seed. Likely to have a food body for ant-dispersal (J. Howell pers. comm.).**Fire response:****Interaction with other organisms:****Distribution****Status/origin:** Native.**Botanical subregions:** CT.**Distribution Sydney area:** Sporadic, Western Blue Mountains.**Select locations:** CT: Cullen Bullen, Hampton, Jenolan Caves, Kowmung.**Habitat****Habitat:** Near creeks and swamps.**Altitude:** 700–1000 m **Annual rainfall:** 600–1000 mm**Typical local abundance:** Occasional–frequent.**Vegetation:** Woodland e.g. with *Eucalyptus pauciflora*, *E. dalrympleana*, *Dillwynia retorta*; riverbank e.g. with *Lomatia myricoides*.**Substrate:** Soils from granite, sandstone, alluvium, low to medium nutrients, poorly-drained.**Exposure:****Conservation****Conservation:** Local endemic, restricted to NSW Central Tablelands, with rare, sporadic populations (Makinson 2000). Conservation status unknown.

Grevillea kedumbensis (*G. obtusifolia* subsp. *kedumbensis*)

PROTEACEAE

Life history**Growth form:** Multi-stemmed shrub 0.2–1 m high, with lignotuber; leaves simple.**Vegetative spread:****Longevity:****Primary juvenile period:****Flowers:** Green to cream, most months, peak June–October; primarily bird-pollinated (Makinson 2000).**Fruit/seed:** Hairy, faintly ridged capsule 13–15 mm long (Makinson 2000), with 1–2 seed released at maturity.**Dispersal, establishment & growth:** Diaspore: seed. Likely to have a food body for ant-dispersal (J. Howell pers. comm.).**Fire response:** Regenerates from seed, lignotuber and ?rhizomes (Makinson 2000).**Interaction with other organisms:**

Distribution**Status/origin:** Native.**Botanical subregions:** CT.**Distribution Sydney area:** Kedumba Valley to Yerranderie.**Select locations:** CT: Kedumba Valley, Mt Solitary, Mt Cookem.

Habitat**Habitat:****Altitude:** 500–800 m **Annual rainfall:** 800–900 mm**Typical local abundance:** Frequent.**Vegetation:** Eucalypt open-forest e.g. with *Eucalyptus eugenoides*, *E. crebra*, *E. punctata*, *E. tereticornis*, *E. siderophloia*.**Substrate:** Sandy soils over quartzite or sandstone (Makinson 2000) and gravelly loam, low nutrients.**Exposure:**

Conservation**Conservation:** Local endemic restricted to an area between Kedumba Valley and Scotts Main Range (near Yerranderie). Listed as Endangered (Schedule 1) NSW *Threatened Species Conservation Act 1995*. Coded 2KCa on national rare species list (Briggs & Leigh 1996).***Grevillea lanigera***

PROTEACEAE

Life history**Growth form:** Prostrate to mounded shrub or dense erect shrub 0.2–2 m high, with simple leaves, very variable in foliage and habit; rhizome present; sometimes intergrades with *G. rosmarinifolia* (Makinson 2000).**Vegetative spread:****Longevity:****Primary juvenile period:****Flowers:** Red to cream, or greenish. Flowers mainly July–December, sporadic in other months; primarily bird-pollinated (Makinson 2000).**Fruit/seed:** Hairy capsule 10–15 mm long, with 1–2 seed released at maturity.**Dispersal, establishment & growth:** Diaspore: seed. Likely to have a food body for ant-dispersal (J. Howell pers. comm.).**Fire response:** Some populations regenerate from rhizomes (Makinson 2000).**Interaction with other organisms:**

Distribution**Status/origin:** Native.**Botanical subregions:** SC CT ST CWS SWS; Vic.**Distribution Sydney area:** Abercrombie.**Select locations:** CT: Abercrombie Caves, Wiaborough Creek, Wingello.

	Habitat
Habitat: Rocky slopes or moist sites near water.	
Altitude: 700–900 m	Annual rainfall: 900–1100 mm
Typical local abundance:	
Vegetation: Woodland e.g. with <i>Eucalyptus pauciflora</i> , <i>E. rubida</i> , <i>Bursaria spinosa</i> , <i>Melichrus urceolata</i> , <i>Poa sieberiana</i> ; riparian scrub.	
Substrate: Sandy, gravelly or light clayey soils over granite, sandstone, serpentine or limestone (Makinson 2000).	
Exposure:	
	Conservation
Conservation: Conservation status unknown.	

Grevillea laurifolia**PROTEACEAE**

	Life history
Growth form: Prostrate trailing shrub, with divided leaves, often forming large mats to 4.5 m diameter, but shows no rooting at nodes or vegetative spread. Natural hybrids occur with <i>G. acanthifolia</i> (Makinson 2000).	
Vegetative spread: No.	
Longevity:	
Primary juvenile period:	
Flowers: Grey-red to red or deep maroon, mainly September–January, peak November. Smaller-flowered form of <i>G. laurifolia</i> occurs in Wentworth Falls to Valley Heights area (Makinson 2000).	
Fruit/seed: Hairy capsule 9 mm long with reddish brown stripes or blotches, with 1–2 seed released at maturity.	
Dispersal, establishment & growth: Diaspore: unwinged seed, gravity-dispersed. Seed probably with an elaiosome and probably ant-dispersed (Makinson 2000). May be light-requiring coloniser species. Establishes on disturbed land e.g. pine plantations, Newnes State Forest (R. Lembit pers comm.).	
Fire response: Killed and regenerates from soil-stored seed (Makinson 2000), resprouting recorded at Leura (DHB).	
Interaction with other organisms:	

	Distribution
Status/origin: Native.	
Botanical subregions: CC CT.	
Distribution Sydney area: Blue Mountains to Richlands.	
Select locations: CC: Valley Heights, Springwood. CT: Newnes SF, Clarence, Bell, Mt Wilson, Mt Victoria, Megalong Valley, Katoomba, Wentworth Falls, Lawson, Loombah Plateau, Richlands.	

	Habitat
Habitat: Near swamps or on slopes or ridges.	
Altitude: 500–700 m	Annual rainfall: 1100–1400 mm
Typical local abundance: Frequent.	
Vegetation: Open-forest e.g. with <i>Eucalyptus sieberi</i> , <i>E. piperita</i> , <i>E. dives</i> , <i>E. mannifera</i> , <i>E. macrorhyncha</i> , <i>E. fastigata</i> , <i>Mirbelia platyloboides</i> , <i>Phyllota squarrosa</i> , <i>Persoonia chamaepitys</i> , <i>P. myrtilloides</i> , <i>Acacia obtusifolia</i> ; open-woodland to heath e.g. with <i>Eucalyptus burgessiana</i> , <i>E. sclerophylla</i> , <i>E. stricta</i> , <i>Banksia marginata</i> .	
Substrate: Sandy to clayey soils on sandstone–shale or loam from fine quartzite, low nutrients, well-drained.	
Exposure: Full sun–light shade.	
	Conservation
Conservation: Probably adequately conserved.	

Grevillea linearifolia (*G. linearifolia* 'Hawkesbury Sandstone form')

PROTEACEAE

Life history**Growth form:** Open erect shrub usually 1–2 m high, not rhizomatous.**Vegetative spread:** No.**Longevity:****Primary juvenile period:** Peak flowering about 5 years after high intensity fire (at Lane Cove, P. Kubiak pers. comm.).**Flowers:** White or rarely tinged pink, mainly August–December, sporadic January–May; insect-pollinated (Makinson 2000). Probably pollinated by Honeybees and native bees (P. Kubiak pers. comm.).**Fruit/seed:** Capsule 13–15 mm long, with 1–2 seeds released at maturity, January–March; seed weight 24.1 mg ± 1.3 (Morris 2000), seeds with an elaiosome (lipid body) (Auld 1995).**Dispersal, establishment & growth:** Diaspore: seed. Small ants *Iridomyrmex*, *Pheidole* sp. individuals working together move seed up to 20 cm and remove the elaiosome in pieces, or large solitary ants *Aphaenogaster*, *Thyridophonera* may drag the seeds to their nests; thus, up to 20% of seed may escape predation by native mammals e.g. Bush Rat *Rattus fuscipes*, Swamp wallaby *Wallabia bicolor* (Auld 1995).

Germination experiment showed that: germination in untreated seeds 5–13%; germination mostly 30–40 days after treatment; germination commenced earlier in smoked seeds; smoke treatment increased amount of germination; heat treatment alone increased germination x 2; smoke treatment plus heat treatment resulted in at least 60% germination; water uptake occurred rapidly in both scarified and unscarified seeds, mostly within 24 hrs and water loss was equally rapid on drying (Morris 2000), removal of seed coat results in 100% germination of dissected seeds (Morris et al. 2000). Persistent soil-stored seedbank, with high dormancy initially, estimated half-life 9–10 years (Auld et al. 2000).

Fire response: Killed after high intensity fire 1/94 (at Lane Cove & Narrabeen Lake, P. Kubiak pers. comm.). Regenerates from soil-stored seed (Makinson 2000).**Interaction with other organisms:** Pre-dispersal seed predation 1–2% by weevils *Cydnarea dorsalis* and 5–22% by wasps *Eurytoma* sp. (Auld & Denham 2001b).**Distribution****Status/origin:** Native.**Botanical subregions:** CC SC CT.**Distribution Sydney area:** Widespread, mainly on coast.**Select locations:** CC: Putty, Gosford, St Ives, Cheltenham, Lane Cove River, Cambewarra. CT: Lawson (Makinson 2000).**Habitat****Habitat:****Altitude:** 0–800 m **Annual rainfall:** 1100–1400 mm**Typical local abundance:** Frequent.**Vegetation:** Shrubby eucalypt woodland.**Substrate:** Sandy, skeletal soils over sandstone, low nutrients, well-drained sites. Occasionally in light sandy clayey or pebbly pseudolateritic soils (Makinson 2000).**Exposure:** Medium shade to full sun.**Conservation****Conservation:** Probably adequately conserved. Mainly coastal with a disjunct population at Lawson in Lower Blue Mountains. Reported in Bouddi NP, Brisbane Water NP, Ku-ring-gai Chase NP, Garigal NP, Lane Cove NP, Sydney Harbour NP.

Grevillea longifolia

PROTEACEAE

Life history

Growth form: Erect to spreading shrub 1.5–6 m high, with divided leaves, sometimes confused with *G. aspleniifolia* (Makinson 2000).

Vegetative spread: No.

Longevity:

Primary juvenile period: Probably 10–30 years (A. Auld pers. comm.).

Flowers: Pink to red or rarely pale orange, July–January, peak September.

Fruit/seed: Hairy capsule 13–16 mm long, with reddish brown stripes or blotches, 1–2 seed, released at maturity. Seed weight 112–143 mg (Auld & Denham 1999), seeds without an elaiosome (Auld 1995).

Dispersal, establishment & growth: Diaspore: seed, with no obvious dispersal mechanism (Auld 1995) but can be moved by water in floods (A. Auld pers. comm.), unwinged (Makinson 2000), probably gravity-dispersed locally.

Fire response: Killed, regenerates from soil-stored seed (Makinson 2000).

Interaction with other organisms: Seed predation by insects, and on the soil surface by native mammals e.g. Bush Rat *Rattus fuscipes*, Swamp Wallaby *Wallabia bicolor* (Auld 1995, Auld & Denham 1999).

Distribution

Status/origin: Native.

Botanical subregions: CC ?CT.

Distribution Sydney area: Mainly Woronora Plateau.

Select locations: CC: Burwood (1898), Carlton (1892), Woronora River, Waterfall, Lucas Hts, Kentlyn, Woolwash, Wedderburn, Appin, Helensburgh, O'Hares Creek, Bulli, Springwood (1903). CT: Lawson (1898).

Habitat

Habitat: Beside creeks, seepage zones, also on plateaus.

Altitude: 0–800 m **Annual rainfall:** 900–1400 mm

Typical local abundance: Rare–frequent.

Vegetation: Along creeks e.g. with *Lomatia myricoides*, *Tristania neriifolia*, *Tristaniopsis laurina*, *Eucalyptus pilularis*, *Ceratopetalum apetalum*; moist open-forest e.g. with *Angophora costata*, *Eucalyptus agglomerata*, *E. piperita*, *Doryanthes excelsa*; woodland e.g. with *Angophora costata*, *Eucalyptus piperita*, *E. oblonga*, *Corymbia gummifera*.

Substrate: Sandy to yellow clay soils on Hawkesbury Sandstone or sandstone/shale transition, low nutrients.

Exposure: Light shade to mid-shade.

Conservation

Conservation: Local endemic coded 2RC- on national rare species list (Briggs & Leigh 1996).

Extinct in Burwood–Carlton area, and probably also in Blue Mountains. Reported in Heathcote NP, Royal NP. Not adequately conserved (A. Auld pers. comm.).

Grevillea molyneuxii (*G. sericea* misapplied)

PROTEACEAE

Life history**Growth form:** Spreading shrub 0.2–1 m high, with narrow leaves.**Vegetative spread:** No.**Longevity:****Primary juvenile period:****Flowers:** Red, mainly August–November, bird-pollinated (Makinson 2000).**Fruit/seed:** Capsule 12–14 mm long, with 1–2 seed released at maturity.**Dispersal, establishment & growth:** Diaspore: seed. Likely to have a food body for ant-dispersal (J. Howell pers. comm.).**Fire response:** Killed, regenerates from soil-stored seed (Makinson 2000).**Interaction with other organisms:**

Distribution**Status/origin:** Native.**Botanical subregions:** CT.**Distribution Sydney area:** Southern Highlands.**Select locations:** CT: Wingello SF, Tallong.

Habitat**Habitat:** Seepage sites.**Altitude:** 500–600 m**Annual rainfall:** 1000 mm**Typical local abundance:** Frequent.**Vegetation:** Heath e.g. with *Calytrix tetragona*, *Allocasuarina distyla*, *Isopogon anethifolius*, *Acacia elongata*, *A. suaveolens*, *A. ulicifolia*, *Banksia spinulosa*, *Epacris microphylla*.**Substrate:** Shallow sandy soils over sandstone, seasonally wet sites, low nutrients.**Exposure:** Full sun.

Conservation**Conservation:** Restricted local endemic, listed as Vulnerable (Schedule 2) NSW*Threatened Species Conservation Act 1995*, coded 2K on national rare species list (Briggs & Leigh 1996). Confined to Tallong–Wingello area. Reported in Morton NP (A. Auld pers. comm.).

Conservation adequacy unknown.

Grevillea mucronulata

PROTEACEAE

Life history**Growth form:** Spreading or erect shrub, 0.3–3.5 m high, with considerable variation in leaf form, habit, regeneration mode and flower colour, with populations consistent on a geographic basis; Cumberland Plain form is lignotuberous, Lower Blue Mountains form without lignotuber (Makinson 2000).**Vegetative spread:** No.**Longevity:** ? short-medium.**Primary juvenile period:****Flowers:** Green to reddish brown, April–September; primarily bird-pollinated (Makinson 2000).**Fruit/seed:** Hairy capsule 13–20 mm long, with 1–2 seed released at maturity, October–December; seed weight 30.6 mg ± 1.4 (Morris 2000).**Dispersal, establishment & growth:** Diaspore: seed. Appears to colonise disturbed sites. Likely to have a food body for ant-dispersal (J. Howell pers. comm.). Germination experiment showed that: germination in untreated seeds c. 20%; germination mostly 30–40 days after treatment; germination commenced earlier in smoked seeds; smoke treatment increased amount of germination; no response to heat treatment and smoking did not change this; scarification significantly increased germination in unsmoked and unheated seeds; water uptake occurred rapidly in both scarified and unscarified seeds, mostly within 24 hrs and water loss was equally rapid on drying (Morris 2000).**Fire response:** Variable, populations in the Richmond to Blacktown area probably resprout from lignotubers. Populations from Singleton to Warragamba probably killed.**Interaction with other organisms:** Fungus *Placoasterella baileyi* causes leaf spot disease (B. Summerell pers. comm.).

Distribution

Status/origin: Native.

Botanical subregions: CC SC CT CWS.

Distribution Sydney area: Widespread.

Select locations: CC: Howes Mountain, Maroota, Londonderry, Kenthurst, Galston, Kurnell, Oatley, Heathcote, Yarramundi, Wallacia, Springwood, Megalong Valley, Avon Dam, Thirlmere.

CT: Nullo Mountain, Gaspers Mountain, Glen Davis, Newnes Junction, Kings Tableland.

Habitat

Habitat: Plateaus, ridges, steep slopes.

Altitude: 0–1000 m

Annual rainfall: 800–1400 mm

Typical local abundance: Frequent.

Vegetation: Open-forest e.g. with *Angophora costata*, *Eucalyptus agglomerata*, *E. piperita*, *Corymbia gummifera*, *Ceratopetalum gummiferum*; woodland e.g. with *Angophora costata*, *Eucalyptus sclerophylla*, *E. parramattensis*, *Angophora bakeri*.

Substrate: Sandy to clayey soils, on sandstones and shales or rarely granite, low nutrients.

Exposure:

Conservation

Conservation: Widespread and probably adequately conserved. Reported in Wollemi NP, Marramarra NP, Ku-ring-gai Chase NP, Sydney Harbour NP, Royal NP.

Grevillea obtusiflora* subsp. *fecunda**PROTEACEAE****Life history**

Growth form: Low spreading to erect shrub 0.5–1 m high, with rhizome (Makinson 2000).

Vegetative spread: Rhizomatous (Makinson 1997).

Longevity:

Primary juvenile period:

Flowers: Pale pink to crimson, August–December, primarily bird-pollinated (Makinson 2000).

Fruit/seed: Capsule 11–13 mm long, with 1–2 seed 9 mm long, released at maturity; copious numbers of fruit set (Makinson 1997).

Dispersal, establishment & growth: Diaspore: seed, probably ant-dispersed (Makinson 1997), establishes on disturbed ground, associated with mechanical disturbance of soil along the road (Makinson 1997, 2000).

Fire response: Resprouts from rhizomes and regenerates from seed (Makinson 2000).

Interaction with other organisms:

Distribution

Status/origin: Native.

Botanical subregions: CT.

Distribution Sydney area: Capertee Valley.

Select locations: CT: Clandulla SE, Pantoneys Crown.

Habitat

Habitat: Rocky ridges, talus slopes.

Altitude: 500–600 m

Annual rainfall: 600 mm

Typical local abundance: Frequent to occasional.

Vegetation: Eucalypt open-forest e.g. with *Eucalyptus tenella*, *E. fibrosa*, *E. nubila*, *E. macrorrhyncha*, *E. punctata*, *Callitris endlicheri*, *Monotoca elliptica*, *Acacia buxifolia*, *Persoonia linearis*.

Substrate: Distinctive orange loamy soil with sandstone boulders, the soil type and *Eucalyptus tenella* may be good indicators for the occurrence of this *Grevillea* (Makinson 1997).

Exposure:

Conservation

Conservation: Local endemic, restricted to the Capertee Valley, SSE of Kandos and probably substrate-specific (Makinson 1997). Listed as Endangered (Schedule 1) NSW *Threatened Species Conservation Act 1995*, coded 2E on national rare species list (Briggs & Leigh 1995). Reported in Gardens of Stone NP (A. Auld pers. comm.). Inadequately conserved.

Grevillea obtusiflora subsp. ***obtusiflora***

PROTEACEAE

Life history**Growth form:** Shrub to 0.7 m high.**Vegetative spread:** Wholly dependent on rhizomatous spread, up to 1.3 m from parent (Makinson 1997).**Longevity:** Indefinite.**Primary juvenile period:****Flowers:** Pink to pinkish red with cream, September–December. July–October. Closely related *Grevillea* species are primarily bird-pollinated (Makinson 2000).**Fruit/seed:** Fruits, seed and seedlings have never been recorded (Makinson 2000).**Dispersal, establishment & growth:****Fire response:** Regenerates from rhizomes only (Makinson 2000).**Interaction with other organisms:**

Distribution**Status/origin:** Native.**Botanical subregions:** CT.**Distribution Sydney area:** Clandulla SF.**Select locations:** CT: Clandulla SF.

Habitat**Habitat:** Open-forest.**Altitude:** 700 m**Annual rainfall:** 600 mm**Typical local abundance:** Frequent.**Vegetation:** Open-forest e.g. with *Eucalyptus rossii*, *E. punctata*, grassy understorey with scattered shrubs e.g. *Exocarpos* sp., *Persoonia linearis*, *Hakea decurrens*, *Acacia dawsonii*, *Acacia buxifolia*.**Substrate:** Gravelly loam derived from sandstone. Loamy soil over granite.**Exposure:**

Conservation**Conservation:** Local endemic, restricted to Clandulla area north of Capertee(R. Makinson pers. comm.). Listed as Endangered (Schedule 1) NSW *Threatened Species**Conservation Act 1995*. *Grevillea obtusiflora* coded 2E on national rare species list (Briggs & Leigh 1995). Populations may be largely clonal (R. Makinson pers. comm.).***Grevillea oldei*** (*G. trinervis*, misapplied *G. capitellata*)

PROTEACEAE

Life history**Growth form:** Diffuse shrub to 1.2 m high, with conspicuously 3-nerved leaves; apparently hybridizes with *G. speciosa* in Kulnura area (Makinson 2000).**Vegetative spread:** No.**Longevity:****Primary juvenile period:****Flowers:** Red, June–February, pollinator not known (Makinson 2000).**Fruit/seed:** Capsule 14–15 mm long, with 1–2 seed released at maturity.**Dispersal, establishment & growth:** Diaspore: seed. Likely to have a food body for ant-dispersal (J. Howell pers. comm.).**Fire response:** Killed, regenerates from soil-stored seed (Makinson 2000).**Interaction with other organisms:**

Distribution**Status/origin:** Native.**Botanical subregions:** CC.**Distribution Sydney area:** Mangrove Mountain to Woy Woy.**Select locations:** CC: Mangrove Mountain, Ourimbah, Narara, Gosford, Woy Woy.

Habitat**Habitat:** Heath or woodland.**Altitude:** 0–300 m**Annual rainfall:** 1400–1600 mm**Typical local abundance:**

Vegetation: Woodland e.g. with *Angophora costata*, *E. piperita*, *E. umbra*, *E. haemastoma*, *Corymbia gummifera*.

Substrate: Shallow, sandy soils on sandstone, low nutrients, well-drained.

Exposure:

Conservation

Conservation: Very localised endemic, coded 2RC- on national rare species list (Briggs & Leigh 1996). Restricted to a small area from Mangrove area to Woy Woy and Gosford (Makinson 2000). Conservation status unknown.

Grevillea oleoides

PROTEACEAE

Life history

Growth form: Erect shrub 0.5–3 m high, with great variation in leaf form and size; the riparian form has narrower leaves (Makinson 2000).

Vegetative spread: Sometimes rhizomatous.

Longevity: Indefinite (D. Keith pers. comm.).

Primary juvenile period:

Flowers: Red, deep reddish pink or pale pink, peak July–November, sporadically at other times. Bird-pollinated (Makinson 2000).

Fruit/seed: Capsule 10–15 mm long, with 1–2 seed, weight 26–30 mg, released at maturity. Seed with food body (J. Howell pers. comm.).

Dispersal, establishment & growth: Diaspore: seed, food body ant-adapted for dispersal (Westoby et al. 1990), local seed dispersal (Keith 1991). Soil-stored seedbank, recruitment mainly after fire (D. Keith pers. comm.).

Fire response: Regenerates from soil-stored seed and sometimes rhizomes (Makinson 2000). Resprouts, secondary juvenile period 4 years (D. Keith pers. comm.).

Interaction with other organisms:

Distribution

Status/origin: Native.

Botanical subregions: CC CT.

Distribution Sydney area: Mainly coast and Woronora Plateau.

Select locations: CC: Heathcote, Helensburgh, Campbelltown, Bargo, Bulli. CT: Wentworth Falls, Hill Top, Mittagong, Robertson, Kangaloon.

Habitat

Habitat: Ridgetops or flood-zone of river banks.

Altitude: 0–1000 m **Annual rainfall:** 1200–1600 mm

Typical local abundance: Occasional–frequent.

Vegetation: Open-forest and shrubby woodland e.g. with *Angophora costata*, *Corymbia gummifera*, *E. punctata*, *Syncarpia glomulifera*, *Banksia spinulosa*, *Gompholobium latifolium*; creekside vegetation e.g. with *Tristaniopsis laurina*, *Tristania nerifolia*, *Allocasuarina littoralis*, *Grevillea longifolia*, *Hakea salicifolia*, *Bossiaea rhombifolia*, *Pseudanthus pimelioides*.

Substrate: Skeletal sandy soils on sandstones, low-nutrients.

Exposure:

Conservation

Conservation: Local endemic, widespread but not common. Conservation status unknown. Reported in Royal NP.

Grevillea parviflora subsp. ***parviflora***
(*G. linearifolia* 'Narrower-leaved Sydney form')

PROTEACEAE

Life history

Growth form: Low open to erect shrub usually 0.3–1 m high, with rhizomes (Makinson 2000).

Vegetative spread:

Longevity: 25–60 years (D. Keith pers. comm.).

Primary juvenile period:

Flowers: White with rusty brown hairs, July–December; insect-pollinated (Makinson 2000).

Fruit/seed: Capsule 8–10 mm long, with 1–2 seed released at maturity.

Dispersal, establishment & growth: Diaspore: seed, gravity-dispersed. Recruitment mainly after fire from soil-stored seedbank (Keith 1991). Likely to have a food body for ant-dispersal (J. Howell pers. comm.).

Fire response: Killed by fire (D. Keith pers. comm.). Sometimes regenerates from rhizomes (Makinson 2000).

Interaction with other organisms:

Distribution

Status/origin: Native.

Botanical subregions: CC.

Distribution Sydney area: Mainly Woronora Plateau.

Select locations: CC: Cooranbong, Georges River, Kempes Creek, Wedderburn, Tahmoor.

Habitat

Habitat: Ridges, steep rocky slopes.

Altitude: 0–300 m

Annual rainfall: 800–1000 mm

Typical local abundance: Rare to frequent.

Vegetation: Shrubby woodland e.g. with *Eucalyptus fibrosa*, *E. sclerophylla*, *Corymbia gummifera*, *Angophora bakeri*, *Allocasuarina littoralis*, *Melaleuca nodosa*, *Grevillea mucronulata*, *Banksia spinulosa*.

Substrate: Sandy to gravelly clay over shale, low nutrients.

Exposure:

Conservation

Conservation: Local endemic. Listed as Vulnerable (Schedule 2) NSW *Threatened Species Conservation Act 1995*. Mainly Woronora Plateau to Prospect (historically), with isolated northern occurrences on western shore of Lake Macquarie and a possible southern occurrence near Moss Vale (R. Makinson pers. comm.).

Grevillea parviflora subsp. ***supplicans***

PROTEACEAE

Life history

Growth form: Low shrub 0.3–0.6 m high, major branches spreading with leaves held skyward; sometimes grows sympatrically with *G. linearifolia* with no interbreeding (Makinson 2000).

Vegetative spread:

Longevity:

Primary juvenile period:

Flowers: White with rusty brown hairs, August–November; insect-pollinated (Makinson 2000).

Fruit/seed: Capsule 8–10 mm long, with 1–2 seed, released at maturity. Seed with food body (J. Howell pers. comm.).

Dispersal, establishment & growth: Diaspore: seed, ant-dispersed locally (J. Howell pers. comm.).

Fire response: Probably killed, regenerates from soil-stored seed and possibly rhizomes (Makinson 2000).

Interaction with other organisms:

Distribution**Status/origin:** Native.**Botanical subregions:** CC.**Distribution Sydney area:** Arcadia–Maroota area.**Select locations:** CC: Maroota, Glenorie, Berrilee, Arcadia.

Habitat**Habitat:** Ridges.**Altitude:** 0–200 m **Annual rainfall:** 800–1000 mm**Typical local abundance:** Frequent.**Vegetation:** Heathy woodland e.g. with *Corymbia eximia*, *Eucalyptus oblonga*, *E. squamosa*, *Angophora bakeri*, *Kunzea ambigua*, *K. rupestris*, *Calytrix tetragona*, *Leptospermum parvifolium*, *L. trinervium*, *Zieria laevigata*, *Petrophile pulchella*.**Substrate:** Skeletal sandy soils over massive sandstones, low nutrients.**Exposure:** Full sun.

Conservation**Conservation:** Local endemic taxon, listed as Endangered (Schedule 1) NSW *Threatened Species Conservation Act 1995*. Reported in Marramarra NP.

Grevillea patulifolia* (*G. linearifolia* 'Southern Sandstone form')*PROTEACEAE**

Life history**Growth form:** Erect or low spreading shrub 0.8–2 m high.**Vegetative spread:****Longevity:****Primary juvenile period:****Flowers:** Pale pink to dark mauve pink, or rarely white, July–February, peak October; probably insect-pollinated (Makinson 2000).**Fruit/seed:** Capsule 11 mm long, with 1–2 seed released at maturity.**Dispersal, establishment & growth:** Diaspore: seed. Likely to have a food body for ant-dispersal (J. Howell pers. comm.).**Fire response:** Regenerates from soil-stored seed and (most populations?) basal suckers and/or rhizomes (Makinson 2000).**Interaction with other organisms:**

Distribution**Status/origin:** Native.**Botanical subregions:** CC SC CT SC; Vic.**Distribution Sydney area:** South from Heathcote.**Select locations:** CC: Heathcote, Picton, Yerrinbool, Jamberoo. CT: Mittagong, Fitzroy Falls, Bundanoon, Barbers Creek.

Habitat**Habitat:****Altitude:** 0–700 m **Annual rainfall:** 900–1200 mm**Typical local abundance:** Occasional–frequent.**Vegetation:** Heath and woodland e.g. with *Eucalyptus sclerophylla*.**Substrate:** Sandy soils on sandstone, low nutrients, possibly poorly-drained.**Exposure:**

Conservation**Conservation:** Heathcote is the northern geographical limit. Conservation status unknown.

Grevillea phyllicoides (*G. buxifolia* subsp. *phyllicoides*)

PROTEACEAE

Grey Spider Flower

Life history**Growth form:** Shrub 1–2 m high.**Vegetative spread:** No.**Longevity:****Primary juvenile period:****Flowers:** Hairy, grey with brown markings, sporadic flowering, mainly June–February; insect-pollinated (Makinson 2000).**Fruit/seed:** Hairy capsule 15 mm long, with 1–2 seed released at maturity.**Dispersal, establishment & growth:** Diaspore: seed. Likely to have a food body for ant-dispersal (J. Howell pers. comm.).**Fire response:** Killed, regenerates from soil-stored seed (Makinson 2000).**Interaction with other organisms:**

Distribution**Status/origin:** Native.**Botanical subregions:** CC CT.**Distribution Sydney area:** Mainly Blue Mountains.**Select locations:** CC: Hawkesbury Lookout, Glenbrook, Linden, Springwood, Oakdale, Warragamba. CT: Kings Tableland, Lawson.

Habitat**Habitat:** Ridgetops, hillsides.**Altitude:** 0–1000 m**Annual rainfall:** 900–1400 mm**Typical local abundance:** Occasional–frequent.**Vegetation:** Open-forest and woodland e.g. with *Corymbia gummifera*, *C. eximia*, *Eucalyptus punctata*, *E. piperita*, *E. sclerophylla*, *Syncarpia glomulifera*, *Angophora costata*, *A. bakeri*, *Grevillea mucronulata*, *Acacia longifolia*, *Persoonia levis*, *P. linearis*.**Substrate:** Skeletal sandy soils over sandstone, low nutrients.**Exposure:** Full sun to light shade.

Conservation**Conservation:** Local endemic species, reported in Wollemi NP, Blue Mountains NP. Conservation adequacy unknown.***Grevillea ramosissima*** subsp. *ramosissima*

PROTEACEAE

Life history**Growth form:** Prickly shrub to 1.5 m high, with stiff and leathery divided leaves; rare intergrades with *G. triternata* occur (Makinson 2000).**Vegetative spread:** Rhizomatous spread confirmed for southern part of the range (ST, SWS) may also occur elsewhere (R. Makinson pers. comm.).**Longevity:****Primary juvenile period:****Flowers:** Cream to pale yellow, August–November; adapted for insect-pollination (Makinson 2000).**Fruit/seed:** Hairy capsule 7–10 mm long, with reddish brown stripes or blotches and 1–2 winged seed, released at maturity.**Dispersal, establishment & growth:** Diaspore: seed, soil-stored seedbank. Likely to have a food body for ant-dispersal (J. Howell pers. comm.).**Fire response:** Generally killed, regenerates from soil-stored seed; some populations regenerate from rhizomes (Makinson 2000).**Interaction with other organisms:**

Distribution**Status/origin:** Native.**Botanical subregions:** CC NT CT ST NWS CWS SWS.**Distribution Sydney area:****Select locations:** CC: Yerranderie. CT: Rylstone, Capertee Valley, Mullions Range, Cargo, Orange, Hill End, Mt Solitary, Mittagong.

	Habitat
Habitat: Rocky ridges.	
Altitude: 160–1000 m	Annual rainfall: 600–1000 mm
Typical local abundance: Rare–frequent.	
Vegetation: Woodland with shrubby understorey e.g. with <i>Eucalyptus punctata</i> , <i>E. eugenioides</i> , <i>E. crebra</i> , <i>E. sideroxylon</i> .	
Substrate: Sandy or loamy soils over sandstone, granite, metamorphics, low nutrients.	
Exposure:	Conservation
Conservation: Conservation status unknown.	

Grevillea raybrownii (prev. included under *G. triternata*) **PROTEACEAE**

	Life history
Growth form: Bushy shrub to 1.5 m high, with divided leaves. Very closely related to <i>G. triternata</i> , from which it is barely distinct at species level (Makinson 2000).	
Vegetative spread: No.	
Longevity:	
Primary juvenile period:	
Flowers: White, August–November, probably insect-pollinated (Makinson 2000).	
Fruit/seed: Hairy capsule 12 mm long, with reddish brown stripes or blotches and 1–2 winged seeds released at maturity.	
Dispersal, establishment & growth: Diaspore: seed, gravity-dispersed. Likely to have a food body for ant-dispersal (J. Howell pers. comm.).	
Fire response: Probably killed, regenerates from seed (?only) (Makinson 2000).	
Interaction with other organisms:	
	Distribution
Status/origin: Native.	
Botanical subregions: CC CT.	
Distribution Sydney area: Illawarra–Southern Highlands.	
Select locations: CC: ?Avon Dam, Dapto. CT: Mittagong, Berrima, ?Bungonia, Bullio.	
	Habitat
Habitat: Edges of cleared areas e.g. tracks, car park, ridgetop.	
Altitude: 0–700 m	Annual rainfall: 700–1200 mm
Typical local abundance: Frequent–occasional.	
Vegetation: Eucalypt open-forest e.g. with <i>Eucalyptus sclerophylla</i> , <i>E. mannifera</i> subsp. <i>gulickii</i> , <i>E. globoidea</i> ; shrubland e.g. with <i>Leptospermum scoparium</i> , <i>Eriostemon australasius</i> , <i>Bossiaea heterophylla</i> , <i>Banksia ericifolia</i> ; moist heath.	
Substrate: Sandy soil, gravelly loam from sandstone, low nutrients.	
Exposure: Full sun to light shade.	
	Conservation
Conservation: Restricted to Dapto–Robertson–Berrima area. Possibly also at Bungonia (R. Makinson pers. comm.). Coded 2KC- on national rare species list (Briggs & Leigh 1996). Conservation adequacy unknown.	

Grevillea rivularis

PROTEACEAE

Carrington Falls Grevillea

Life history**Growth form:** Dense spreading prickly shrub 2–2.5 m high, with divided leaves.**Vegetative spread:** No.**Longevity:****Primary juvenile period:****Flowers:** Cream becoming pearly pink or grey, September–April (Makinson 2000).**Fruit/seed:** Hairy capsule 8–10 mm long, with reddish brown stripes or blotches and 1–2 winged seeds, released at maturity.**Dispersal, establishment & growth:** Diaspore: unwinged seed, probably with an elaiosome (Makinson 2000), short-distance gravity-dispersed. Likely to have a food body for ant-dispersal (J. Howell pers. comm.).**Fire response:** Probably killed and regenerates from seed only (Makinson 2000), obligate seeder (A. Auld pers. comm.).**Interaction with other organisms:****Distribution****Status/origin:** Native.**Botanical subregions:** CT.**Distribution Sydney area:** Carrington Falls.**Select locations:** CC: Carrington Falls.**Habitat****Habitat:** Moist creekbanks, rock ledges.**Altitude:** 400–600 m**Annual rainfall:** 1000–1600 mm**Typical local abundance:** Occasional–frequent.**Vegetation:** Riparian vegetation e.g. with *Leptospermum polygalifolium*, *Acacia binervata*, *A. longifolia*, *Hakea dactyloides*, *H. salicifolia*, *Callicoma serratifolia*, *Lomandra longifolia*, *Tristania*.**Substrate:** Sandy alluvium from sandstone, low nutrients.**Exposure:** Mid shade.**Conservation****Conservation:** Local endemic restricted to the Carrington Falls area SE of Moss Vale (Makinson 2000), listed as Endangered (Schedule 1) NSW *Threatened Species Conservation Act 1995*. Coded 2VCi on national rare species list (Briggs & Leigh 1996). Conservation adequacy unknown.***Grevillea rosmarinifolia* subsp. *rosmarinifolia***

PROTEACEAE

Life history**Growth form:** Compact to open shrub 0.2–2 m high; very variable foliage (Makinson 2000).**Vegetative spread:****Longevity:****Primary juvenile period:****Flowers:** Pink to red or rarely yellow, pale green, cream or orange, July–December, primarily bird-pollinated (Makinson 2000).**Fruit/seed:** Hairy capsule 8–11 mm long, with 1–2 seed released at maturity.**Dispersal, establishment & growth:** Diaspore: seed. Likely to have a food body for ant-dispersal (J. Howell pers. comm.).**Fire response:** Regenerates usually from seed, but in some populations also from rhizomes (Makinson 2000).**Interaction with other organisms:** Fungi *Seimatosporium grevilleae*, *S. kennedyae* causes leaf spot disease (B. Summerell pers. comm.).**Distribution****Status/origin:** Native.**Botanical subregions:** CT ST SWS; Vic, *S.A.**Distribution Sydney area:** Kowmung–Jenolan area.**Select locations:** CT: Kowmung, Hampton, Hartley.

	Habitat
Habitat: Rocky slopes or on creekbanks subject to inundation.	
Altitude: 600–1200 m	Annual rainfall: 800–1000 mm
Typical local abundance: Rare–occasional.	
Vegetation: Eucalypt open-forest.	
Substrate: Loamy sand, alluvium, medium nutrients.	
Exposure:	
	Conservation
Conservation: Conservation status unknown.	

***Grevillea sericea* subsp. *riparia* (*G. riparia*)** **PROTEACEAE**

	Life history
Growth form: Shrub 0.5–2 m high.	
Vegetative spread: Possibly from basal suckers (Makinson 2000).	
Longevity:	
Primary juvenile period:	
Flowers: Deep purplish pink, August–November; probably insect-pollinated (Makinson 2000).	
Fruit/seed: Capsule, with 1–2 seed released at maturity. Seed with food body (J. Howell pers. comm.).	
Dispersal, establishment & growth: Diaspore: seed, ant-dispersed locally (J. Howell pers. comm.). Likely to have a food body for ant-dispersal (J. Howell pers. comm.).	
Fire response: Regeneration possibly from basal suckers (Makinson 2000).	
Interaction with other organisms:	
	Distribution
Status/origin: Native.	
Botanical subregions: CC.	
Distribution Sydney area: Foot of Blue Mountains escarpment.	
Select locations: CC: Lower Colo, lower Grose River, Glenbrook Creek.	
	Habitat
Habitat: Riverbanks, floodzones of permanent streams.	
Altitude: 0–50 m	Annual rainfall: 800–900 mm
Typical local abundance: Occasional–frequent.	
Vegetation: Riparian floodzone e.g. with <i>Allocasuarina littoralis</i> , <i>Acacia longifolia</i> , <i>Acacia binervia</i> , <i>Lomandra fluviatilis</i> , <i>Epacris sparsa</i> , <i>Daviesia corymbosa</i> , <i>Goodenia ovata</i> .	
Substrate: Silty sand, deep alluvial sandy loam soils, low nutrients.	
Exposure: Dense shade, subject to periodic flooding.	
	Conservation
Conservation: Local endemic restricted to the banks of the lower Grose and Colo Rivers and Glenbrook Creek and possibly Erskine Creek (Makinson 2000). Conservation status unknown.	

Grevillea sericea* subsp. *sericea* (*G. stricta*)*PROTEACEAE****Life history**

Growth form: Shrub 0.5–2 m high.

Vegetative spread: Generally no.

Longevity: Short–medium (to 20 years). Main growth period December–April.

Primary juvenile period: More than 2 years after high intensity fire 1/94 (at Lane Cove, P. Kubiak pers. comm.), 4–6 years (Benson 1985).

Flowers: Deep pink, pale pink or white, at any time of year but mostly July–January, peak September–October. Peak flowering 4–5 years after high intensity fire (1/94) at Lane Cove (P. Kubiak pers. comm.). Insect-pollinated (Makinson 2000). large native bees may assist pollination (P. Kubiak pers. comm.)

Fruit/seed: Capsule 9–16 mm long, with 1–2 seed released at maturity, January–March; seed weight 24.1 mg ± 1.3 (Morris 2000).

Dispersal, establishment & growth: Diaspore: seed, with food body ant-adapted for dispersal (Westoby et al. 1990, Rice & Westoby 1981). Soil-stored seedbank. Germination experiment showed that: germination in untreated seeds 5–13%; germination mostly 30–40 days after treatment; smoke treatment increased amount of germination; no response to heat treatment and smoking did not change this; water uptake occurred rapidly in both scarified and unscarified seeds, mostly within 24 hrs and water loss was equally rapid on drying (Morris 2000), additive relationship between smoke and heat, with smoke having the most influence (Kenny 2000).

Fire response: Populations on skeletal soils over massive sandstones (i.e. over most of its range on Gosford, Hornsby, Woronora Plateaus) are generally killed (Makinson 2000). Re-establishment from soil-stored seed is most common. Killed after high intensity fire 1/94 (at Lane Cove & Narrabeen Lake, P. Kubiak pers. comm.). Some root suckering (at Wallarah Creek and Leura) and basal resprouting (at Brisbane Water) has been observed. Resprouting from base and root suckers 6–12 months after fire (at Wye 1980, Herb. notes).

Interaction with other organisms: Host of scale insect, possibly *Gascardia destructor*. Fungus *Placoasterella baileyi* causes a leaf spot disease (B. Summerell pers. comm.). Pre-dispersal seed predators include weevils *Cydmaea dorsalis* (Auld & Denham 2001b).

Distribution

Status/origin: Native.

Botanical subregions: CC CT CWS.

Distribution Sydney area: Widespread.

Select locations: CC: Wyong, Kariiong, Berowra, Palm Beach, Terry Hills, Narrabeen, Cheltenham, Lane Cove, Pennant Hills, Bondi, Oatley, Engadine, Yarramundi, Springwood. CT: Glen Davis, Newnes Plateau, Bilpin, Kings Tableland, Lawson, Linden.

Habitat

Habitat: Plateaus, ridges, slopes.

Altitude: 0–1000 m

Annual rainfall: 700–1400 mm

Typical local abundance: Frequent–occasional.

Vegetation: Open-forest to woodland e.g. with *Corymbia gummifera*, *Eucalyptus capitellata*, *Angophora costata*, *Eucalyptus sieberi*, *E. haemastoma*, *Acacia linifolia*; shrubland/heath e.g. with *Grevillea buxifolia*, *Hakea sericea*, *H. laevipes*, *H. teretifolia*, *Banksia serrata*, *Leptospermum squarrosum*.

Substrate: Gravelly, loamy to sandy, skeletal soils over sandstone, low nutrients.

Exposure: Full sun to light shade.

Conservation

Conservation: Widespread and probably adequately conserved. Reported in Wollemi NP, Bouddi NP, Brisbane Water NP, Ku-ring-gai Chase NP, Garigal NP (east), Lane Cove NP, Sydney Harbour NP. Northern populations (Mudgee to Goulburn River) may be a distinct taxon (R. Makinson pers. comm.).

Grevillea shiressii**PROTEACEAE****Life history**

Growth form: Erect shrub 1.5–5 m high, with simple leaves 8–19 cm long.

Vegetative spread: No.

Longevity:

Primary juvenile period:

Flowers: Bluish to mauve and cream, mainly July–December, bird-pollinated (Makinson 2000).

Fruit/seed: Capsule 14–16 mm long, with 1–2 seeds, weight 25 mg, released at maturity, October.

Dispersal, establishment & growth: Diaspore: seed, with food body adapted for ant-dispersal (Auld & Denham 2001b, Auld et al. 1991), dispersed by ants (Auld & Denham 1999).

Fire response: Killed, regenerates from seed only (Makinson 2000).

Interaction with other organisms: Pre-dispersal seed predation 46% by wasps *Eurytoma* sp. (Auld & Denham 2001b).

Distribution

Status/origin: Native.

Botanical subregions: CC.

Distribution Sydney area: Brisbane Water.

Select locations: CC: Mooney Mooney Creek, Mullet Creek.

Habitat

Habitat: Creekbanks close to water.

Altitude: 0–30 m

Annual rainfall: 1200 mm

Typical local abundance: Frequent.

Vegetation: Moist open-forest e.g. with *Eucalyptus deanei*, *Syncarpia glomulifera*, *Angophora floribunda*; riparian vegetation e.g. with *Tristaniopsis laurina*, *Lomatia myricoides* (R. Makinson pers. comm.).

Substrate: Sandy soil on alluvium, sandstone.

Exposure:

Conservation

Conservation: Very, restricted local endemic, listed as Vulnerable (Schedule 2) NSW *Threatened Species Conservation Act 1995*. Coded 2VCit on national rare species list (Briggs & Leigh 1996). Reported in Brisbane Water NP. Very localised, review of conservation status needed (A. Auld pers. comm.).

Grevillea speciosa

PROTEACEAE

Red Spider Flower

Life history**Growth form:** Shrub to 3 m high.**Vegetative spread:** No.**Longevity:****Primary juvenile period:** 2 years (Auld 1995), 4 years (Benson 1985).**Flowers:** Red or coral pink, January–December, peak July–October. Bird-pollinated (Makinson 2000). New Holland and White-cheeked Honeyeaters obtain nectar from flowers (Armstrong 1991).**Fruit/seed:** Capsule with 1–2 seeds; seeds with an elaiosome (lipid body) (Auld 1995), released at maturity, October–November; seed weight 27–34 mg (Morris 2000, Auld & Denham 1999, Westoby et al. 1990).**Dispersal, establishment & growth:** Diaspore: seed, with food body ant-adapted for dispersal (Westoby et al. 1990, Rice & Westoby 1981). Soil-stored seedbank (Bradstock et al. 1997), initially with 88% dormancy, estimated half-life 3–4 years (Auld et al. 2000). No breaking of seed dormancy by heating; strongly pulsed pattern of post-fire germination (Auld & Tozer 1995).

Germination experiment showed that: germination in untreated seeds c. 20%; germination mostly 30–40 days after treatment; germination commenced earlier in smoked seeds; smoke treatment increased amount of germination (x 1.7 with smoke alone); heat treatment; increase in germination with heat applied to smoked seeds but no increase with unsmoked seeds; significant increase in germination when scarification was used in addition to heat and smoke treatment; water uptake occurred rapidly in both scarified and unscarified seeds, mostly within 24 hrs and water loss was equally rapid on drying (Morris 2000), combined heat and smoke gave almost full germination, smoke having the most influence (Kenny 2000).

Fire response: Killed after high intensity fire 1/94 (at Lane Cove & Narrabeen Lake, P. Kubiak pers. comm.).**Interaction with other organisms:** Small ants *Iridomyrmex* sp., *Pheidole* sp., *Crematogaster* sp. individuals working together move seed up to 20 cm and remove the elaiosome in pieces, or large solitary ants *Aphaenogaster* sp., *Thyridophonera* sp. may drag the seeds to their nests; thus, up to 20% of seed may escape predation by native mammals e.g. Bush Rat *Rattus fuscipes*, Swamp Wallaby *Wallabia bicolor* (Auld 1995, Auld & Denham 1999). Fungus *Placoasterella baileyi* causes a leaf spot disease (B. Summerell pers. comm.). Pre-dispersal seed predation 3% by weevils *Cydmaea dorsalis* and 1–13% by wasps *Eurytoma* sp. (Auld & Denham 2001b).**Distribution****Status/origin:** Native.**Botanical subregions:** CC.**Distribution Sydney area:** Widespread north of Port Jackson (R. Makinson pers. comm.).**Select locations:** CC: Kulnura, Bucketty, Narara, Maroota, Hornsby, Commodore Heights, Cheltenham, Frenchs Forest, Dee Why, Manly, Ryde, Northbridge, Rose Bay.**Habitat****Habitat:** Ridgetops, hillsides.**Altitude:** 0–200 m**Annual rainfall:** 1200–1400 mm**Typical local abundance:** Frequent–occasional.**Vegetation:** Woodland e.g. with *Angophora bakeri*, *A. costata*, *Corymbia gummifera*, *Eucalyptus punctata*, *E. racemosa*, *Syncarpia glomulifera*.**Substrate:** Sandy soils on sandstone, low nutrients.**Exposure:** Full sun to light shade.**Conservation****Conservation:** Local endemic species, Port Jackson is southern geographical limit.

Reported from Marramarr NP, Ku-ring-gai Chase NP, Garigal NP, Sydney Harbour NP.

Grevillea sphacelata (*G. buxifolia* subsp. *sphacelata*)

PROTEACEAE

Grey Spider Flower

Life history

Growth form: Shrub 0.4–2.5 m high, with silky branchlets and simple, narrow leaves and lignotuber (Makinson 2000), easily confused with *G. phyllicoides* (R. Makinson pers. comm.).

Vegetative spread: No.

Longevity:

Primary juvenile period:

Flowers: Pale brown, June–December, peak September.

Fruit/seed: Slightly hairy capsule, with 1–2 seeds, weight 35 mg, released at maturity. Seed with food body (J. Howell pers. comm.).

Dispersal, establishment & growth: Diaspore: seed, ant-adapted for dispersal (Westoby et al. 1990).

Fire response: Resprouts (Morrison et al. 1995). ?Sometimes regenerates from a lignotuber (Makinson 2000).

Interaction with other organisms: Fungus *Placoasterella baileyi* causes a leaf spot disease (B. Summerell pers. comm.).

Distribution

Status/origin: Native.

Botanical subregions: CC CT .

Distribution Sydney area: Mainly Woronora Plateau.

Select locations: CC: Gladesville, Arncliffe, Randwick, Holsworthy, Engadine, Waterfall, Douglas Park, Appin, Bargo. CT: Colo Vale, Hill Top, Mittagong.

Habitat

Habitat: Woodland and heath.

Altitude: 0–600 m

Annual rainfall: 900–1400 mm

Typical local abundance: Frequent.

Vegetation: Woodland e.g. with *Eucalyptus sieberi*, *E. haemastoma*, *Corymbia gummifera*, *Angophora costata*; heath/scrub e.g. with *Banksia marginata*, *B. oblongifolia*, *B. spinulosa*, *Acacia suaveolens*, *Angophora hispida*, *Kunzea ambigua*.

Substrate: Shallow soils from sandstone, shaley clay or heavy loam.

Exposure: Full sun.

Conservation

Conservation: Conservation status unknown. Local endemic species, coastal from Port Jackson and Parramatta River to West Dapto and Mittagong (Makinson 2000). Reported in Royal NP.

Grevillea triternata

PROTEACEAE

Life history

Growth form: Shrub 0.2–1 m high, with rhizome; leaves divided. Closely related to *G. raybrownii*, *G. ramosissima* (Makinson 2000).

Vegetative spread:

Longevity:

Primary juvenile period:

Flowers: White to cream or pale yellow, October.

Fruit/seed: Hairy capsule with reddish brown stripes or blotches and 1–2 winged seed, released at maturity, ?November.

Dispersal, establishment & growth: Diaspore: seed. Likely to have a food body for ant-dispersal (J. Howell pers. comm.).

Fire response: Probably reprints from base.

Interaction with other organisms:

Distribution

Status/origin: Native.

Botanical subregions: NT CT NWS CWS.

Distribution Sydney area: Blue Mountains and Bathurst area.

Select locations: CT: Widdin Valley, Growee, Winburndale NR, Bathurst, Mt Blaxland, Wanganderry.

Habitat

Habitat: Plateau.

Altitude: 400–800 m **Annual rainfall:** 600–700 mm

Typical local abundance: Occasional–frequent.

Vegetation: Woodland e.g. with *Eucalyptus fibrosa*, *E. punctata*, *E. sclerophylla*, *Hakea constablei*, *Callitris*.

Substrate: Gravelly clay to sandy soils on conglomerate, granite, sandstone, low nutrients.

Exposure: Full sun to light shade.

Conservation

Conservation: Conservation status unknown.

Hakea bakeriana

PROTEACEAE

Life history

Growth form: Bushy, dense multistemmed low shrub 1–2 m high, with needle-like leaves 5–7 cm long; with a lignotuber.

Vegetative spread: No.

Longevity: Medium-long.

Primary juvenile period:

Flowers: Pink to crimson, on the main stem, May–September (Barker et al. 1999).

Fruit/seed: Rough, wrinkled woody fruit 50–70 mm long, with 2 winged seeds 38–55 mm long (Barker et al. 1999); canopy-stored seedbank.

Dispersal, establishment & growth: Diaspore: seed, gravity-dispersed or short distance wind-dispersed.

Fire response: Stems killed, resprouts from lignotuber. Flowers 2–3 years, fruits 4–5 years after fire (Aust Plants 8-295). Seedlings rare after fire.

Interaction with other organisms:

Distribution

Status/origin: Native.

Botanical subregions: NC CC.

Distribution Sydney area: Hornsby Plateau.

Select locations: CC: Morisset, Wyee, Wybung Head, Doyalson, Munmorah SRA, Kulnura, Maroota, Canoelands, Glenorie.

Habitat

Habitat: Ridges and hillsides.

Altitude: 0–300 m **Annual rainfall:** 1000–1400 mm

Typical local abundance: Occasional–frequent.

Vegetation: Woodland e.g. with *Angophora bakeri*, *Corymbia gummifera*, *Eucalyptus punctata*, *E. racemosa*, *E. capitellata*; heath e.g. with *Allocasuarina distyla*, *Lambertia formosa*.

Substrate: Sandy soils on sandstone, low nutrients.

Exposure: Light shade to full sun.

Conservation

Conservation: Restricted to near coastal area between Newcastle and Hawkesbury River (Barker et al. 1999), with southern geographical limit at Glenorie. Conservation status unknown. Reported from Dharug NP, Marramarra NP and Munmorah SRA.

Hakea constablei**PROTEACEAE****Life history**

Growth form: Slender to bushy shrub or small tree 2–6 m high, with hairy young growth and needle-like leaves 4–12 cm long.

Vegetative spread:

Longevity:

Primary juvenile period:

Flowers: Cream to white, October–November. September–November (Barker et al. 1999). Flowers on previous season's growth (Stacy 1977).

Fruit/seed: Warty, woody fruit 40–60 mm long, with 2 winged seeds. Oven-dried fruit weight 23.3 g, with one seed per fruit (Bradstock et al. 1994), seed 27–37 mm long (Barker et al. 1999). Fruits 5 cm diam, take up to 2 years to mature (Stacy 1977). Canopy-stored seedbank.

Dispersal, establishment & growth: Diaspore: seed, gravity-dispersed and short distance wind-dispersed. Seed with no dormancy mechanism (Bradstock et al. 1994). Relies on mist for moisture requirements (Stacy 1977).

Fire response: Plants killed (Barker et al. 1999). Exposure of fruits to increasing temperature (to 800 °C) does not adversely affect the viability of seed (Bradstock et al. 1994). May not regenerate well from seed following fire (Stacy 1977).

Interaction with other organisms:

Distribution

Status/origin: Native.

Botanical subregions: CC CT.

Distribution Sydney area: Upper Blue Mountains, Southern Highlands.

Select locations: CT: Mt Wilson, Mittagong, Bonnum Pic.

Habitat

Habitat: Rocky outcrops, cliffs.

Altitude: 500–1100 m **Annual rainfall:** 900–1200 mm

Typical local abundance: Frequent.

Vegetation: Heath and mallee e.g. with *Leptospermum trinervium*, *Banksia ericifolia*, *Acacia binervia*, *Eucalyptus apiculata*.

Substrate: Sandy soil or laterite on sandstone, low nutrients, well-drained.

Exposure: Full sun.

Conservation

Conservation: Local endemic confined to Blue Mountains and Southern Highlands, coded 2RCa on national rare species list (Briggs & Leigh 1996). Conservation adequacy unknown. Reported from Blue Mountains NP, Nattai NP.

Hakea dactyloides**PROTEACEAE****Life history**

Growth form: Erect, single-stemmed, non-lignotuberous shrub or small tree 2.5–4.5 m high, with simple flat leaves 5–14 mm wide. '*Hakea dactyloides* species complex' now divided into two species with the resprouting form recognised as *Hakea laevipes*; further resolution may follow as more information becomes available (Barker et al. 1999).

Vegetative spread: No.

Longevity: Medium (?15–28 years).

Primary juvenile period: 4 years (R. Lembit pers comm), 6.5 years after high intensity fire (1/1994) at Lane Cove (P. Kubiak pers. comm.).

Flowers: Cream, October–November. May show marked variation in amount of flowering from one year to the next (P. Kubiak pers. comm.). Honeybees, beetles and wasps attracted to flowers for ?nectar (P. Kubiak pers. comm.).

Fruit/seed: Woody, warty follicle 20–30 mm long, with 2 winged seeds 18–23 mm long; canopy-stored seedbank, released when death of branch or plant occurs. Oven-dried fruit weight 2.9–15.5 g (Bradstock et al. 1994). Seed viability 78.8% (Williams & Clarke 1998). In a field experiment highest germination rate was only 17.5%; waterlogging inhibits seed germination (Williams & Clarke 1997).

Dispersal, establishment & growth: Diaspore: seed, gravity or short distance wind-dispersed. May establish in absence of fire. Seedlings observed on disturbed sites (at Lithgow).

Fire response: Killed, re-establishes from seed released from follicles. Exposure of fruits to increasing temperatures decreases the viability of seed (Bradstock et al. 1994).

Interaction with other organisms: Low levels of pre-dispersal seed predation (Williams & Clarke 1997).

Distribution

Status/origin: Native.

Botanical subregions: CC SC CT ST CWS; Vic.

Distribution Sydney area: Widespread on coast and tablelands.

Select locations: CC: Kulnura, Gosford, Wisemans Ferry, Hornsby, Dee Why, Balls Head, Canterbury, Botany Bay, Cronulla, Nortons Basin, Woronora River, Royal NP, West Dapto, Springwood. CT: Clarence, Mt Wilson, Wentworth Falls, Katoomba, Kanangra Tops, Mittagong, Fitzroy Falls, Bundanoon, Wingello.

Habitat

Habitat: Slopes, ridges and along watercourses (Barker et al. 1999).

Altitude: 0–1200 m **Annual rainfall:** 800–1400 mm

Typical local abundance: Frequent.

Vegetation: Open-forest, gullies.

Substrate: Sandy soil on sandstone.

Exposure: Full sun.

Conservation

Conservation: Widespread and probably adequately conserved. Reported in Dharug NP, Royal NP, Blue Mountains NP.

Hakea dohertyi (*H. sp. B*)

PROTEACEAE

Life history

Growth form: Slender shrub 3–4 m high, 3 m wide, with linear leaves 20–40 cm long; without a lignotuber. Stem circumference 30 cm above soil level to 39 cm (Steenbeeke 1995).

Vegetative spread: No.

Longevity: More than 100 years (Steenbeeke 1995).

Primary juvenile period: 7 years (Steenbeeke 1995).

Flowers: Creamy white, late August–late September (Steenbeeke 1995).

Fruit/seed: Woody fruit 25 mm long, with 2 winged seeds. Seed 12 mm long (Barker et al. 1999); canopy-stored seedbank. Seed predation in canopy 3–6%; canopy-stored seed highly viable 90–100% (Steenbeeke 1995).

Dispersal, establishment & growth: Diaspore: winged seed, gravity-dispersed, short-distance wind-dispersed. Protective mulch required for successful seedling recruitment; seed is dispersed at all times due to opening of the lower (older) follicles as a result of secondary thickening, although peak dispersal is after a bushfire. Seedlings establish in the litter, and growth is initially very slow. Juvenile leaves are different to those of adults, being up to 10 cm long and 1 cm wide, and often covered in a closely appressed layer of rusty hairs. Unlike many *Hakea* species, this one occurs in populations having a wide representation of differently aged individuals; growth rate at least 10 cm per year (Steenbeeke 1995).

Fire response: Plants killed, regeneration from canopy-stored seed, seed killed with burning time more than 3 mins or temperature exceeding 300° C low intensity fast fire allows survival of seed-store; seedling recruitment continues in the absence of fire (Steenbeeke 1995).

Interaction with other organisms: Hover flies often seen around flower clusters, plant predators include scale insect, larva of butterfly *Papilio* sp. or *Graphium* sp., larvae of borers Coleoptera ; young plants eaten by goats (Steenbeeke 1995).

Distribution

Status/origin: Native.

Botanical subregions: CT.

Distribution Sydney area: Southern Blue Mountains.

Select locations: CT: Sombre Dome, Nercus Spur, Tonalli Point, Lake Burragorang, Irrae Gowar, Moonshine Hill, Rudders Rift.

Habitat

Habitat: Open, rocky ridgetops, often steep, dry, north facing sites.

Altitude: 100–1100 m **Annual rainfall:** 800–1000 mm

Typical local abundance:

Vegetation: Open-forest or woodland e.g. with *Eucalyptus punctata*, *E. sieberi*, *E. blaxlandii*, *Allocasuarina torulosa*, *Lomatia silaifolia*, *Stypandra glauca*, *Persoonia linearis*.

Substrate: Fine sandy soil with shale substrate, shallow sandy soil on rocky quartzite and shale in Lambie group (Devonian) or Kowmung Volcano clastics (Silurian), low nutrients.

Exposure: Withstands below-freezing temperatures. Full sun to light shade. Generally high exposure, under light shade and on crests of ridges or on north-facing slopes. Very rarely in heavy shade, and then showing spindly growth suggestive of stress (Steenbeeke 1995).

Conservation

Conservation: Local endemic species, mainly restricted to an area 18 km² in Kanangra Boyd NP, at least 7000 individuals (Steenbeeke 1995). Listed as Endangered (Schedule 1) NSW *Threatened Species Conservation Act 1995* and coded 2VCi on national rare species list (Briggs & Leigh 1996). Burragorang population threatened by possible increased storage level of lake.

Hakea gibbosa

PROTEACEAE

Life history

Growth form: Shrub 1–3 m high, with hairy branchlets and hairy young needle-like leaves 2–8 cm long. No lignotuber (Barker et al. 1999).

Vegetative spread:

Longevity: ?20–30 years.

Primary juvenile period: 3 years after high intensity fire 1/94 (at Lane Cove, P. Kubiak pers. comm.).

Flowers: Yellowish white, on previous years growth. April–July (Barker et al. 1999).

Fruit/seed: Woody follicle 26–45 mm long, with winged seed 20–33 mm long; seed weight 64–71 mg (Westoby et al. 1990), may possibly release seed viable seed seasonally from underdeveloped fruit (Barker et al. 1999); canopy-stored seedbank, released after death of plant usually following fire. Oven-dried fruit weight 15.5 g, with one seed per fruit (Bradstock et al. 1994).

Dispersal, establishment & growth: Diaspore: seed, gravity or short distance wind-dispersed.

Fire response: Killed, re-establishes from canopy-stored seed. Exposure of fruits to increasing temperature (to 800°C) does not adversely affect the viability of seed (Bradstock et al. 1994).

Interaction with other organisms: Host plant of Cerambycid beetle *Aphanasium australe* (Hawkeswood 1993). Provides habitat for small nesting birds (Stacy 1977). Honeybees, hoverflies attracted to flowers for ?nectar; some plants with borers in tips of stems (P. Kubiak pers. comm.).

Distribution

Status/origin: Native.

Botanical subregions: CC SC.

Distribution Sydney area: Coast and adjacent plateaus.

Select locations: CC: Kulnura, Commodore Heights, Wahroonga, Cheltenham, Elanora, Brookvale, Chatswood, Manly, Dobroyd Point, Bondi, Arncliffe, Waterfall.

Habitat

Habitat: Most common in windswept scrub on coastal cliffs (Barker et al. 1999), ridges.

Altitude: 0–300 m **Annual rainfall:** 1100–1400 mm

Typical local abundance: Frequent.

Vegetation: Heath, woodland e.g. with *Corymbia gummifera*, *Leptospermum trinervium*, *Hakea teretifolia*, *Banksia ericifolia*, *Petrophile pulchella*.

Substrate: Sandy loam over sandstone, low nutrients.

Exposure: Full sun to light shade.

Conservation

Conservation: Reported from Bouddi NP, Brisbane Water NP, Marramarra NP, Ku-ring-gai Chase NP, Garigal NP, Lane Cove NP, Sydney Harbour NP. Probably adequately conserved.

***Hakea laevipes* subsp. *laevipes* (prev. included in *Hakea dactyloides*)**

PROTEACEAE

Life history

Growth form: Erect, bushy lignotuberous shrub 0.3–3 m high, with simple flat leaves 4–30 mm wide. '*Hakea dactyloides* species complex' now divided into two species with the resprouting form recognised as *Hakea laevipes*; further resolution may follow as more information becomes available (Barker et al. 1999).

Vegetative spread: No.

Longevity:

Primary juvenile period:

Flowers: Creamish, November–January. Flies, beetles and ants attracted to flowers for ?nectar (P. Kubiak pers. comm.).

Fruit/seed: Woody fruit 20–30 mm long, with 2 winged seeds 20 mm long; seed weight 18–27 mg (Westoby et al. 1990), canopy-stored seedbank, released when death of branch or plant occurs.

Dispersal, establishment & growth: Diaspore: seed, gravity-dispersed or short distance wind-dispersed.

Fire response: Stems killed, resprouts from lignotuber. Resprouted at Agnes Banks (Benson 1981).

Interaction with other organisms:

Distribution

Status/origin: Native.

Botanical subregions: NC CC SC CT ST.

Distribution Sydney area: Widespread on coast and ranges.

Select locations: CC: Bucketty, Bilpin, Shane Park, Royal NP. CT: Newnes SF, Clarence, Wingello.

Habitat

Habitat: Ridges and slopes.

Altitude: 0–1000 m

Annual rainfall: 800–1200 mm

Typical local abundance: Frequent–occasional.

Vegetation: Open-forest e.g. with *Angophora costata*, *Eucalyptus piperita*; woodland e.g. with *Eucalyptus haemastoma*, *E. sieberi*, *E. capitallata*, *Corymbia gummifera*, *Banksia serrata*, *B. spinulosa*, *Persoonia levis*, *Isopogon anemonifolius*, *Lomatia silaifolia*; mallee and heath e.g. with *Eucalyptus stricta*, *Petrophile pulchella*, *Banksia marginata*, *Phyllota squarrosa*.

Substrate: Sandy soils, on sandstone, Tertiary alluvium, low nutrients, sometimes poorly-drained.

Exposure:

Conservation

Conservation: Reported in Royal NP.

Hakea microcarpa

PROTEACEAE

Small-fruited Hakea

Life history

Growth form: Spreading shrub to 2 m high, with needle-like leaves 3–11 cm long.

Vegetative spread: No.

Longevity:

Primary juvenile period:

Flowers: Whitish, December. September–February (Barker et al. 1999).

Fruit/seed: Woody follicle 15–17 mm long, with 2 winged seeds. Seed 7–12 mm long (Barker et al. 1999); canopy-stored seedbank. Seed viability 81.2% (Williams & Clarke 1997).

Dispersal, establishment & growth: Diaspore: seed, gravity or short distance wind-dispersed. Waterlogging inhibits germination (Williams & Clarke 1997).

Fire response: Resprouts from lignotuber (Williams & Clarke 1997).

Interaction with other organisms: Low levels of pre-dispersal seed predation (Williams & Clarke 1997). Fungus *Placoasterella baileyi* causes leaf spot disease (B. Summerell pers. comm.),

Distribution

Status/origin: Native.

Botanical subregions: SC NT CT ST NWS CWS; Qld, Vic., Tas.

Distribution Sydney area: Tablelands.

Select locations: CT: Mount Vincent, Newnes SF, Little Hartley, Turon River, Jenolan Caves, Oberon, Bowral, Penrose SF.

Habitat

Habitat: Wet places near creeks.

Altitude: 600–1200 m

Annual rainfall: 800–900 mm

Typical local abundance: Frequent.

Vegetation: Wet heath and shrub swamp e.g. with *Leptospermum* sp., *Baeckea* sp. etc.

Substrate: Sandy soil on sandstone, low nutrients, poorly drained.

Exposure: Full sun.

Conservation

Conservation: Conservation status unknown.

Hakea pachyphylla (prev. included in *H. propinqua*)

PROTEACEAE

Life history

Growth form: Compact to spreading, single-stemmed shrub to 2 m high, with branchlets ribbed and hairy, and needle-like leaves 1–5 cm long. No lignotuber (Barker et al. 1999).

Vegetative spread: No.

Longevity:

Primary juvenile period:

Flowers: Yellow, October. August–September (–October) (Barker et al. 1999).

Fruit/seed: Roundish woody follicle 29–35 mm long, with 2 winged seeds. Seed 22–25 mm long (Barker et al. 1999). Canopy-stored seedbank, released after death of branch or plant usually following fire.

Dispersal, establishment & growth: Diaspore: seed, gravity-dispersed or short distance wind-dispersed.

Fire response: Probably killed.

Interaction with other organisms:

Distribution

Status/origin: Native.

Botanical subregions: CT ?SC.

Distribution Sydney area: Upper Blue Mountains.

Select locations: CT: Newnes SF, Du Fours Rocks, Mt Wilson, Medlow, Kings Tableland.

Habitat

Habitat: Exposed sites, swampy areas or along creeks.

Altitude: 1000–1100 m **Annual rainfall:** 1000–1400 mm

Typical local abundance: Frequent.

Vegetation: Heath; wet heath; mallee heath e.g. with *Allocasuarina nana*.

Substrate: Skeletal sandy soil on sandstone, low nutrients.

Exposure: Full sun to light shade.

Conservation

Conservation: Local endemic species though possible occurrences in the Budawang Ranges need confirmation (Barker et al. 1999). Conservation status unknown.

Hakea propinqua

PROTEACEAE

Life history

Growth form: Bushy shrub 1–2 m high, with needle-like leaves 2–8 cm long; without lignotuber. Often confused with *H. pachyphylla* (Barker et al. 1999).

Vegetative spread: No.

Longevity:

Primary juvenile period: Less than 3 years for a some, but more than 5 years for most plants after high intensity fire 1/94 (at Lane Cove, P. Kubiak pers. comm.).

Flowers: White–yellow, mainly August–December.

Fruit/seed: Woody fruit 30–40 mm long, very rough with acute warty protuberances, with winged seed. Seed 24–38 mm long (Barker et al. 1999). Canopy-stored seedbank, released after death of branch or plant usually following fire. Oven-dried fruit weight approximately 14–19 g, with one seed per fruit (Bradstock et al. 1994).

Dispersal, establishment & growth: Diaspore: seed, gravity-dispersed or short distance wind-dispersed. No seed dormancy (Bradstock et al. 1994).

Fire response: Killed after high intensity fire 1/94 (at Lane Cove & Narrabeen Lake, P. Kubiak pers. comm.). Exposure of fruits to increasing temperatures decreases the viability of seed (Bradstock et al. 1994).

Interaction with other organisms: Fungus *Placoasterella baileyi* causes a leaf spot disease (B. Summerell pers. comm.).

Distribution

Status/origin: Native.

Botanical subregions: CC CT.

Distribution Sydney area: Widespread Hornsby Plateau and Upper Blue Mountains.

Select locations: CC: Wollemi NP, Gosford, Maroota, Belrose, Bilpin. CT: Newnes SF, Mount Banks, Mt Victoria, Blackheath, Leura, Wentworth Falls, Hill Top.

Habitat

Habitat: Ridges, rocky plateaus.

Altitude: 0–1100 m **Annual rainfall:** 800–1400 mm

Typical local abundance: Frequent to occasional.

Vegetation: Open woodland e.g. with *Eucalyptus piperita*, *E. sclerophylla*; heath e.g. with *Allocasuarina nana*, *Banksia conferta*, *Boronia ledifolia*, *Lambertia formosa*, *Hakea teretifolia*, *Petrophile* sp., *Leptospermum* sp.

Substrate: Sand or sandy soil on sandstone, low nutrients, well-drained.

Exposure: Exposed to wind. Full sun.

Conservation

Conservation: Reported from Wollemi NP, Brisbane Water NP, Marramarra NP, Ku-ring-gai Chase NP, Garigal NP, Royal NP, Blue Mountains NP. Probably adequately conserved.

Hakea salicifolia* subsp. *angustifolia**PROTEACEAE****Life history**

Growth form: Tall slender shrub to 7 m high, with simple flat leaves 4–7 mm wide.

Vegetative spread: No.

Longevity:

Primary juvenile period:

Flowers: White, August–December. May possibly produce inflorescences from below leaves of previous ones (Barker et al. 1999).

Fruit/seed: Woody fruit 20 mm long, with 2 winged seeds. Seed 20 mm long. Canopy-stored seedbank.

Dispersal, establishment & growth: Diaspore: seed, gravity-dispersed or short distance wind-dispersed. Some seedlings seen 41 weeks after high intensity fire 1/94 (at Lane Cove, P. Kubiak pers. comm.).

Fire response: Probably killed by fire.

Interaction with other organisms:

Distribution

Status/origin: Native.

Botanical subregions: CC.

Distribution Sydney area: Hornsby to Helensburgh.

Select locations: CC: Cockle and Cowan Creeks (Hornsby), Georges River, Casula, Lane Cove River, Woronora River (Heathcote), Flat Rock Creek (Helensburgh).

Habitat

Habitat: Creek banks and creekbeds.

Altitude: 0–100 m **Annual rainfall:** 1200–1400 mm

Typical local abundance: Frequent.

Vegetation: Riparian scrub e.g. with *Tristaniopsis laurina*, *Tristania neriifolia*, *Stenocarpus salignus*, *Lomandra fluviatilis*.

Substrate: Sandy alluvial soil on sandstone, low nutrients, periodically flooded.

Exposure: Full sun to mid shade.

Conservation

Conservation: Local endemic species, confined to river banks between Hornsby and Helensburgh (Barker et al. 1999). Reported in Lane Cove NP. Conservation adequacy unknown.

Hakea salicifolia subsp. ***salicifolia***

PROTEACEAE

Willow-leaved Hakea

Life history

Growth form: Tall shrub or small tree 2–5 m high, with simple flat leaves more than 7 mm wide.

Vegetative spread: No.

Longevity: 20–30 years?

Primary juvenile period: 6.5 years after high intensity fire (1 / 1994) at Lane Cove (P. Kubiak pers. comm.).

Flowers: White, September–November.

Fruit/seed: Woody fruit 20 mm long, with 2 winged seeds 20 mm long; canopy-stored seedbank.

Dispersal, establishment & growth: Diaspore: seed, gravity or short distance wind-dispersed.

Fire response: Killed, re-establishes from seed.

Interaction with other organisms: Small hairy caterpillars feed on leaves (P. Kubiak pers. comm.). Fungus *Placoasterella baileyi* causes a leaf spot disease (B. Summerell pers. comm.).

Distribution

Status/origin: Native.

Botanical subregions: NC CC SC NT CT.

Distribution Sydney area: Widespread.

Select locations: CC: Ku-ring-gai, Frenchs Forest, O'Hares Creek, Sublime Point, Tahmoor, Oakdale. CT: Nullo Mountain, Newnes SF, McMahons Lookout, Lawson, Fitzroy Falls.

Habitat

Habitat: Ridgetops, gullies, creek banks.

Altitude: 0–1200 m **Annual rainfall:** 900–1400 mm

Typical local abundance: Frequent.

Vegetation: Moist eucalypt open-forest e.g. with *Eucalyptus piperita*, *E. punctata*, *Corymbia gummifera*, *Angophora costata*; riparian scrub e.g. with *Callicoma serratifolia*, *Lomatia myricoides*, *Leptospermum polygalifolium*.

Substrate: Sandy loam on sandstone along creeks, medium nutrient soils.

Exposure:

Conservation

Conservation: Reported from Brisbane Water NP, Garigal NP, Lane Cove NP. Conservation adequacy unknown.

Hakea sericea**PROTEACEAE****Life history**

Growth form: Spreading bushy shrub to 4 m high, with needle-like leaves 2–5 cm long; without a lignotuber.

Vegetative spread: No.

Longevity: 15–20 years. Large plants 4 m high, died naturally in areas unburnt for 23 years at Elouera.

Primary juvenile period: 3 years (in cultivation). About 3–4 years after high intensity fire 1/94 (at Lane Cove, P. Kubiak pers. comm.).

Flowers: White, July–September, peak August, on previous years growth, insect-pollinated. Hoverflies, small native bees, and black beetles attracted to flowers probably for nectar (P. Kubiak pers. comm.).

Fruit/seed: Deeply wrinkled woody fruit 25–40 mm long, with 2 winged seeds released when death of branch or plant occurs. Seed 16–31 mm long (Barker et al. 1999); weight 39.1 mg ±1.4 (Hammill et al. 1998), 28–34 mg (Westoby et al. 1990). Oven-dried fruit weight 6.4 g (Bradstock et al. 1994).

Dispersal, establishment & growth: Diaspore: seed, gravity-dispersed or short distance wind-dispersed, rarely found more than a few yards from parents (Price 1979). No apparent dormancy mechanism, post-fire germination pattern appears to be related to rainfall events rather than season of burning (Whelan & York 1998). Seeds germinate 14–21 days (Cavanagh 1974) without treatment, and in absence of fire. Gregarious, often a coloniser of disturbed sites. Seedlings recorded in light gaps in areas unburnt for 20 years (Bradley, 1972) and 23 years (at Elouera).

Fire response: Killed after low intensity fire (Morrison et al. 1995), recruitment from canopy-stored seed. Recruitment following fire may not be very successful (Morrison 1995), exposure of fruit to increasing temperature decreases viability of seed (Bradstock et al. 1994). Following a spring fire more than 25% seeds germinated, with survival 5% of seedlings for next 1.5 years (Whelan & Tait 1995).

Interaction with other organisms: Host plant of Cerambycid beetles *Aphanasium australe*, *Aphanosperma occidentalis*, *Coptopterus arduus*, *C. scutellatus*, *Notoceresium impressiceps* (Hawkeswood 1993). Fungi *Placoasterella baileyi*, *Chaetodiplodia* sp. cause leaf spot diseases (B. Summerell pers. comm.). Troublesome weed in Norfolk Is, New Zealand, S Africa (Barker et al. 1999).

Distribution

Status/origin: Native.

Botanical subregions: NC CC SC CT ST; Qld, *Vic.

Distribution Sydney area: Widespread

Select locations: CC: Maitland Bay, Glenorie, Marsden Park, Llandillo, Thornleigh, Chullora, Bangor, Waterfall. CT: Corricudgy, Mt Wilson, Hill Top, Berrima.

Habitat

Habitat: Slopes.

Altitude: 0–1000 m **Annual rainfall:** 800–1600 mm

Typical local abundance: Frequent.

Vegetation: Woodland e.g. with *Corymbia gummifera*, *Angophora costata*, *Eucalyptus punctata*, *E. fibrosa*, *Allocasuarina littoralis*, *Melaleuca decora*, *M. nodosa*.

Substrate: Sandy clay soil on sandstones, generally with lateritic or clay influence, also Tertiary alluvium and Wianamatta Shale. Low to medium-nutrient soils, periodically poorly-drained.

Exposure: Full sun to light shade.

Conservation

Conservation: Reported from Bouddi NP, Royal NP. Conserved in Western Sydney (James et al. 1999).

Hakea teretifolia (including subsp. *teretifolia* & subsp. *hirsuta*)

PROTEACEAE

Life history

Growth form: Low spreading to erect much branched shrub to 4 m high, with needle-like leaves and hairy young branchlets. Two subspecies, subsp. *teretifolia* and subsp. *hirsuta* are recognised (Barker et al. 1999) but their distributions overlap.

Vegetative spread:

Longevity:

Primary juvenile period:

Flowers: White or cream-white, November–February (Barker et al. 1999).

Fruit/seed: Woody fruit 16–27 mm long, with 2 winged seeds, retained on plant as canopy-stored seedbank. Seed weight 11.1 mg ± 0.4 (Hammill et al. 1998).

Dispersal, establishment & growth: Diaspore: seed, gravity or short distance wind-dispersed. Recruitment mainly after fire. Main growth period, December–June.

Fire response: Killed, re-establish from seed released from follicles. Seedlings establish within 9 months of fire with no further recruitment. Resprouting reported for plants at O'Hares Creek (D. Keith pers. comm.) although this may be a localised form (see separate record). *Hakea teretifolia* is generally killed by fire but some populations in the Sydney region produce lignotubers but it is not known whether this relates to a particular subspecies (Barker et al. 1999)

Interaction with other organisms: Fungi recovered from leaves: *Capnodium saliciumum*, *Phyllachora hakeae*, *Placoasterella baileyi* (B. Summerell pers. comm.). Shoot damage by rabbits but not eaten (P. Kubiak pers. comm.).

Distribution

Status/origin: Native.

Botanical subregions: NC CC SC CT ST; Vic., Tas.

Distribution Sydney area: Widespread.

Select locations: CC: Doyalson, Hornsby, Cheltenham, Lane Cove River, Maroubra, Arncliffe, Waterfall NP, Mt Ousley. CT: Mt Wilson, Leura, Robertson, Wingello.

Habitat

Habitat: Mainly coastal heath.

Altitude: 0–1000 m

Annual rainfall: 900–1400 mm

Typical local abundance: Frequent.

Vegetation: Coastal heath e.g. with *Banksia ericifolia*; woodland e.g. with *Eucalyptus haemastoma*, *E. piperita*, *Corymbia gummifera*.

Substrate: Usually in wet or damp, sandy soil, on sandstone, low nutrients.

Exposure: Full sun.

Conservation

Conservation:

Helicia glabriflora

PROTEACEAE

Life history

Growth form: Shrub or small tree to 10 m high, with leathery leaves 5–15 cm long.

Vegetative spread:

Longevity:

Primary juvenile period:

Flowers: Cream to pink, and blue, November–July.

Fruit/seed: Fleshy, dark blue, egg-shaped 12 mm diam. , with one seed, ripe June–November.

Dispersal, establishment & growth: Diaspore: fruit.

Fire response:

Interaction with other organisms: Fungus *Asterina* sp. causes a leaf spot (B. Summerell pers. comm.).

Distribution

Status/origin: Native.

Botanical subregions: NC CC CT; Qld.

Distribution Sydney area: North from Illawarra region.

Select locations: CC: Minnamurra Falls. CT: Robertson.

Habitat**Habitat:** Rainforest.**Altitude:** 0–700 m **Annual rainfall:** 1600–1800 mm**Typical local abundance:** Rare.**Vegetation:** Warm-temperate rainforest e.g. with *Acacia melanoxylon*, *Acmena smithii*, *Doryphora sassafras*, *Schizomeria ovata*.**Substrate:** Clay soils on basalt, shale, high nutrients.**Exposure:****Conservation****Conservation:** Sydney region population disjunct and confined to Minnamurra–Robertson area. Regionally rare in Illawarra region (Mills 1988). Minnamurra is southern geographical limit.***Isopogon anemonifolius*****PROTEACEAE**

Drumsticks

Life history**Growth form:** Shrub 1–1.5 m high, with divided leaves; multi-stemmed, with a lignotuber.**Vegetative spread:****Longevity:** More than 60 years (D. Keith pers. comm.).**Primary juvenile period:** More than 7 years (D. Keith pers. comm.).**Flowers:** Yellow, July–January, peak October.**Fruit/seed:** Hairy nut 2–3 mm long, weight 5 mg, in a woody cone 10–16 mm diam., retained on plant as canopy-stored seedbank.**Dispersal, establishment & growth:** Diaspore: nut, gravity-dispersed, short distance wind-dispersed. Recruitment mainly after fire (D. Keith pers. comm.). Germination slow, up to 3 months, seedlings rarely observed.**Fire response:** Stems killed, resprout from base in less than 2 months. Secondary juvenile period 2 years (Keith 1996). Minimum lignotuber size required to survive a low intensity fire 2 cm diam; becomes fire-tolerant at more than 15 years old (Bradstock & Myerscough 1988). Population size is stable when interval between fire is 15 years for low intensity fires, or 16 years for high intensity fires (Bradstock & Auld 1987).**Interaction with other organisms:** Small weevils seen on flower buds (P. Kubiak pers. comm.). Fungus *Vizella* sp. causes a leaf spot disease (B. Summerell pers. comm.).**Distribution****Status/origin:** Native.**Botanical subregions:** NC CC SC NT CT ST; Qld.**Distribution Sydney area:** Widespread.**Select locations:** CC: Wheeny Creek, Upper Colo, Castlereagh NR, Wilberforce, Maroota, Galston, Avalon, North Rocks, Centennial Park, Cooks River, Kurnell, Bundeena, Helensburgh, Bulli Pass, Springwood, Cambewarra, Bomaderry. CT: Clarence, Corricudgy, Newnes Plateau, Wentworth Falls, Blackheath, Mt Colong, Mittagong, Belmore Falls, Bundanoon, Wingello.**Habitat****Habitat:** Ridgetops and open sites.**Altitude:** 0–1200 m **Annual rainfall:** 800–1400 mm**Typical local abundance:** Frequent.**Vegetation:** Heath e.g. with *Banksia oblongifolia*, *B. paludosa*, *Kunzea ambigua*, *Allocasuarina torulosa*, *Lambertia formosa*, *Petrophile pulchella*; open-forest e.g. with *Angophora costata*, *Corymbia gummifera*, *Eucalyptus haemastoma*, *Corymbia eximia*, *Eucalyptus sclerophylla*, *Angophora bakeri*, *Eucalyptus consideriana*.**Substrate:** Sandy or sandy clay soils on sandstone, low nutrients.**Exposure:** Full sun to light shade.**Conservation****Conservation:** Reported from Wollemi NP, Bouddi NP, Brisbane Water NP, Ku-ring-gai Chase NP, Garigal NP, Blue Mountains NP, Royal NP, Castlereagh NR, Barren Grounds NR. A widespread well conserved species.

Isopogon anethifolius

PROTEACEAE

Life history**Growth form:** Erect shrub 1-3 m high.**Vegetative spread:****Longevity:** Medium**Primary juvenile period:****Flowers:** Yellow, mainly September–December, peak October.**Fruit/seed:** Hairy nut 2–3 mm long, weight 4 mg, in a woody cone 12–25 mm diam., retained on plant as canopy-stored seedbank.**Dispersal, establishment & growth:** Diaspore: nut, gravity-dispersed and short distance wind-dispersed. Seeds released after fire (J. Howell pers. comm.).**Fire response:** Resprouts (D. Keith pers. comm.).**Interaction with other organisms:** Small weevils feed destructively on flower buds (P. Kubiak pers. comm.). Fungus *Vizella* sp. causes a leaf spot disease (B. Summerell pers. comm.).**Distribution****Status/origin:** Native.**Botanical subregions:** CC SC CT ST.**Distribution Sydney area:** widespread**Select locations:** CC: Pearl Beach, Galston Gorge, Frenchs Forest, Cheltenham, Centennial Park, Leumeah, Wattamolla. CT: Coricudgy, Newnes SF, Mount Wilson, Kanangra, Wombeyan Caves, Bundanoon.**Habitat****Habitat:** Rocky outcrops, ridges.**Altitude:** 0–1200 m**Annual rainfall:** 900–1600 mm**Typical local abundance:** Frequent.**Vegetation:** Woodland e.g. with *Eucalyptus haemastoma*, *E. sieberi*, *E. sclerophylla*; heath e.g. with *Allocasuarina nana*, *Banksia ericifolia*.**Substrate:** Sandy soil, low nutrients.**Exposure:** Full sun to light shade.**Conservation****Conservation:** Conserved in Western Sydney (James et al. 1999). Reported in Wollemi NP, Boudi NP, Brisbane Water NP, Muogamarra Nature Reserve, Ku-ring-gai Chase NP, Garigal NP, Lane Cove NP, Sydney Harbour NP, Royal NP. Widespread, probably adequately conserved.***Isopogon dawsonii***

PROTEACEAE

Life history**Growth form:** Erect shrub 1-3 m high, with hairy young branchlets and divided leaves.**Vegetative spread:** No.**Longevity:** Medium**Primary juvenile period:****Flowers:** Creamy-yellowish, October.**Fruit/seed:** Hairy nut 2–3 mm long in a woody cone 15–18 mm diam., retained on plant as canopy-stored seedbank.**Dispersal, establishment & growth:** Diaspore: nut, gravity-dispersed.**Fire response:** Plants killed, re-establish from seed released from burnt cones.**Interaction with other organisms:****Distribution****Status/origin:** Native.**Botanical subregions:** CC CT CWS.**Distribution Sydney area:****Select locations:** CC: Glen Davis, Grose Vale, Glenbrook Creek, Nortons Basin. CT: Rylstone, Capertee, Lidsdale, Glowworm Tunnel.

Habitat

Habitat: Generally on sandstone ledges, cliffs, pagodas which may act as fire refuges.

Altitude: 0–1000 m **Annual rainfall:** 600–900 mm

Typical local abundance: Occasional.

Vegetation: Open-forest e.g. with *Eucalyptus punctata*, *E. piperita*, *Angophora costata*, *Syncarpia glomulifera*, *Eucalyptus crebra*, *E. eugeniooides*, *Corymbia eximia*; heath e.g. with *Calytrix tetragona*, *Leucopogon muticus*.

Substrate: Skeletal soil on sandstone.

Exposure:

Conservation

Conservation: Conservation adequacy unknown. Reported from Wollemi NP.

Isopogon fletcheri**PROTEACEAE****Life history**

Growth form: Multi-stemmed shrub to 1.5 m high, with simple leaves.

Vegetative spread: No.

Longevity:

Primary juvenile period:

Flowers: Creamish green, September–December.

Fruit/seed: Nut 3 mm long, in a cone, retained on plant.

Dispersal, establishment & growth: Diaspore: nut, gravity-dispersed.

Fire response: Resprouts from base (R Coveny pers. comm.).

Interaction with other organisms:

Distribution

Status/origin: Native.

Botanical subregions: CT.

Distribution Sydney area: Blackheath.

Select locations: CT: Govetts Leap, Perrys Lookdown.

Habitat

Habitat: Wet cliff faces on escarpments.

Altitude: 600–1000 m **Annual rainfall:** 1200 mm

Typical local abundance: Rare–occasional.

Vegetation: Moist cliff vegetation e.g. with *Blandfordia cunninghamii*, *Goodenia decurrens*, *Dracophyllum secundum*, *Stylidium productum*.

Substrate: Sandstone, cliff-faces, low nutrients, permanent moisture.

Exposure: Sheltered.

Conservation

Conservation: Restricted local endemic coded 2VCat on national rare species list (Briggs & Leigh 1996). Confined to cliff faces at Blackheath, listed as Vulnerable (Schedule 2) NSW *Threatened Species Conservation Act 1995*.

Isopogon prostratus

PROTEACEAE

Life history**Growth form:** Prostrate shrub, sometimes more erect, with divided leaves.**Vegetative spread:** Not capable of vegetative spread or rooting at nodes.**Longevity:****Primary juvenile period:****Flowers:** Yellow, October–March.**Fruit/seed:** Hairy nut 2–3 mm long on a woody cone 12–20 mm diam., retained on plant, sometimes covered by soil.**Dispersal, establishment & growth:** Diaspore: nut, gravity-dispersed, short distance wind-dispersed. Resprouts from base after bulldozer damage.**Fire response:** Probably resprouts.**Interaction with other organisms:****Distribution****Status/origin:** Native.**Botanical subregions:** SC CT ST; Vic.**Distribution Sydney area:** Newnes Plateau, Penrose.**Select locations:** CT: Newnes SF, Bald Trig, Tallong, Penrose SF.**Habitat****Habitat:** Exposed situations.**Altitude:** 600–1200 m **Annual rainfall:** 900–1000 mm**Typical local abundance:** Rare.**Vegetation:** Open-forest e.g. with *Eucalyptus mannifera*, *E. oreades*; heath e.g. with *Allocasuarina nana*, *Petrophile pulchella*, *Eucalyptus gregsoniana*, *E. stricta*.**Substrate:** Sandy soil over sandstone.**Exposure:** Full sun.**Conservation****Conservation:** Rare, restricted to small localised populations. Conservation status unknown.***Lambertia formosa***

PROTEACEAE

Mountain Devil

Life history**Growth form:** Shrub to 2 m high, with pungent-pointed leaves in whorls of 3 or 4–6.**Vegetative spread:** No.**Longevity:** More than 60 years (D. Keith pers. comm.).**Primary juvenile period:****Flowers:** Red, 7 tubular flowers enclosed by bracts, at any time of year. Inflorescence density reaches peak 2–3 years after fire (Pyke 1983). Source of nectar for White-eared Honeyeater *Lichenostomus leucotis*, White-cheeked Honeyeater *Phylidonyris nigra* (Barker & Vestjens 1990). Small black ants, Noisy Miner *Manorina melanocephala* and New Holland Honeyeater *Phylidonyris ?novaehollandiae* feed on nectar (P. Kubiak pers. comm.).**Fruit/seed:** Hard, beaked, horned woody fruit 15–25 mm long, with seed weight 17–26 mg, retained on plant.**Dispersal, establishment & growth:** Diaspore: seed, with no special morphology for dispersal (Westoby et al. 1990). Recruitment mainly after fire (D. Keith pers. comm.). New resprouting growth is very sticky (L.McD.).**Fire response:** Stems killed, resprouts from basal lignotuber. Secondary juvenile period 2 years (D. Keith pers. comm.). Tolerates repeated burning (A. Jelinek) but seedlings probably slow to establish.**Interaction with other organisms:** Host to Cup Moth larvae *Mecytha fasciata* (Common 1990); larvae of moth *Xylorycta strigata* tunnel in the branches and feed on leaves (CSIRO 1991).

Distribution

Status/origin: Native.

Botanical subregions: NC CC SC CT ST.

Distribution Sydney area: Widespread

Select locations: CC: Putty, Norah Head, Kulnura, Kariong, Bowen Mountain, Wilberforce, Galston, Hornsby, Duffys Forest, Bantry Bay, La Perouse, Sutherland, Bundeena, Cataract, Springwood, Bomaderry. CT: Mt Wilson, Blackheath, Hill Top, Robertson, Bundanoon, Tallong.

Habitat

Habitat: Ridges, hillsides.

Altitude: 0–1100 m **Annual rainfall:** 800–1400 mm

Typical local abundance: Frequent–occasional.

Vegetation: Heath e.g. with *Angophora hispida*, *Leptospermum trinervium*, *Banksia oblongifolia*, *Banksia ericifolia*; open-forest and woodland e.g. with *Eucalyptus sieberi*, *Corymbia gummifera*, *Angophora costata*, *Angophora bakeri*, *Corymbia eximia*, *Eucalyptus sclerophylla*, *E. piperita*.

Substrate: Gravelly sand to sandy loam on sandstone, possibly with ironstone influence.

Exposure: Open sites, may have high light requirement.

Conservation

Conservation: Reported from Wollemi NP, Bouddi NP, Brisbane Water NP, Marramorra NP, Blue Mountains NP, Ku-ring-gai Chase NP, Garigal NP, Sydney Harbour NP, Royal NP. A widespread species, probably adequately conserved.

Lomatia ilicifolia**PROTEACEAE****Life history**

Growth form: Shrub to 3 m high, with rusty-hairy buds; leaves toothed.

Vegetative spread: Branches from underground stems.

Longevity: Indefinite.

Primary juvenile period:

Flowers: Creamy white, December–February. Flowering occurs on regrowth from the lignotuber in the first year after the previous shoot system has been destroyed by fire or other disturbance; although flowers may appear subsequently, they are usually smaller (Weston & Crisp 1994).

Fruit/seed: Leathery fruit 20–30 mm long, with several flat winged seeds, weight 16 mg, with yellow powder, released at maturity, mainly September–January.

Dispersal, establishment & growth: Diaspore: seed, wind-dispersed locally (Westoby et al. 1990).

Fire response: Stems killed, resprouts from lignotuber (R Lembit pers. comm.). Secondary juvenile period 1 year (Weston & Crisp 1994).

Interaction with other organisms: Fungus *Periconiella telopeae* causes a leaf spot disease (B. Summerell pers. comm.).

Distribution

Status/origin: Native.

Botanical subregions: SC CT ST; Vic.

Distribution Sydney area: Southern Highlands.

Select locations: CT: Moss Vale, Robertson, Paddys River, Belmore Falls, Fitzroy Falls, Bundanoon, Wingello, Abercrombie River.

Habitat

Habitat: Open-forest.

Altitude: 600–700 m **Annual rainfall:** 900–1000 mm

Typical local abundance: Frequent.

Vegetation: Open-forest e.g. with *Eucalyptus sieberi*, *E. piperita*, *E. quadrangulata*, *Lambertia formosa*.

Substrate: Sandy loam over sandstone, low nutrients, well-drained.

Exposure:

Conservation

Conservation: Moss Vale is northern geographical limit. Conservation status unknown.

Lomatia myricoides**PROTEACEAE**

River Lomatia

Life history

Growth form: Shrub or small tree 2–7 m high. Occasionally hybridizes with *L. silaifolia* where they grow together (P. Weston pers. comm.).

Vegetative spread: No.

Longevity: Probably long.

Primary juvenile period:

Flowers: Greenish yellow to creamy white or pale pink, December–February. Flies and small ants feed on nectar (P. Kubiak pers. comm.).

Fruit/seed: Leathery fruit 20–30 mm long, green, turning black on maturity with several flat winged seeds, with yellow powder, released at maturity, mainly September–January.

Dispersal, establishment & growth: Diaspore: seed, wind-dispersed locally.

Fire response: Resprouts from base (R. Lembit pers. comm.).

Interaction with other organisms: Fungi recovered from leaves: *Brefeldiella* sp., *Chaectothyrrium* sp., *Meliola lanosa*, *Periconiella telopeae* (B. Summerell pers. comm.).

Distribution

Status/origin: Native.

Botanical subregions: CC SC CT ST CWS; Vic.

Distribution Sydney area: Widespread.

Select locations: CC: Dharug NP, Narrara, Pennant Hills, Mosman (1892), Casula, Woronora River, Cobbitty, Tahmoor. CT: Coricudgy, Clarence, Mt Wilson, Lawson, Kanangra Walls, Mt Werong, Mittagong, Robertson, Wombeyan Caves.

Habitat

Habitat: Creeks, watercourses, with permanent moisture, montane forest.

Altitude: 0–1200 m **Annual rainfall:** 700–1400 mm

Typical local abundance: Frequent.

Vegetation: Riverbank forest e.g. with *Tristaniopsis laurina*, *Backhousia myrtifolia*, *Acacia elata*, *Ceratopetalum apetalum*, *Leptospermum polygalifolium*, *Gleichenia dicarpa*, or as understorey in montane open-forest e.g. with *Eucalyptus mannifera*, *E. dives*, *Brachyloma daphnoides*, *Monotoca scoparia* e.g. Montane Moist Forest of Keith and Benson 1988.

Substrate: Sandy alluvium from sandstone or moist loamy soil from basalt, low to high nutrients.

Exposure: Sheltered sites.

Conservation

Conservation: Widespread species with northern geographical limit at Mt Coricudgy. Adequately conserved. Reported in Brisbane Water NP, Dharug NP, Marramarra NP, Muogamarra Nature Reserve, Ku-ring-gai Chase NP, Garigal NP, Lane Cove NP.

Lomatia silaifolia

PROTEACEAE

Crinkle Bush

Life history

Growth form: Shrub 1–2 m high, with lignotuber. Extremely variable in the amount of dissection in the leaves and the degree of glaucousness (Harden 1991). Occasionally hybridizes with *L. myricoides* where they grow together (P. Weston pers. comm.).

Vegetative spread: No.

Longevity: More than 60 years (D. Keith pers. comm.).

Primary juvenile period:

Flowers: White, November–January. Flowers abundantly only after fire (Keith 1996). Flowering is confined to the post-fire period, mostly in the second summer following fire; partially self-compatible, only 25% of self-pollinated flowers initiating fruit, compared to 100% of cross-pollinated flowers; probably insect-pollinated — most visits by beetles and ants, with no birds, moths or butterflies observed; up to 14% of flowers undamaged by herbivory produce fruit (Denham & Whelan 2000). Possibly pollinated by large flies (P. Kubiak pers. comm.). Fewer viable seeds (22%) produced from self-pollinated flowers than from cross-pollinated flowers (62%); 7–14 seeds per fruit (Denham & Whelan 2000).

Fruit/seed: Leathery fruit 30–50 mm long, with several flat winged seeds released at maturity, February–May. Yellow powder observed on mature seeds — ?does it inhibit seed predation or fungus (P. Kubiak pers. comm.).

Dispersal, establishment & growth: Diaspore: seed, wind-dispersed (Westoby et al. 1990), no dormancy mechanism (Denham & Whelan 2000), recruitment mainly after fire. Seed germination related to seed mass, with viable seeds weighing more than 7 mg (Denham & Whelan 2000).

Fire response: Stems killed, resprouts from lignotuber within 2 months of fire (Bradley, 1972). Secondary juvenile period 1 year; flowering occurs on regrowth from the lignotuber in the first year after the previous shoot system has been destroyed by fire or other disturbance; although flowers may appear subsequently, they are usually smaller (Weston & Crisp 1994)

Interaction with other organisms: Fungus *Stenella lomatiae* causes a leaf spot disease (B. Summerell pers. comm.). Substantial herbivory of flowering branches by mammals, probably wallaby *Wallabia bicolor*; also damage to flowers by invertebrates e.g. grasshoppers and larvae of moths or butterflies (Denham & Whelan 2000).

Distribution

Status/origin: Native.

Botanical subregions: NC CC NT CT NWS CWS; Qld.

Distribution Sydney area: Widespread.

Select locations: CC: Howes Valley, Kulnura, Wisemans Ferry, Maroota, Duffys Forest, Long Bay, Oatley, La Perouse, Oakdale, Wedderburn, Helensburgh. CT: Nullo Mountain, Newnes SF, Katoomba, Jenolan Caves, Kanangra Walls, Bowral, Barren Grounds.

Habitat

Habitat: Ridges and gullies.

Altitude: 0–1200 m **Annual rainfall:** 800–1400 mm

Typical local abundance: Frequent.

Vegetation: Open-forest e.g. *Corymbia gummifera*, *Syncarpia glomulifera*, *E. pilularis*, *Eucalyptus agglomerata*, *E. piperita*, *Angophora costata*, *E. punctata*, *E. sclerophylla*, *Allocasuarina torulosa*, *Eucalyptus macrorhyncha*, *E. radiata*.

Substrate: Sandy soils on sandstone, granite, slates, low nutrients.

Exposure:

Conservation

Conservation: Widespread and well conserved. Reported in Bouddi NP, Brisbane Water NP, Marramarra NP, Muogamarra Nature Reserve, Ku-ring-gai Chase NP, Dalrymple Hay Nature Reserve, Garigal NP, Sydney Harbour NP, Royal NP.

Persoonia acerosa**PROTEACEAE****Life history**

Growth form: Erect to spreading shrub with narrow leaves channelled on upper surface. Occasionally hybridises with *P. levis*, *P. myrtilloides* and *P. linearis* where they grow together.

Vegetative spread: No.

Longevity:

Primary juvenile period:

Flowers: Yellow, sweetly scented, December–April, peak January.

Fruit/seed: Fleshy fruit, with one seed enclosed in a hard, woody stone, dull green to yellow when ripe, shed at maturity, October–November.

Dispersal, establishment & growth: Diaspore: fruit, probably dispersed by large birds e.g. Currawongs (Buchanan 1989), possibly dispersed by large mammals, kangaroos, possums; soil-stored seedbank, germination triggers unknown (P. Weston pers. comm.).

Fire response: Probably killed (P. Weston pers. comm.).

Interaction with other organisms:

Distribution

Status/origin: Native.

Botanical subregions: CC CT.

Distribution Sydney area: Blue Mountains.

Select locations: CC: Valley Heights. CT: Newnes Plateau, Mt Wilson, Mt Victoria, Blackheath, Katoomba, Kings Tableland, Hazelbrook, Hill Top.

Habitat

Habitat: Ridges, rock outcrops.

Altitude: 400–1100 m **Annual rainfall:** 900–1400 mm

Typical local abundance: Rare to occasional.

Vegetation: Eucalypt open-forest e.g. with *Eucalyptus sclerophylla*, *E. sieberi*, *E. piperita*, *E. sparsifolia*, *Angophora costata*; heath e.g. with *Eucalyptus stricta*.

Substrate: Clayey to sandy soils on sandstone, low nutrients.

Exposure: Full sun to light shade (P. Weston pers. comm.).

Conservation

Conservation: Listed as Vulnerable (Schedule 2) NSW *Threatened Species Conservation Act 1995*. Coded 2VC- on national rare species list (Briggs & Leigh 1996). Recorded for Blue Mountains NP.

Persoonia acuminata* (*P. nutans* subsp. C in part)*PROTEACEAE****Life history**

Growth form: Prostrate to spreading shrub to 1.7 m high, with hairy young branchlets. Apparently intergrades with *P. oxycoccooides* in a limited area between Jenolan Caves and Kanangra Walls (Weston & Johnson 1991).

Vegetative spread:

Longevity:

Primary juvenile period:

Flowers: Yellow, December–April (Weston & Johnson 1991).

Fruit/seed: Fleshy green fruit, with one seed enclosed in a hard, woody stone, shed at maturity.

Dispersal, establishment & growth: Diaspore: fruit, probably dispersed by large birds e.g. Currawongs (Buchanan 1989), possibly dispersed by large mammals, kangaroos, possums; soil-stored seedbank, germination triggers unknown (P. Weston pers. comm.).

Fire response:

Interaction with other organisms:

Distribution

Status/origin: Native.

Botanical subregions: NT CT.

Distribution Sydney area: Hampton area.

Select locations: CT: Hampton, Mt Bindo, Jenolan Caves, Belarah Swamp, Kanangra Walls.

Habitat

Habitat: Hillsides.

Altitude: 1000–1200 m **Annual rainfall:** 900–1000 mm

Typical local abundance: Frequent–occasional.

Vegetation: Eucalypt woodland or open-forest e.g. with *Eucalyptus radiata*, *E. dalrympleana*, *E. sieberi*, *E. stricta*, *E. mannifera*.

Substrate: Well-drained soils, usually derived from granite or metasediments, or on basic volcanic substrates (Weston & Johnson 1991), low to high nutrients.

Exposure: Full sun to light shade (P. Weston pers. comm.).

Conservation

Conservation: Conservation adequacy unknown though not considered rare (Weston & Johnson 1991). Reported in Kanangra-Boyd NP.

Persoonia bargoensis (split from *P. nutans*)**PROTEACEAE****Life history**

Growth form: Erect shrub 0.6–2.5 m high, with hairy young branchlets.

Vegetative spread: No.

Longevity:

Primary juvenile period:

Flowers: Yellow, December–January (Weston & Johnson 1991).

Fruit/seed: Fleshy green fruit, with one seed enclosed in a hard, woody stone. Fruit shed at maturity.

Dispersal, establishment & growth: Diaspore: fruit, probably dispersed by large birds e.g. Currawongs (Buchanan 1989), possibly dispersed by large mammals, kangaroos, possums; soil-stored seedbank, germination triggers unknown (P. Weston pers. comm.).

Fire response: Probably killed (P. Weston pers. comm.).

Interaction with other organisms:

Distribution

Status/origin: Native.

Botanical subregions: CC.

Distribution Sydney area: Douglas Park to Bargo.

Select locations: CC: Douglas Park, Wilton, Bargo, Yanderra.

Habitat

Habitat: Woodland to open-forest.

Altitude: 100–300 m **Annual rainfall:** 900–1000 mm

Typical local abundance: Rare–occasional.

Vegetation: Open-forest e.g. with *Eucalyptus tereticornis*, *E. fibrosa*, and grassy *Themeda australis* understorey; woodland e.g. with *Corymbia gunnifera*, *Eucalyptus sclerophylla*, *E. punctata*, *E. sparsifolia*, *Angophora bakeri*, and shrubby understorey e.g. with *Pultenaea elliptica*.

Substrate: Clayey soil on intergrading areas Hawkesbury Sandstone and Wianamatta Shale (Mittagong formation) (Weston & Johnson 1991), low to medium nutrients.

Exposure: Full sun to light shade (P. Weston pers. comm.).

Conservation

Conservation: Local endemic restricted to the Bargo area, listed as Endangered (Schedule 1) NSW *Threatened Species Conservation Act* 1995. Coded 2V on national rare species list (Briggs & Leigh 1996).

Persoonia chamaepeuce**PROTEACEAE****Life history**

Growth form: Prostrate shrub with narrow leaves. Often forms extensive rhizomes (P. Weston pers. comm.).

Vegetative spread: Suckering from rootstock.

Longevity:

Primary juvenile period:

Flowers: Yellow, December–January. Long-tongue bees *Leioproctus (Filiglossa)* sp. forage on flowers (Bernhardt & Weston 1996), *Leioproctus filamentosa* forages on the flowers (Bernhardt & Walker 1996), probably not effective pollinators (P. Weston pers. comm.).

Fruit/seed: Fleshy fruit green with maroon striations, with one seed enclosed in a hard, woody stone. Fruit shed at maturity.

Dispersal, establishment & growth: Diaspore: fruit, probably dispersed by large birds e.g. Currawongs (Buchanan 1989), possibly dispersed by large mammals, kangaroos, possums; soil-stored seedbank, germination triggers unknown (P. Weston pers. comm.).

Fire response: Probably resprouts from rootstock and rhizomes (P. Weston pers. comm.).

Interaction with other organisms:

Distribution

Status/origin: Native.

Botanical subregions: NT CT ST; Vic.

Distribution Sydney area: Tablelands.

Select locations: CT: Orange, Hargraves, Sunny Corner, Upper Kowmung.

Habitat

Habitat: Hillsides.

Altitude: 800–1200 m **Annual rainfall:** 700–1000 mm

Typical local abundance: Occasional.

Vegetation: Eucalypt open-forest and woodland e.g. with *Eucalyptus radiata*, *E. sieberi*, *E. pauciflora*, *E. oreades*, *E. dives*, with shrubby understorey.

Substrate: Sandy soil on sandstone, granites and metasediments, not on limestones, low nutrients.

Exposure:

Conservation

Conservation: Uncommon species occurring sporadically. Conservation status unknown.

Persoonia chamaepitys**PROTEACEAE****Life history**

Growth form: Prostrate shrub forming mats often exceeding 1m diameter, with hairy young branchlets.

Vegetative spread: No nodal rooting or vegetative spread.

Longevity:

Primary juvenile period:

Flowers: Yellow, occasionally with reddish markings (P. Weston pers. comm.), November–December. Long-tongue bees *Chalicodoma* sp., *Hylaeus* sp. and *Eumenid* wasp forage on flowers but only long-tongue bee *Leioproctus raymenti* carried pollen (Bernhardt & Weston 1996).

Fruit/seed: Fleshy fruit whitish with red striations, with one seed enclosed in a hard, woody stone. Fruit shed at maturity.

Dispersal, establishment & growth: Diaspore: fruit, probably dispersed by large birds e.g. Currawongs (Buchanan 1989), possibly dispersed by large mammals, kangaroos, possums; soil-stored seedbank, germination triggers unknown (P. Weston pers. comm.). Often along roadsides and may be a light-requiring coloniser.

Fire response: Killed by fire (P. Weston pers. comm.).

Interaction with other organisms:

Distribution

Status/origin: Native.

Botanical subregions: CC CT CWS.

Distribution Sydney area: Colo area and higher parts of Blue Mountains and adjacent valleys.

Select locations: CC: Mellong Range, Colo Heights. CT: Coricudgy, Newnes SF, Clarence, Mount Victoria, Blackheath, Narrow Neck, Kings Tableland, Wingello.

Habitat

Habitat: Plateaus, slopes and near swamps.

Altitude: 300–1200 m **Annual rainfall:** 800–1400 mm

Typical local abundance: Frequent–occasional.

Vegetation: Open-forest and woodland e.g. with *Eucalyptus dives*, *E. radiata*, *E. sclerophylla*, *E. sieberi*, *E. piperita*, *Corymbia gummifera*.

Substrate: Sandy soils and sandy alluvium, low nutrients.

Exposure: Full sun to light shade (P. Weston pers. comm.).

Conservation

Conservation: Reported from Blue Mountains NP, Wollemi NP. Status of disjunct population at Wingello (last collected 1917) unknown. Recent collections from the Budawangs (P. Weston pers. comm.).

Persoonia glaucescens* (P. lanceolata subsp. B)*PROTEACEAE****Life history**

Growth form: Erect shrub, with hairy young branchlets.

Vegetative spread: No.

Longevity:

Primary juvenile period:

Flowers: Orange–yellow, January–May. Insects foraging on flowers include *Apis mellifera*, *Callomelitta* sp. *Exoneura* sp. but only long-tongue bees *Leioproctus* (*Cladocerapis*) *carinatifrons*, *L. incanescens*, *L. speculiferus* carried (Bernhardt & Weston 1996).

Fruit/seed: Fleshy fruit green suffused with purple, with one seed enclosed in a hard, woody stone. Fruit shed at maturity, September–December.

Dispersal, establishment & growth: Diaspore: fruit, probably dispersed by large birds e.g. Currawongs (Buchanan 1989), possibly dispersed by large mammals, kangaroos, possums; soil-stored seedbank, germination triggers unknown (P. Weston pers. comm.).

Fire response: Killed by fire (P. Weston pers. comm.).

Interaction with other organisms:

Distribution

Status/origin: Native.

Botanical subregions: CC CT.

Distribution Sydney area: Picton to Berrima.

Select locations: CC: Thirlmere, Buxton. CT: Hill Top, Welby, Berrima, Kangaloon, Fitzroy Falls.

Habitat

Habitat: Ridgetops and slopes.

Altitude: 400–700 m **Annual rainfall:** 900 mm

Typical local abundance: Occasional.

Vegetation: Woodland; open-forest e.g. with *Eucalyptus piperita*, *E. sieberi*, *E. sparsifolia*, *E. sclerophylla*, *E. punctata*, *Corymbia gummifera*, with shrubby understorey.

Substrate: Sandy clay soil on sandstone, low nutrients.

Exposure: Full sun to light shade (P. Weston pers. comm.).

Conservation

Conservation: Local endemic species listed as Vulnerable (Schedule 2) NSW *Threatened Species Conservation Act 1995*. Coded 2V on national rare species list (Briggs & Leigh 1996).

Persoonia hindii

PROTEACEAE

Life history

Growth form: Erect to spreading multi-stemmed shrub to 1 m high, with narrow succulent leaves that become concave when dried. Most closely resembles *P. chamaepeuce*.

Vegetative spread: Shoots arise from extensive rhizomes which lie 5 cm below the soil surface (Weston & Johnson).

Longevity: Indefinite.

Primary juvenile period:

Flowers: Deep yellow, January to March.

Fruit/seed: Dull green, succulent, fleshy fruit (drupe), with one seed enclosed in a hard, woody stone. Fruit shed at maturity.

Dispersal, establishment & growth: Diaspore: fruit, probably dispersed by large birds e.g. Currawongs (Buchanan 1989), possibly dispersed by large mammals, kangaroos, possums; soil-stored seedbank, germination triggers unknown (P. Weston pers. comm.). Seedling recruitment rate appears to be extremely low (Weston & Johnson 1997).

Fire response: Probably resprouts from rhizomes.

Interaction with other organisms:

Distribution

Status/origin: Native.

Botanical subregions: CT.

Distribution Sydney area: Newnes Plateau, near Lithgow.

Select locations: CT: Sunnyside Road, Newnes SF, State Mine Creek.

Habitat

Habitat: Plateaus and slopes.

Altitude: 1130–1170 m **Annual rainfall:** 900–1000 mm

Typical local abundance: Rare.

Vegetation: Eucalypt open-forest and woodland 'Newnes Plateau Woodland' (Benson & Keith 1990) e.g. with *Eucalyptus sieberi*, *E. radiata*, *E. dives*, *E. pauciflora*, *E. oreades*, *E. gullickii* and shrubby understorey e.g. with *Daviesia latifolia*, *Phyllota squarrosa*, *Lomatia silaifolia*, *Polyscias sambucifolia*.

Substrate: Sandy soils from Narrabeen Sandstone, low nutrients, well-drained (Weston & Johnson 1997).

Exposure: Full sun to light shade (P. Weston pers. comm.).

Conservation

Conservation: Rare local endemic, known from only 6 small populations each no more than 100 m wide and each possibly consisting of a single clone; a more detailed survey of the distribution of *P. hindii* is needed for management in Newnes State Forest (Weston & Johnson 1997). Listed as Endangered (Schedule 1) NSW *Threatened Species Conservation Act 1995*.

Proposed code 2V on national rare species list of Briggs and Leigh 1996 (Weston & Johnson 1997), not conserved and threatened by sand mining.

Persoonia hirsuta* subsp. *evoluta

PROTEACEAE

Life history

Growth form: Spreading to decumbent, shrub, with hairy young branchlets. The subspecies intergrade extensively from the lower Blue Mountains to within 15 km of the coast (Weston & Johnson 1991), hybridizes with *P. mollis* subsp. *nectens* (P. Weston pers. comm.).

Vegetative spread: No.

Longevity:

Primary juvenile period:

Flowers: Yellow, very strongly sweetly scented (P. Weston pers. comm.), September–January.

Fruit/seed: Fleshy fruit green to cream with red streaks, rarely uniformly dark purple (P. Weston pers. comm.). with one seed enclosed in a hard, woody stone. Fruit shed at maturity.

Dispersal, establishment & growth: Diaspore: fruit, dispersed by large birds e.g. Currawongs (Buchanan 1989), possibly dispersed by large mammals, kangaroos, possums; soil-stored seedbank, germination triggers unknown (P. Weston pers. comm.).

Fire response: Probably killed by fire (P. Weston pers. comm.).

Interaction with other organisms:

Distribution**Status/origin:** Native.**Botanical subregions:** CC CT.**Distribution Sydney area:** Sporadic.**Select locations:** CC: Putty, Glen Davis, Springwood, Bargo. CT: Balmoral, Hill Top.**Habitat****Habitat:** Ridges.**Altitude:** 300–600 m **Annual rainfall:** 700–900 mm**Typical local abundance:** Rare–frequent.**Vegetation:** Open-forest to woodland e.g. with *Eucalyptus sclerophylla*, *E. sparsifolia*, *E. punctata*, *E. sieberi*, *Corymbia gummifera*, *Persoonia levis*, *Acacia* sp., *Eriostemon australasius*.**Substrate:** Sandy loam on Hawkesbury Sandstone, low nutrients.**Exposure:** Full sun to light shade (P. Weston pers. comm.).**Conservation****Conservation:** Local endemic taxon, conservation status not known. Possibly vulnerable (P. Weston pers. comm.).***Persoonia hirsuta* subsp. *hirsuta*****PROTEACEAE****Life history****Growth form:** Spreading to decumbent, shrub, with hairy young branchlets. The species intergrade with subsp. *evoluta* extensively from the lower Blue Mountains to within 15 km of the coast (Weston & Johnson 1991).**Vegetative spread:** No.**Longevity:****Primary juvenile period:****Flowers:** Yellow, mainly November–January.**Fruit/seed:** Fleshy fruit, with one seed enclosed in a hard, woody stone. Fruit shed at maturity.**Dispersal, establishment & growth:** Diaspore: fruit, probably dispersed by large birds e.g. Currawongs (Buchanan 1989), possibly dispersed by large mammals, kangaroos, possums; soil-stored seedbank, germination triggers unknown (P. Weston pers. comm.).**Fire response:** Probably killed.**Interaction with other organisms:****Distribution****Status/origin:** Native.**Botanical subregions:** CC.**Distribution Sydney area:** Coast, Gosford to Royal NP.**Select locations:** CC: Gosford, Cowan, Wahroonga, Turramurra, Roseville, Manly, North Head, Oatley, Jannali, Royal NP.**Habitat****Habitat:** Sides of ridges, often on disturbed sites such as quarries.**Altitude:** 0–300 m **Annual rainfall:** 1200–1600 mm**Typical local abundance:** Rare.**Vegetation:** Heath, scrub or woodland.**Substrate:** Sandy to stony soils from sandstone, low nutrients.**Exposure:** Full sun to light shade (P. Weston pers. comm.).**Conservation****Conservation:** Local endemic subspecies, listed as Endangered (Schedule 1) NSW *Threatened Species Conservation Act 1995*, coded 3KCi on national rare species list (Briggs & Leigh 1996).

No known conservation sites and now found as single plants or groups of less than 10.

Many old collection sites now destroyed. Many herbarium collections made before 1920, suggesting it may have been more common then.

Persoonia isophylla (sp. aff. *pinifolia*)

PROTEACEAE

Life history

Growth form: Erect to spreading shrub 0.3–1.5 m high, with hairy young branchlets; closely resembles *P. pinifolia* but no hybrids reported (Weston & Johnson 1991).

Vegetative spread: No.

Longevity:

Primary juvenile period:

Flowers: Yellow, December–June, peak March. Long-tongue bee *Leioproctus (Cladocera) speculiferus* is the dominant species foraging on flowers; others foragers include *Apis mellifera*, *Hyaleus* sp., *Lasioglossum brazieri*, *Leioproctus (Filiglossa)* sp., *L. speculiferus*, *Nomia* sp., Sphecid wasps (Bernhardt & Weston 1996), *Leioproctus filamentosa* (Bernhardt & Walker 1996).

Fruit/seed: Fleshy, green with purple suffusion, with one seed enclosed in a hard woody stone, shed at maturity, August–December.

Dispersal, establishment & growth: Diaspore: fruit, probably dispersed by large birds e.g. Currawongs (Buchanan 1989), possibly dispersed by large mammals, kangaroos, possums; soil-stored seedbank, germination triggers unknown (P. Weston pers. comm.). Appears to be coloniser of disturbed sites.

Fire response: Killed (P. Weston pers. comm.).

Interaction with other organisms:

Distribution

Status/origin: Native.

Botanical subregions: CC.

Distribution Sydney area: Gosford–Kulnura to Manly.

Select locations: CC: Boree Track, Kulnura, Gosford, Bouddi NP, Patonga Creek, McCarrs Creek, Terrey Hills.

Habitat

Habitat: Heathy sites. Edges of walking/vehicular tracks (L.McD.).

Altitude: 0–250 m **Annual rainfall:** 1200 mm

Typical local abundance: Occasional–frequent.

Vegetation: Woodland e.g. with *Corymbia gummifera*, *Eucalyptus sieberi*, *E. haemastoma*, *Banksia serrata*, *Petrophile pulchella*, *Leptospermum trinervium*, *Hakea sericea*; heath e.g. with *Angophora hispida*.

Substrate: Sand or sandy soil on sandstone, low nutrients, well-drained.

Exposure: Full sun to light shade.

Conservation

Conservation: Local endemic species, likely to be adequately conserved. Reported in Yengo NP, Bouddi NP, Brisbane Water NP, Ku-ring-gai Chase NP.

Persoonia lanceolata**PROTEACEAE****Life history**

Growth form: Erect to spreading shrub 1–3.5 m high, with hairy young branchlets; leaves 3–10 cm long. Occasionally hybridizes with *P. linearis* (Weston 1991).

Vegetative spread: No.

Longevity: 25–60 years (D. Keith pers. comm.), present in bush unburnt for 13 years (at Field Mars).

Primary juvenile period: Primary juvenile period more than 6 years (D. Keith pers. comm.). About 3 years after high intensity fire 1/94 (at Lane Cove, P. Kubiak pers. comm.).

Flowers: Yellow, mainly January–May. Probably pollinated by native bees (P. Kubiak pers. comm.). Long-tongue bees *Leioproctus* (*Cladocerapis*) *carinatifrons*, *L. incanescens*, *L. speculiferus* collect nectar and / or pollen from the flowers; other insect foragers include *Leioproctus* (*Filiglossa*) sp., *Exoneura* sp. (Bernhardt & Weston 1996), *Leioproctus filamentosa* forages on the flowers (Bernhardt & Walker 1996).

Fruit/seed: Fleshy fruit, mean fresh weight 1300 mg (Westoby et al. 1990), with two or rarely one seed enclosed in a hard, woody stone. Fruit shed at maturity, peak September–October.

Dispersal, establishment & growth: Diaspore: fruit, adapted for vertebrate dispersal (Westoby et al. 1990). Probably dispersed by large birds e.g. Currawongs (Buchanan 1989), Seed eaten by foxes (Myall Lakes), possibly dispersed by large mammals, kangaroos, possums; soil-stored seedbank, germination triggers unknown (P. Weston pers. comm.). Recruitment mainly after fire. Re-establishes naturally on areas after sand mining between Budgewoi and Toukley where it is common. Recolonised mined areas at Bonny Hills (Clark, 1975) with higher cover than pre-mining. ? Indicative of disturbance.

Fire response: Killed and re-establishes from soil-stored seedbank (Fox 1988).

Interaction with other organisms: Fungi *Anthracostroma persooniae*, *Camarosporula persooniae* cause leaf spot disease (B. Summerell pers. comm.).

Distribution

Status/origin: Native.

Botanical subregions: NC CC SC CT ST.

Distribution Sydney area: Mainly coastal.

Select locations: CC: Norah Head, Somersby, Cheltenham, Belrose, Manly, Bondi, Long Bay, Kurnell, Heathcote, Waterfall, Appin, Dapto, Warrimoo. CT: Hill Top, Belanglo.

Habitat

Habitat: Ridgetops, slopes.

Altitude: 0–700 m

Annual rainfall: 900–1400 mm

Typical local abundance: Occasional–frequent.

Vegetation: Open-forest e.g. with *Eucalyptus sclerophylla*, *E. piperita*, *E. sieberi*, *E. sparsifolia*, *E. punctata*, *Corymbia gummifera*, shrubby understorey e.g. with *Lambertia formosa*, *Leptospermum trinervium*, *Daviesia corymbosa*, *Banksia ericifolia*, *Banksia serrata*; woodland; heath e.g. with *Banksia ericifolia*, *B. oblongifolia*, *Darwinia fascicularis*; also sea cliff-top scrub.

Substrate: Sand or sandy loam on sandstone, low nutrients, well-drained.

Exposure: Full sun to light shade (P. Weston pers. comm.).

Conservation

Conservation: Adequately conserved (P. Weston pers. comm.). Reported in Bouddi NP, Brisbane Water NP, Marramarra NP, Ku-ring-gai Chase NP, Lane Cove NP, Sydney Harbour NP, Botany Bay NP.

***Persoonia laurina* subsp. *intermedia* (*P. laurina* subsp. *B*)**

PROTEACEAE

Life history

Growth form: Erect to spreading multi-stemmed shrub; leaves mostly opposite, mature leaves scabrous.

Vegetative spread: No.

Longevity:

Primary juvenile period:

Flowers: Yellow and white, November–January, peak December.

Fruit/seed: Fleshy fruit, fresh weight 1100–1550 mg (Westoby et al. 1990), with one seed enclosed in a hard, woody stone. Fruit shed at maturity, July–October.

Dispersal, establishment & growth: Diaspore: fruit, adapted for vertebrate dispersal (Westoby et al. 1990), probably dispersed by large birds e.g. Currawongs (Buchanan 1989), possibly dispersed by large mammals, kangaroos, possums; soil-stored seedbank, germination triggers unknown (P. Weston pers. comm.).

Fire response: Resprouts from lignotuber.

Interaction with other organisms:

Distribution

Status/origin: Native.

Botanical subregions: CC CT.

Distribution Sydney area: Woronora Plateau.

Select locations: CC: Leumeah, Cataract River, Thirlmere, Yerrinbool. CT: Hill Top, Mittagong, Robertson, Wombeyan Caves.

Habitat

Habitat: Ridges.

Altitude: 0–620 m

Annual rainfall: 700–1000 mm

Typical local abundance: Frequent.

Vegetation: Open-forest e.g. with *Corymbia gummifera*, *Eucalyptus sparsifolia*, *E. sclerophylla*, *E. punctata*, *E. sieberi*, *E. piperita*, *E. smithii*.

Substrate: Sandy loam on sandstone, Tertiary sediments, low nutrients, well-drained.

Exposure: Full sun to light shade (P. Weston pers. comm.).

Conservation

Conservation: Local endemic taxon, conservation status unknown.

***Persoonia laurina* subsp. *laurina* (*P. laurina* subsp. *A*)**

PROTEACEAE

Life history

Growth form: Erect to spreading shrub; leaves mostly opposite, mature leaves smooth.

Vegetative spread: Root suckering may be possible in some populations (C. Nancarrow pers. comm.).

Longevity: 50–100 years.

Primary juvenile period:

Flowers: Yellow and white, November–February, peak December. Long-tongue bee *Leioproctus (Cladocerapis)* sp. collects nectar and/or pollen from the flowers (Bernhardt & Weston 1996).

Fruit/seed: Fleshy fruit, with one seed enclosed in a hard, woody stone. Fruit shed at maturity, June–December, peak September.

Dispersal, establishment & growth: Diaspore: fruit, adapted for vertebrate dispersal (Westoby et al. 1990), probably dispersed by large birds e.g. Currawongs (Buchanan 1989), possibly dispersed by large mammals, kangaroos, possums; soil-stored seedbank, germination triggers unknown (P. Weston pers. comm.).

Fire response: Stems killed, sometimes resprouts from lignotuber. Secondary juvenile period less than 3 years after high intensity fire 1/94 (at Lane Cove, P. Kubiak pers. comm.).

Interaction with other organisms: Fungus *Camarosporula persooniae* causes a leaf spot disease (B. Summerell pers. comm.).

Distribution

Status/origin: Native.

Botanical subregions: NC CC CT.

Distribution Sydney area: Coast and Blue Mountains.

Select locations: CC: Morisset, Maroota, Agnes Banks, Llandilo, Castle Hill, Hornsby, Beecroft, Peakhurst, Kemps Creek. CT: Capertee, Clarence, Mt Victoria, Blackheath, Katoomba, Woodford.

Habitat

Habitat: Ridges.

Altitude: 0–1100 m

Annual rainfall: 700–1400 mm

Typical local abundance: Occasional–frequent.

Vegetation: Woodland e.g. with *Eucalyptus haemastoma*, *Angophora bakeri*, *Eucalyptus sieberi*, *E. sclerophylla*; heath e.g. with *Banksia ericifolia*, *Allocasuarina nana*.

Substrate: Sandy loam on sandstone, Wianamatta Shale, Tertiary sand deposits, low to medium nutrient soils.

Exposure: Full sun to light shade (P. Weston pers. comm.).

Conservation

Conservation: Southern geographical limit is Georges River. Conservation status unknown. Reported in Marramarra NP, Ku-ring-gai Chase NP, Garigal NP, Lane Cove NP.

Persoonia laurina subsp. *leiogyne* (*P. laurina* subsp. *C*)

PROTEACEAE**Life history**

Growth form: Erect to spreading shrub; leaves mostly opposite, mature leaves scabrous.

Vegetative spread:

Longevity:

Primary juvenile period:

Flowers: Yellow, September–December.

Fruit/seed: Fleshy fruit, with one seed enclosed in a hard, woody stone. Fruit shed at maturity, August–December.

Dispersal, establishment & growth: Diaspore: fruit, adapted for vertebrate dispersal (Westoby et al. 1990), probably dispersed by large birds e.g. Currawongs (Buchanan 1989), possibly dispersed by large mammals, kangaroos, possums; soil-stored seedbank, germination triggers unknown (P. Weston pers. comm.).

Fire response: Resprouts from lignotuber (P. Weston pers. comm.).

Interaction with other organisms:

Distribution

Status/origin: Native.

Botanical subregions: SC CT ST.

Distribution Sydney area: Tablelands south from Jenolan.

Select locations: CT: Oberon, Jenolan Caves, Kanangra, Mt Werong, Berrima, Wombeyan Caves, Carrington Falls, Wingello.

Habitat

Habitat: Rocky hillsides.

Altitude: 550–1000 m

Annual rainfall: 1000–1200 mm

Typical local abundance: Frequent–occasional.

Vegetation: Open-forest e.g. with *Eucalyptus sieberi*, *E. piperita*, *E. radiata*, *E. cinerea*, *Allocasuarina torulosa*; shrubby understorey.

Substrate: Shallow sandy soils on sandstone, granite, quartzite/igneous rocks, low nutrients, poorly-drained.

Exposure: Full sun to light shade (P. Weston pers. comm.).

Conservation

Conservation: Northern geographical limit is Oberon. Conservation status unknown.

Persoonia laxa (*P. nutans* subsp. *B*)**PROTEACEAE****Life history**

Growth form: Decumbent or prostrate shrub with hairy young branchlets. Specimen collected from Dee Why (1922) could be hybrid with *P. levis* (Weston & Johnson 1991).

Vegetative spread:

Longevity:

Primary juvenile period:

Flowers: Yellow, November–January? (Weston & Johnson 1991).

Fruit/seed: Fruit unknown but most probably a drupe like all other persoonias (P. Weston pers. comm.).

Dispersal, establishment & growth: Diaspore: fruit, probably dispersed by large birds e.g. Currawongs (Buchanan 1989), possibly dispersed by large mammals, kangaroos, possums; soil-stored seedbank, germination triggers unknown (P. Weston pers. comm.).

Fire response:

Interaction with other organisms:

Distribution

Status/origin: Native.

Botanical subregions: CC.

Distribution Sydney area: Newport–Manly.

Select locations: CC: Newport (1907), Manly (1908).

Habitat

Habitat:

Altitude: 0–20 m

Annual rainfall: 1200–1400 mm

Typical local abundance:

Vegetation: Open-forest, woodland, heath.

Substrate:

Exposure:

Conservation

Conservation: Local endemic listed as Presumed Extinct under NSW *Threatened Species Conservation Act 1995*, coded 2X on national rare species list (Briggs & Leigh 1996). Known from only 2 collections, Manly, Newport in developed suburban areas.

Persoonia levis**PROTEACEAE**

Broad-leaved Geebung

Life history

Growth form: Erect to spreading shrub or small tree, with loose flaky bark. Occasionally hybridizes with *P. acerosa*, *P. linearis*, *P. mollis* subsp. *ledifolia*, *P. myrtilloides* and *P. oxyccoides*.

Vegetative spread: No.

Longevity: More than 60 years (D. Keith pers. comm.).

Primary juvenile period:

Flowers: Yellow, mainly September–February, peak December–January. Long-tongue bee *Leioproctus (Cladocera) carinatifrons* collects nectar and/or pollen from the flowers (Bernhardt & Weston 1996).

Fruit/seed: Fleshy fruit, mean fresh weight 1700 mg (Westoby et al. 1990), with one or two seeds enclosed in a hard, woody stone. Fruit shed at maturity.

Dispersal, establishment & growth: Diaspore: fruit, adapted for vertebrate dispersal (Westoby et al. 1990), probably dispersed by large birds e.g. Currawongs (Buchanan 1989), possibly dispersed by large mammals, kangaroos, possums; soil-stored seedbank, germination triggers unknown (P. Weston pers. comm.). Recruitment mainly after fire (D. Keith pers. comm.). Germination after lying in sand and leaf litter for 12 months (S. Fisher pers. comm.).

Fire response: Stems killed and regenerates with basal sprouts (D. Keith pers. comm.). Vigorous resprouting from all of the trunk (c. 8 cm diam.) following very high intensity fire at Bantry Bay 12/1990 (L.McD.). May fruit 4 years after fire (Bradley 1972), 1 year after high intensity fire 1/94 (at Lane Cove, P. Kubiak pers. comm.).

Interaction with other organisms: Fungus *Anthracostroma persooniae* causes a leaf spot disease (B. Summerell pers. comm.).

Distribution

Status/origin: Native.

Botanical subregions: NC CC SC CT ST; Vic.

Distribution Sydney area: Widespread.

Select locations: CC: Gosford, Pymble, Chowder Head, O'Hares Creek, La Perouse, Kurnell, Waterfall, Springwood, Bargo, Minnamurra Falls. CT: Mt Coricudgy, Mt Wilson, Katoomba, Wombeyan Caves, Carrington Falls.

Habitat

Habitat: Ridges and slopes.

Altitude: 0–1100 m

Annual rainfall: 900–1400 mm

Typical local abundance: Frequent–occasional.

Vegetation: Open-forest and woodland e.g. with *Eucalyptus piperita*, *E. sieberi*, *E. sclerophylla*, *Corymbia gummifera*, *Eucalyptus radiata*, *E. smithii*, *Angophora costata*.

Substrate: Sandy soils on sandstone, low nutrients, well-drained.

Exposure: Full sun to light shade (P. Weston pers. comm.).

Conservation

Conservation: Adequately conserved. Reported in Wollemi NP, Bouddi NP, Brisbane Water NP, Marramorra NP, Blue Mountains NP, Ku-ring-gai Chase NP, Garigal NP, Lane Cove NP, Sydney Harbour NP, Botany Bay NP, Budderoo NP.

Persoonia linearis

PROTEACEAE

Narrow-leaved Geebung

Life history

Growth form: Erect shrub or small tree, with flaky bark reddish beneath surface. Occasionally hybridizes with *P. acerosa*, *P. levis*, *P. mollis* subsp. *ledifolia*, *P. myrtilloides* and *P. oxycoccooides*.

Vegetative spread: Limited suckering from roots (up to 8 m from adult) exposed by disturbance (observed at Elderslie).

Longevity:

Primary juvenile period:

Flowers: Yellow, December–July, peak January–February. Probably pollinated by native bees (*P. Kubiak* pers. comm.).

Fruit/seed: Fleshy fruit green with maroon stripes or rarely green, mean fresh weight 1900 mg (Westoby et al. 1990), with one or two seeds enclosed in a hard, woody stone. Fruit shed at maturity, September–November.

Dispersal, establishment & growth: Diaspore: fruit, adapted for vertebrate dispersal (Westoby et al. 1990), probably dispersed by large birds e.g. Currawongs (Buchanan 1989), possibly dispersed by large mammals, kangaroos, possums; soil-stored seedbank, germination triggers unknown (*P. Weston* pers. comm.).

Fire response: Resprouts from lignotuber and epicormics on stem greater than 2 cm diameter.

Interaction with other organisms:

Distribution

Status/origin: Native.

Botanical subregions: NC CC SC NT CT ST CWS; Vic.

Distribution Sydney area: Widespread.

Select locations: CC: Putty, Howes Valley, Wisemans Ferry, Morisset, Ourimbah, Bobbin Head, Cheltenham, Manly, Oatley, Bilpin, Campbelltown, Picton, Bargo, Cambewarra.

CT: Mt Coricudgy, Portland, Capertee, Lithgow, Blackheath, Kowmung, Yerranderie, Mt Jellore, Wombeyan Caves, Fitzroy Falls, Bundanoon.

Habitat

Habitat:

Altitude: 0–1000 m **Annual rainfall:** 700–1400 mm

Typical local abundance: Frequent–occasional.

Vegetation: Woodland, open-forest e.g. with *Angophora costata*, *Eucalyptus sieberi*, *E. piperita*, *E. agglomerata*, *E. pilularis*, *E. paniculata*, *E. saligna*, *E. sparsifolia*, *E. rossii* with shrubby understorey.

Substrate: Sandy soil on sandstone, low nutrients, well-drained.

Exposure: Full sun to light shade.

Conservation

Conservation: Widespread and adequately conserved. Reported in Bouddi NP, Brisbane Water NP, Marramarra NP, Ku-ring-gai Chase NP, Garigal NP, Lane Cove NP, Sydney Harbour NP.

Persoonia marginata

PROTEACEAE

Life history

Growth form: Spreading to decumbent shrub with hairy young branches.

Vegetative spread:

Longevity:

Primary juvenile period:

Flowers: Yellow, December.

Fruit/seed: Fleshy green fruit, with two seeds enclosed in a hard, woody stone. Fruit shed at maturity.

Dispersal, establishment & growth: Diaspore: fruit, probably dispersed by large birds e.g. Currawongs (Buchanan 1989), possibly dispersed by large mammals, kangaroos, possums; soil-stored seedbank, germination triggers unknown (*P. Weston* pers. comm.).

Fire response: Resprouts [Herbarium specimen]

Interaction with other organisms:

Distribution**Status/origin:** Native.**Botanical subregions:** CT.**Distribution Sydney area:** Confined to Capertee district.**Select locations:** CT: Clandulla SF, Capertee, Dark Corner.**Habitat****Habitat:** Ridges and slopes.**Altitude:** 700–800 m **Annual rainfall:** 600–700 mm**Typical local abundance:** Rare–occasional.**Vegetation:** Open-forest e.g. with *Eucalyptus rossii*, *E. beyeriana*, *E. tenella* with grassy/shrubby understorey.**Substrate:** Sandy clay and gravelly soil, low nutrients.**Exposure:****Conservation****Conservation:** Restricted local endemic, listed as Vulnerable (Schedule 2) under NSW *Threatened Species Conservation Act 1995* and coded 2V on national rare species list (Briggs & Leigh 1996).***Persoonia microphylla*****PROTEACEAE****Life history****Growth form:** Prostrate to erect shrub to 2 m high, with hairy young branchlets. Grows sympatrically with *P. laurina* subsp. *intermedia* and subsp. *leioygyna*; occasionally hybridises with *P. mollis* subsp. *livens* where they grow together (Weston & Johnson 1991).**Vegetative spread:****Longevity:****Primary juvenile period:****Flowers:** Yellow, February. Flowers sporadically throughout the year (Weston & Johnson 1991).**Fruit/seed:** Fleshy fruit green with purple stripes, with one seed; with four cotyledons (Weston & Johnson 1991), shed at maturity, October.**Dispersal, establishment & growth:** Diaspore: fruit, probably dispersed by large birds e.g. Currawongs (Buchanan 1989), possibly dispersed by large mammals, kangaroos, possums; soil-stored seedbank, germination triggers unknown (P. Weston pers. comm.).**Fire response:****Interaction with other organisms:****Distribution****Status/origin:** Native.**Botanical subregions:** CT ST.**Distribution Sydney area:** Southern Blue Mountains.**Select locations:** CT: Mount Werong, Wombeyan Caves.**Habitat****Habitat:****Altitude:** 900–1200 m **Annual rainfall:** 800–1000 mm**Typical local abundance:** Frequent.**Vegetation:** Open-forest e.g. with *Eucalyptus viminalis*.**Substrate:** Stony, sandy to clayey soil from sandstone or other siliceous rocks (Weston & Johnson 1991), low nutrients.**Exposure:** Full sun to light shade (P. Weston pers. comm.).**Conservation****Conservation:** Mt Werong is northern geographical limit. Conservation status unknown.

Persoonia mollis* subsp. *caleyi

PROTEACEAE

Life history**Growth form:** Erect to prostrate shrub, with hairy young branchlets.**Vegetative spread:** No.**Longevity:****Primary juvenile period:****Flowers:** Yellow, buds in December.**Fruit/seed:** Fruit with one seed, shed at maturity.**Dispersal, establishment & growth:** Diaspore: fruit, probably dispersed by large birds e.g. Currawongs (Buchanan 1989), possibly dispersed by large mammals, kangaroos, possums; soil-stored seedbank, germination triggers unknown (P. Weston pers. comm.).**Fire response:** Killed (Krauss 1997).**Interaction with other organisms:**

Distribution**Status/origin:** Native.**Botanical subregions:** SC CC.**Distribution Sydney area:** Kangaroo Valley.**Select locations:** CC: Tallowa Dam.

Habitat**Habitat:** Roadside, disturbed edge of open-forest.**Altitude:** 100–200 m **Annual rainfall:** 1200 mm**Typical local abundance:** Frequent.**Vegetation:** Eucalypt open-forest.**Substrate:** Clay-influenced soil from Shoalhaven Group.**Exposure:** Full sun to light shade (P. Weston pers. comm.).

Conservation**Conservation:** Recently recorded near Bendeela Picnic Area, Tallowa Dam, the only record for CC and the northern geographical limit. Conservation adequacy unknown.***Persoonia mollis* subsp. *ledifolia***

PROTEACEAE

Life history**Growth form:** Erect shrub, with hairy young branchlets.**Vegetative spread:** No.**Longevity:****Primary juvenile period:****Flowers:** Yellow, January–February. Long-tongue bees *Leioproctus* (*Cladocerapis*) collect nectar and/or pollen from the flowers (Bernhardt & Weston 1996).**Fruit/seed:** Fleshy fruit, with one seed enclosed in a hard, woody stone, shed at maturity, October–November.**Dispersal, establishment & growth:** Diaspore: fruit, probably dispersed by large birds e.g. Currawongs (Buchanan 1989), possibly dispersed by large mammals, kangaroos, possums; soil-stored seedbank, germination triggers unknown (P. Weston pers. comm.).**Fire response:** Killed (Krauss 1997).**Interaction with other organisms:**

Distribution**Status/origin:** Native.**Botanical subregions:** CC CT.**Distribution Sydney area:** Southern Highlands.**Select locations:** CC: Berry. CT: Robertson, Carrington Falls, Fitzroy Falls, Bundanoon, Penrose, Wingello.

Habitat**Habitat:** Plateaus, hillsides.**Altitude:** 600–700 m **Annual rainfall:** 900–1600 mm**Typical local abundance:** Occasional–frequent.

Vegetation: Open-forest e.g. with *Eucalyptus radiata*, *E. piperita*, *E. smithii*, *E. sieberi*, *Corymbia gummifera*; woodland e.g. with *Eucalyptus sieberi*, *E. piperita*, *Banksia paludosa*, *Persoonia levis*, *P. oxycoccoides*.

Substrate: Sandy soil on sandstone, low nutrients.

Exposure: Full sun to light shade (P. Weston pers. comm.).

Conservation

Conservation: Local endemic, adequacy of conservation unknown. Recorded for Morton NP, Barren Grounds Nature Reserve, Budderoo NP.

Persoonia mollis* subsp. *leptophylla
PROTEACEAE

Life history

Growth form: Erect shrub to 1.5 m high, with hairy young branchlets.

Vegetative spread: No.

Longevity:

Primary juvenile period:

Flowers: Yellow, mainly January–March.

Fruit/seed: Fleshy fruit, with one seed enclosed in a hard, woody stone. Fruit shed at maturity.

Dispersal, establishment & growth: Diaspore: fruit. Probably dispersed by large birds e.g. Currawongs (Buchanan 1989), possibly dispersed by large mammals, kangaroos, possums; soil-stored seedbank, germination triggers unknown (P. Weston pers. comm.). Possibly colonises locally bared sites

Fire response: Killed (Krauss 1997).

Interaction with other organisms:

Distribution

Status/origin: Native.

Botanical subregions: CC SC ST.

Distribution Sydney area: Nowra.

Select locations: CC: Bomaderry, Nowra.

Habitat

Habitat: Woodland.

Altitude: 0–200 m

Annual rainfall: 1400 mm

Typical local abundance: Frequent.

Vegetation: Woodland e.g. with *Corymbia gummifera*, *Eucalyptus piperita*, *E. consideniana*, *Kunzea ambigua*, *Leptospermum sejunctum*, *Acacia obtusifolia*, *Lambertia formosa*; heathy scrub e.g. with *Allocasuarina*, *Banksia ericifolia*, *Leptospermum trinervium*, *Kunzea ambigua*.

Substrate: Sandy and clayey to gravelly loam over sandstone, low nutrients.

Exposure: Full sun.

Conservation

Conservation: Bomaderry is northern geographical limit, conservation status unknown.

Persoonia mollis* subsp. *livens**PROTEACEAE****Life history**

Growth form: Erect shrub to 1.5 m high, with hairy young branchlets and narrow grey-green leaves with a hairy lower surface.

Vegetative spread: No.

Longevity:

Primary juvenile period:

Flowers: Yellow, mainly January.

Fruit/seed: Fleshy fruit, with one seed enclosed in a hard, woody stone. Fruit shed at maturity.

Dispersal, establishment & growth: Diaspore: fruit, probably dispersed by large birds e.g. Currawongs (Buchanan 1989), possibly dispersed by large mammals, kangaroos, possums; soil-stored seedbank, germination triggers unknown (P. Weston pers. comm.).

Fire response: Killed (Krauss 1997).

Interaction with other organisms:

Distribution

Status/origin: Native.

Botanical subregions: CT ST.

Distribution Sydney area: Penrose–Wingello.

Select locations: CT: Paddys River, Penrose, Wingello SF, Barbers Creek, Tallong.

Habitat

Habitat: Ridgetop, upper hillside.

Altitude: 500–700 m

Annual rainfall: 900–1000 mm

Typical local abundance: Occasional.

Vegetation: Open-forest to woodland e.g. with *Eucalyptus rossii*, *E. mannifera*, *E. cinerea*, *E. sclerophylla*, *Allocasuarina littoralis*, *Banksia spinulosa*, *Platysace lanceolata*, *Pomaderris ligustrina*.

Substrate: Brown sandy loam from metasediments, conglomerate, sandstone, low nutrients.

Exposure: Light shade.

Conservation

Conservation: Penrose is northern geographical limit. Conservation status unknown.

Persoonia mollis subsp. ***maxima***

PROTEACEAE

Life history

Growth form: Erect shrub to 6 m high, with copper-coloured hairs on flower buds, young branchlets, and young leaves.

Vegetative spread: No.

Longevity:

Primary juvenile period: Probably reaches peak flowering and fruiting at 10–15 years (NPWS 1999).

Flowers: Yellow, December–March; pollinated by native bees, mostly *Leioproctus* and *Exoneura* species; the European Honey Bee forages actively on the pollen and nectar but is probably not an effective pollinator; approximately 20% cross-pollinated flowers set fruit compared with 1% of self-pollinated flowers (NPWS 1999).

Fruit/seed: Fleshy fruit dull pink to purple at maturity, with one seed enclosed in a hard, woody stone. Drops to the ground when ripe, November–December. Seedbank stored in the leaf litter layer of the soil profile (NPWS 1999).

Dispersal, establishment & growth: Diaspore: fruit, may be dispersed by floodwaters along creeklines (P. Kubiak pers. comm.). Seed dispersal may be supplemented by small mammals and birds; seed germination may be chemically inhibited with dormancy broken by passing through the gut of small mammals (NPWS 1999). Soil-stored seedbank, germination triggers unknown (P. Weston pers. comm.).

Fire response: Killed (Krauss 1997). Populations aged less than 8 years are extremely vulnerable to local extinction (NPWS 1999).

Interaction with other organisms: Seed predation by Cockatoos, Rosellas and possibly possums, small native rats, and some reptiles (NPWS 1999).

Distribution

Status/origin: Native.

Botanical subregions: CC.

Distribution Sydney area: Cowan to Hornsby.

Select locations: CC: Berowra Valley, Mt Kuring-gai, Galston Creek, Asquith, Hornsby.

Habitat

Habitat: Sheltered hillsides and moist gullies, mostly with a southerly aspect. Flood-prone habitat along creeks (P. Kubiak pers. comm.).

Altitude: 50–150 m **Annual rainfall:** 1200 mm

Typical local abundance: Rare–frequent.

Vegetation: Open-forest e.g. with *Angophora costata*, *Eucalyptus piperita*, *E. punctata*, *Leionema dentatum*, *Isopogon anethifolius*, *Ceratopetalum gummiferum*, *Hakea salicifolia*, *Gleichenia*, *Pultenaea flexilis*, *Grevillea linearifolia*; creekside scrub e.g. with *Bauera rubioides*, *Acrotriche divaricata*, *Ceratopetalum apetalum*, *Callicoma serratifolia*.

Substrate: Sandy soil from Hawkesbury Sandstone, low nutrients, well-drained.

Exposure: Sheltered, light shade to medium shade, but will tolerate full sun. Able to tolerate flooding (P. Kubiak pers. comm.).

Conservation

Conservation: Local endemic taxon listed as Endangered (Schedule 1) NSW *Threatened Species Conservation Act 1995*, coded 2E on national rare species list (Briggs & Leigh 1996). Restricted to Hornsby Heights–Mt Colah–Mt Kuring-gai area with a north-south range 5.75 km; total population size 550 adult plants (NPWS 1999). Relatively recent range contraction (Krauss 1997) threatened by inappropriate fire regime, urban run-off, sedimentation of creek lines, weeds, and loss of opportunity for cross-pollination with fragmentation, isolation of populations and loss of native bee pollinators (NPWS 1999). Reported in Ku-ring-gai Chase NP.

Persoonia mollis subsp. *mollis*

PROTEACEAE

Life history

Growth form: Erect to prostrate shrub, with hairy young branchlets.**Vegetative spread:** No.**Longevity:****Primary juvenile period:****Flowers:** Yellow, December–April. Long-tongue bees *Leioproctus* (*Cladocerapis*) *carinatifrons*, *L. incanescens*, *L. speculiferus* collect nectar and /or pollen from the flowers; other insect foragers include Coleoptera: *Zonitis* sp., Hymenoptera: *Amegilla* sp., *Apis mellifera*, *Chalicodoma* sp., *Exoneura* sp., *Homalictus urbanus*, *Lasioglossum repraesentans*, *Leioproctus bipectinatus*, *L. (Filiglossa)* sp., *Nomia* sp., Ichneumonid wasp (Bernhardt & Weston 1996).**Fruit/seed:** Fleshy fruit, with two seeds enclosed in a hard, woody stone, shed at maturity, August–November.**Dispersal, establishment & growth:** Diaspore: fruit, probably dispersed by large birds e.g. Currawongs (Buchanan 1989), possibly dispersed by large mammals, kangaroos, possums; soil-stored seedbank, germination triggers unknown (P. Weston pers. comm.).**Fire response:** Killed (Krauss 1997).**Interaction with other organisms:** Fungi *Camarosporula persooniae*, *Dichomora* sp. cause leaf spot disease (B. Summerell pers. comm.).

Distribution

Status/origin: Native.**Botanical subregions:** CC CT.**Distribution Sydney area:** Blue Mountains.**Select locations:** CC: Bilpin, Kurrajong Heights, Woodford, Springwood. CT: Mt Wilson, Blackheath, Kings Tableland, Little Cedar Gap, Gibraltar Rocks, Jenolan Caves.

Habitat

Habitat: Ridges, hillsides.**Altitude:** 400–1100 m **Annual rainfall:** 900–1400 mm**Typical local abundance:** Frequent.**Vegetation:** Open-forest e.g. with *Eucalyptus piperita*, *Angophora costata*, *Syncarpia glomulifera*, *Eucalyptus notabilis*, *E. cypellocarpa*, *E. sieberi*, *E. blaxlandii*.**Substrate:** Sandy soil on sandstones, low nutrients, well-drained.**Exposure:**

Conservation

Conservation: Local endemic taxon. Conservation status unknown, reported in Blue Mountains NP.**Persoonia mollis** subsp. *nectens*

PROTEACEAE

Life history

Growth form: Erect to prostrate shrub, with hairy young branchlets.**Vegetative spread:** No.**Longevity:****Primary juvenile period:****Flowers:** Yellow, January–April. Long-tongue bee *Leioproctus filamentosa* forages on the flowers (Bernhardt & Walker 1996).**Fruit/seed:** Fleshy fruit, with one seed enclosed in a hard, woody stone, shed at maturity, August–October.**Dispersal, establishment & growth:** Diaspore: fruit, probably dispersed by large birds e.g. Currawongs (Buchanan 1989), possibly dispersed by large mammals, kangaroos, possums; soil-stored seedbank, germination triggers unknown (P. Weston pers. comm.).**Fire response:** Killed (Krauss 1997).**Interaction with other organisms:**

Distribution**Status/origin:** Native.**Botanical subregions:** CC CT.**Distribution Sydney area:** Woronora Plateau.**Select locations:** CC: O'Hares Creek, Loddon Falls, Sublime Point, Mt Keira, Mt Kembla, Thirlmere Lakes, Oakdale. CT: Hill Top.**Habitat****Habitat:** Ridgetops.**Altitude:** 0–600 m**Annual rainfall:** 900–1800 mm**Typical local abundance:** Occasional.**Vegetation:** Open-forest e.g. with *Eucalyptus piperita*, *E. sieberi*, *E. sparsifolia*, *E. sclerophylla*, *Corymbia gummifera*, *Eucalyptus punctata*, *E. deanei*, *E. agglomerata*.**Substrate:** Sandy soil over sandstone, low nutrients.**Exposure:****Conservation****Conservation:** Local endemic taxon, conservation status unknown.***Persoonia mollis* subsp. *revoluta*****PROTEACEAE****Life history****Growth form:** Prostrate to decumbent shrub, with hairy young branchlets.**Vegetative spread:** No.**Longevity:****Primary juvenile period:****Flowers:** Yellow, January.**Fruit/seed:** Fleshy fruit, with one seed enclosed in a hard, woody stone. Fruit shed at maturity.**Dispersal, establishment & growth:** Diaspore: fruit, probably dispersed by large birds e.g. Currawongs (Buchanan 1989), possibly dispersed by large mammals, kangaroos, possums; soil-stored seedbank, germination triggers unknown (P. Weston pers. comm.).**Fire response:** Killed (Krauss 1997).**Interaction with other organisms:****Distribution****Status/origin:** Native.**Botanical subregions:** CT.**Distribution Sydney area:** Mittagong area.**Select locations:** CT: Mittagong, Berrima, Soapy Flat, Bullio.**Habitat****Habitat:** Gentle slopes and sandy flats.**Altitude:** 600–800 m**Annual rainfall:** 900–1000 mm**Typical local abundance:** Occasional.**Vegetation:** Open-forest e.g. with *Eucalyptus sclerophylla*, *E. radiata*, *E. dives*, *E. sieberi*, *E. piperita*, *E. agglomerata*.**Substrate:** Sandy soil over sandstone, low nutrients, well-drained.**Exposure:****Conservation****Conservation:** Restricted local endemic taxon, coded 2R on national rare species list (Briggs & Leigh 1996). Adequacy of conservation unknown.

Persoonia myrtilloides* subsp. *cunninghamii

PROTEACEAE

Life history

Growth form: Erect to spreading shrub with hairy young branchlets. Occasionally hybridises with *P. acerosa*, *P. levis*, *P. recedens* where they grow together.

Vegetative spread:

Longevity:

Primary juvenile period:

Flowers: Yellow, December–May.

Fruit/seed: Fleshy fruit, with one or two seeds enclosed in a hard, woody stone. Fruit shed at maturity, August–September.

Dispersal, establishment & growth: Diaspore: fruit, probably dispersed by large birds e.g. Currawongs (Buchanan 1989), possibly dispersed by large mammals, kangaroos, possums; soil-stored seedbank, germination triggers unknown (P. Weston pers. comm.).

Fire response:

Interaction with other organisms:

Distribution

Status/origin: Native.

Botanical subregions: CT CWS.

Distribution Sydney area: Upper Cudgegong River.

Select locations: CT: Kandos Weir, Coricudgy.

Habitat

Habitat: Ridges with sandstone outcrops.

Altitude: 600–1000 m **Annual rainfall:** 700–800 mm

Typical local abundance: Occasional–frequent.

Vegetation: Woodland e.g. with *Eucalyptus rossii*, *Angophora floribunda*, *Callitris*, *Eucalyptus sclerophylla*; mallee e.g. with *Eucalyptus multicaulis*, *E. laophila*.

Substrate: Sandy soil, among conglomerate rock outcrops, low nutrients, sometimes poorly-drained.

Exposure:

Conservation

Conservation: Southern geographical limit Coricudgy. Conservation adequacy unknown, reported in Wollemi National Park.

Persoonia myrtilloides* subsp. *myrtilloides

PROTEACEAE

Life history

Growth form: Erect to spreading shrub to 2 m high, with hairy young branchlets. May hybridise with *P. acerosa*, *P. levis*, *P. recedens* where they grow together.

Vegetative spread:

Longevity:

Primary juvenile period:

Flowers: Yellow, October–July, peak December–January. Insect foragers on flowers include: *Exoneura* sp., *Hylaeus* sp., *Homalictus holochorus*, *Leioproctus (Cladocerapis)* sp., *L. carinatifrons*, *L. raymenti*, *L. speculiferus*, *Odyneurus* sp., *Odyneurus* sp., *Trigona carbonaria* (Bernhardt & Weston 1996).

Fruit/seed: Fleshy fruit, with two seeds enclosed in a hard, woody stone. Fruit shed at maturity, June–December.

Dispersal, establishment & growth: Diaspore: fruit, probably dispersed by large birds e.g. Currawongs (Buchanan 1989), possibly dispersed by large mammals, kangaroos, possums; soil-stored seedbank, germination triggers unknown (P. Weston pers. comm.). Coloniser of disturbed soil such as along margins of pine plantations.

Fire response:

Interaction with other organisms:

Distribution

Status/origin: Native.

Botanical subregions: CT.

Distribution Sydney area: Upper Blue Mountains.

Select locations: CT: Capertee, Wallerawang, Clarence, Newnes Plateau, Mt Wilson, Blackheath, Wentworth Falls.

Habitat

Habitat: Ridges and slopes.

Altitude: 800–1100 m **Annual rainfall:** 900–1400 mm

Typical local abundance: Occasional.

Vegetation: Open-forest e.g. with *Eucalyptus piperita*, *E. sieberi*, *E. radiata* with shrubby understorey e.g. with *Banksia serrata*, *Phyllota squarrosa*, *Leptospermum trinervium*, *Lambertia formosa*; occasionally in heath.

Substrate: Sandy loam on sandstone, low nutrients, well-drained.

Exposure:

Conservation

Conservation: Local endemic taxon, partly conserved in Blue Mountains National Park.

Persoonia nutans* (*P. nutans* subsp. *A*)*PROTEACEAE****Life history**

Growth form: Erect to spreading shrub 0.5–1.5 m high, with hairy young branches.

Sometimes grows with *P. laurina* and *P. hirsuta* but no hybrids are known (Weston & Johnson 1991).

Vegetative spread: No.

Longevity:

Primary juvenile period:

Flowers: Yellow, mainly December–January. Long-tongue bees *Chalicodoma* sp., *Leioproctus* (*Cladocerapis*) sp. *L. incanescens* forage on flowers (Bernhardt & Weston 1996).

Fruit/seed: Fleshy fruit, with one or two seeds enclosed in a hard, woody stone, shed at maturity, December–October.

Dispersal, establishment & growth: Diaspore: fruit; probably dispersed by large birds e.g. Currawongs (Buchanan 1989). Possibly dispersed by large mammals, kangaroos, possums; soil-stored seedbank, germination triggers unknown (*P. Weston pers. comm.*). Disturbance appears to favour seedling establishment (Robertson et al. 1996).

Fire response: Killed (Robertson et al. 1996).

Interaction with other organisms:

Distribution

Status/origin: Native.

Botanical subregions: CC.

Distribution Sydney area: Western Sydney.

Select locations: CC: Agnes Banks, Londonderry, St Marys, Kemps Creek, Voyager Point, Macquarie Fields, Villawood.

Habitat

Habitat: Dry woodland.

Altitude: 0–60 m **Annual rainfall:** 800–900 mm

Typical local abundance: Frequent–occasional.

Vegetation: In Castlereagh Scribbly gum Woodland and Agnes Banks Woodland (Benson 1992) e.g. with *Angophora bakeri*, *Eucalyptus sclerophylla*, *E. parramattensis*, *E. fibrosa*, *Melaleuca decora* and shrubby understorey including e.g. *Melaleuca nodosa*, *Hakea sericea*, *Dillwynia tenuifolia*, *Micromyrtus minutiflora*, *Banksia spinulosa*.

Substrate: Sandy soils associated with Tertiary alluvium, low nutrients, sometimes poorly drained. More common on well drained deeper sands of Agnes Banks than nearby Londonderry Clay (Robertson et al. 1996).

Exposure: Full sun to light shade.

Conservation

Conservation: Local endemic confined to Cumberland Plain, listed as Endangered (Schedule 1) NSW *Threatened Species Conservation Act 1995* and coded 2ECi on national rare species list (Briggs & Leigh 1996). Most remaining populations are threatened by development for housing and sandmining (Weston & Johnson (1991). Reported in Agnes Banks NR, Windsor Downs NR.

Persoonia oblongata**PROTEACEAE****Life history**

Growth form: Erect to spreading shrub to 2 m high, with hairy young branches; no lignotuber.

Vegetative spread: No.

Longevity:

Primary juvenile period:

Flowers: Yellow, January–June. Insects foraging on the flowers include *Apis mellifera*, *Homalictus urbanus*, *Lasioglossum instabilis*, *Leioproctus raymenti*, *Trigona carbonaria* (Bernhardt & Weston 1996).

Fruit/seed: Fleshy fruit, with one or two seeds enclosed in a hard, woody stone, shed at maturity, August–November.

Dispersal, establishment & growth: Diaspore: fruit, probably dispersed by large birds e.g. Currawongs (Buchanan 1989), possibly dispersed by large mammals, kangaroos, possums; soil-stored seedbank, germination triggers unknown (P. Weston pers. comm.).

Fire response: Probably killed.

Interaction with other organisms:

Distribution

Status/origin: Native.

Botanical subregions: CC CT CWS.

Distribution Sydney area: Howes Valley to Blue Mountains.

Select locations: CC: Mellong Range, Howes Swamp, Sackville Reach, Cattai, Winmalee, Blaxland, Glen Davis. CT: Mt Coorongooba.

Habitat

Habitat: Ridges, rocky hillsides.

Altitude: 200–800 m **Annual rainfall:** 900–1000 mm

Typical local abundance: Frequent–occasional.

Vegetation: Eucalypt open-forest to woodland e.g. with *Angophora costata*, *Eucalyptus sparsifolia*, *Corymbia gummifera*, *Eucalyptus notabilis*, *E. punctata*, *Angophora bakeri*.

Substrate: Sandy soil on sandstone, low nutrients.

Exposure:

Conservation

Conservation: Conservation status unknown. Reported from Wollemi NP.

Persoonia oxycoccoides**PROTEACEAE****Life history**

Growth form: Prostrate to spreading shrub to 90 cm high, with hairy young branchlets. Occasionally hybridises with *P. levis*. Apparently intergrades with *P. acuminata* in a limited area between Jenolan Caves and Kanangra Walls; grows with *P. levis* (occasionally hybridises), *P. mollis*, *P. laurina* (Weston & Johnson 1991).

Vegetative spread:

Longevity:

Primary juvenile period:

Flowers: Yellow, December–April (Weston & Johnson 1991). Insects foraging on the flowers include *Apis mellifera*, *Exoneura* sp., *Leioproctus speculiferus* (Bernhardt & Weston 1996).

Fruit/seed: Fleshy green fruit, with one seed enclosed in a hard, woody stone, shed at maturity, September–October.

Dispersal, establishment & growth: Diaspore: fruit, probably dispersed by large birds e.g. Currawongs (Buchanan 1989), possibly dispersed by large mammals, kangaroos, possums; soil-stored seedbank, germination triggers unknown (P. Weston pers. comm.).

Fire response: Resprouts from lignotuber (at Budderoo) (P. Weston pers. comm.).

Interaction with other organisms:

Distribution

Status/origin: Native.

Botanical subregions: CT.

Distribution Sydney area: Kanangra, Southern Highlands.

Select locations: CT: Kanangra Walls, Bindook, Mittagong, Bundanoon, Fitzroy Falls, Penrose SF, Wingello.

Habitat

Habitat: Ridgetop.

Altitude: 600–1000 m **Annual rainfall:** 900–1100 mm

Typical local abundance: Occasional.

Vegetation: Montane heath, eucalypt open-forest e.g. with *Eucalyptus sieberi*, *E. piperita*, *E. fastigata*.

Substrate: Sandy soils from sandstone, quartzite, low nutrients.

Exposure:

Conservation

Conservation: Local endemic species coded 2RCa on national rare species list (Briggs & Leigh 1996). Adequacy of conservation unknown. Reported in Kanangra-Boyd NP, Budderoo NP, Morton NP.

Persoonia pinifolia**PROTEACEAE**

Pine-leaved Geebung

Life history**Growth form:** Erect shrub or small tree. Rarely hybridizes with *P. isophylla* and *P. linearis*.**Vegetative spread:** No.**Longevity:** 25–60 years (D. Keith pers. comm.).**Primary juvenile period:** More than 5 years (P. Kubiak pers. comm.).**Flowers:** Yellow, December–July, peak January (Weston & Johnson 1991). Nectar is sucrose-dominant (Bernhardt & Weston 1996). Native bee *Leioproctus filamentosa* feeds on nectar (P. Bernhardt quoted by Beale 1992). Majority of long-tongue native bees foraging on flowers belong to families Anthophoridae, Megachilidae and Apidae; only 7% were *Leioproctus* (*Cladocerapis*) sp. including *L. incanescens*, *L. raymenti*, *L. speculiferus*; other insects foraging on flowers include *Apis mellifera*, *Chalicodoma* species, *Exoneura* sp., *Trigona carbonaria*, Sphecid wasp (Bernhardt & Weston 1996), *Leioproctus filamentosa*, *L. hamatus* forage on flowers (Bernhardt & Weston 1996).**Fruit/seed:** Fleshy fruit, purplish when ripe, with one seed enclosed in a hard, woody stone. Mean fresh weight of fruit 1270 mg (Westoby et al. 1990). Fruit shed at maturity, November–December.**Dispersal, establishment & growth:** Diaspore: fruit, adapted for vertebrate dispersal (Westoby et al. 1990). Probably dispersed by large birds e.g. Currawongs (Buchanan 1989), possibly dispersed by large mammals, kangaroos, possums; soil-stored seedbank (P. Weston pers. comm.). Seed 85% viable, all dormant at release but short-lived in soil (Auld et al. 2000). Fruit eaten by Lewin's Honeyeater *Meliphaga lewinii* (Barker & Vestjens 1990), seed found in dung of Swamp Wallaby (J. Howell pers. comm.). Regurgitated fruit (? from mammals or large birds) observed sometimes along walking tracks; seedlings seem to be more frequently observed along tracks; Antechinus observed apparently gnawing woody-coated seed on ground (September at West Head, L.McD.); germination triggers unknown (P. Weston pers. comm.), germination after woody coat decomposed in leaf litter (in Frenchs Forest garden) (L.McD.).**Fire response:** Killed, re-establish from soil-stored seed and/or unburnt plants.**Interaction with other organisms:** Fungi *Anthracostruma persooniae*, *Camarosporula persooniae* cause leaf spot disease (B. Summerell pers. comm.).**Distribution****Status/origin:** Native.**Botanical subregions:** CC.**Distribution Sydney area:** Coast and Lower Blue Mountains.**Select locations:** CC: Pearl Beach, Cowan, Berowra, Terrey Hills, Mona Vale, Dee Why, Galston Gorge, Pennant Hills, Turramurra, Lindfield, Leumeah, Wedderburn, Waterfall, Woronora Dam, Bilpin, Springwood.**Habitat****Habitat:** Hillsides.**Altitude:** 0–500 m**Annual rainfall:** 1000–1200 mm**Typical local abundance:** Frequent–occasional.**Vegetation:** Open-forest e.g. with *Eucalyptus sieberi*, *Angophora costata*; woodland e.g. with *Eucalyptus haemastoma*, *E. piperita*, *Corymbia gummifera*, *Allocasuarina littoralis*, understorey e.g. with *Olax stricta*, *Lasiopetalum ferrugineum*, *Conospermum longifolium*; heath e.g. with *Hakea sericea*, *Kunzea ambigua*.**Substrate:** Gravelly to sandy soil on sandstone, low nutrients.**Exposure:** Full sun to light shade.**Conservation****Conservation:** Local endemic species, probably adequately conserved. Reported in Brisbane Water NP, Marramorra NP, Ku-ring-gai Chase NP, Garigal NP, Lane Cove NP, Royal NP.

Persoonia recedens**PROTEACEAE****Life history**

Growth form: Prostrate to spreading shrub 0.3–1.5 m high, with hairy young branches. Most closely resembles *P. acuminata* (Weston & Johnson 1991).

Vegetative spread:

Longevity:

Primary juvenile period:

Flowers: Yellow, mainly December–January (Weston and Johnson 1991).

Fruit/seed: Green fleshy fruit, with seed enclosed in a hard woody stone, cotyledons not known (Weston & Johnson 1991). Fruit shed at maturity.

Dispersal, establishment & growth: Diaspore: fruit, probably dispersed by large birds e.g. Currawongs (Buchanan 1989), possibly dispersed by large mammals, kangaroos, possums; soil-stored seedbank, germination triggers unknown (P. Weston pers. comm.).

Fire response:

Interaction with other organisms:

Distribution

Status/origin: Native.

Botanical subregions: CT.

Distribution Sydney area: Newnes Plateau.

Select locations: CT: Newnes SF, Bungleboori, Clarence, Blackheath.

Habitat

Habitat: Plateaus, hillsides.

Altitude: 630–1170 m

Annual rainfall: 1000–1200 mm

Typical local abundance: Occasional–frequent.

Vegetation: Eucalypt open-forest e.g. with *Eucalyptus radiata*, *E. dives*, *E. sieberi*, *E. gullickii*; grassy, shrubby understorey e.g. with *Phyllota squarrosa*, *Daviesia latifolia*, *Lomatia silaifolia*, *L. myricoides*, *Polyscias sambucifolia*, *Banksia spinulosa*, *Hakea dactyloides*, *Persoonia chamaepitys*, *P. myrtilloides*.

Substrate: Sandy siliceous soils, usually derived from Narrabeen Sandstone (Weston & Johnson 1991), low nutrients.

Exposure: Light shade to full sun.

Conservation

Conservation: Local endemic species, coded 2R on national rare species list (Briggs & Leigh 1996). Confined mainly to Newnes Plateau, with a dubious disjunct record from Abercrombie Caves (Weston & Johnson 1991). Adequacy of conservation unknown.

Persoonia rigida**PROTEACEAE****Life history**

Growth form: Erect to decumbent shrub, with hairy young branchlets and grey-green leaves.

Vegetative spread:

Longevity:

Primary juvenile period:

Flowers: Yellow, December–January.

Fruit/seed: Fleshy fruit, with one seed enclosed in a hard, woody stone, shed at maturity, September–October.

Dispersal, establishment & growth: Diaspore: fruit, probably dispersed by large birds e.g. Currawongs (Buchanan 1989), possibly dispersed by large mammals, kangaroos, possums; soil-stored seedbank, germination triggers unknown (P. Weston pers. comm.).

Fire response:

Interaction with other organisms: Fungi *Anthracostroma persooniae* and *Camarosporula persooniae* cause leaf spot diseases (B. Summerell pers. comm.).

Distribution

Status/origin: Native.

Botanical subregions: CC NT CT ST CWS SWS; Vic.

Distribution Sydney area: Tablelands.

Select locations: CC: Mt Kembla. CT: Growee, Mullions Range, Clandulla SF, Portland, Bathurst, Winburndale, Kedumba.

Habitat

Habitat: Gentle slopes.

Altitude: 0–800 m

Annual rainfall: 600–1400 mm

Typical local abundance: Rare–occasional.

Vegetation: Open-forest e.g. with *Eucalyptus rossii*, *E. beyeri*, *E. tenella*, *E. punctata*, *E. macrorhyncha*, *Persoonia linearis*, *Dillwynia phyllicoides*.

Substrate: Gravelly clay, loamy sand, low nutrients.

Exposure:

Conservation

Conservation: Conservation status unknown. Reported for Winburndale Nature Reserve.

Petrophile canescens

PROTEACEAE

Life history**Growth form:** Shrub 0.5–1.2 m high, with silvery hairy young shoots; leaves divided.**Vegetative spread:** No.**Longevity:****Primary juvenile period:****Flowers:** Long, silky, January.**Fruit/seed:** Nut 2–5 mm long, in cone, retained on plant as canopy-stored seedbank.**Dispersal, establishment & growth:** Diaspore: nut, gravity-dispersed locally.**Fire response:** Stems killed, resprouts from base.**Interaction with other organisms:****Distribution****Status/origin:** Native.**Botanical subregions:** NC CC NT CT ST NWS CWS; Qld.**Distribution Sydney area:** Mainly Upper Blue Mountains.**Select locations:** CC: Ingar. CT: Olinda, Newnes SF, Clarence, Bouchier Ridge (Oberon), Yerrinbool.**Habitat****Habitat:** Deep sands on plateaus.**Altitude:** 500–1100 m **Annual rainfall:** 900–1100 mm**Typical local abundance:** Frequent.**Vegetation:** Woodland e.g. with *Eucalyptus piperita*, *E. radiata*, *E. mannifera*, *E. sclerophylla*.**Substrate:** Deep sandy soils from sandstone, low nutrients.**Exposure:****Conservation****Conservation:** Conservation status unknown, recorded from Blue Mountains NP.***Petrophile pedunculata***

PROTEACEAE

Life history**Growth form:** Tall glabrous shrub to 2.5 m high.**Vegetative spread:** No.**Longevity:****Primary juvenile period:****Flowers:** Yellow, mainly November–December.**Fruit/seed:** Nut 4 mm long, in cone, retained on plant as canopy-stored seedbank.**Dispersal, establishment & growth:** Diaspore: nut, gravity-dispersed locally.**Fire response:** Resprouts (at Leura DHB).**Interaction with other organisms:****Distribution****Status/origin:** Native.**Botanical subregions:** CC SC CT.**Distribution Sydney area:****Select locations:** CC: Grose Vale, Castlereagh, Springwood, Glenbrook, Nortons Basin, Thirlmere, O'Hares Creek, Yerrinbool. CT: Lawson, Hill Top, Bundanoon, Wingello, Fitzroy Falls.**Habitat****Habitat:** Ridges and flat areas.**Altitude:** 0–700 m **Annual rainfall:** 900–1400 mm**Typical local abundance:** Occasional–frequent.**Vegetation:** Open-forest e.g. with *Syncarpia glomulifera*, *Corymbia gummifera*, *Eucalyptus eugenioides*, *Banksia spinulosa*.**Substrate:** Sandy loam over sandstone, low nutrients.**Exposure:** Full sun to light shade.**Conservation****Conservation:** Conservation status unknown. Reported in Morton NP.

Petrophile pulchella (*P. fucifolia*)

PROTEACEAE

Conesticks

Life history**Growth form:** Shrub to 3 m high, with divided leaves.**Vegetative spread:** No.**Longevity:** 25–60 years (D. Keith pers. comm.).**Primary juvenile period:** 4 years (Bradstock & O'Connell 1988), 6–9 years (Benson 1985).**Flowers:** Yellow, mainly December–January. Possibly pollinated by native bees (P. Kubiak pers. comm.).**Fruit/seed:** Nut 4 mm long, weight 9 mg, in a cone, retained on plant as canopy-stored seedbank.**Dispersal, establishment & growth:** Diaspore: nut, gravity-dispersed locally, with no special morphology for dispersal (Westoby et al. 1990). Recruitment mainly after fire (D. Keith pers. comm.) from canopy-stored seedbank, released following fire (Bradstock & Auld 1987). Seedling establishment within the first year after fire (Bradstock & Auld 1987).**Fire response:** Killed by fire (Bradstock & O'Connell 1988).**Interaction with other organisms:****Distribution****Status/origin:** Native.**Botanical subregions:** NC CC SC CT; Qld.**Distribution Sydney area:** Widespread.**Select locations:** CC: Kulnura, Gosford, Maroota, Yarramundi, Glenbrook, Avalon, Hornsby, Terrey Hills, Pennant Hills, Lindfield, Mosman, Bondi, Kogarah, Loftus, Audley, Stanwell Park. CT: Never Never (Rylstone), Newnes SF, Mt Victoria, Wentworth Falls, Kanangra.**Habitat****Habitat:** Ridges and slopes.**Altitude:** 0–1100 m**Annual rainfall:** 800–1600 mm**Typical local abundance:** Frequent–occasional.**Vegetation:** Open-forest e.g. with *Eucalyptus piperita*, *Angophora costata*; woodland e.g. with *Eucalyptus sclerophylla*, *E. sieberi*; heath e.g. with *Lambertia formosa*, *Isopogon anemonifolius*, *Leptospermum trinervium*.**Substrate:** Sandy soil on sandstone, sandy alluvium, shale, low nutrients.**Exposure:** Full sun to light shade.**Conservation****Conservation:** Widespread and probably adequately conserved. Reported from Bouddi NP, Brisbane Water NP, Marramarra NP, Ku-ring-gai Chase NP, Garigal NP, Sydney Harbour NP.***Petrophile sessilis***

PROTEACEAE

Life history**Growth form:** Erect shrub to 3 m high, with hairy young growth and divided leaves.**Vegetative spread:****Longevity:****Primary juvenile period:****Flowers:** Yellow, December–January.**Fruit/seed:** Nut 3 mm long, in a cone, retained on plant as canopy-stored seedbank.**Dispersal, establishment & growth:** Diaspore: nut, gravity-dispersed. No apparent dormancy mechanism, post-fire germination pattern appears to be related to rainfall events rather than season of burning (Whelan & York 1998). Found as small localised populations.**Fire response:** Resprouts from base.**Interaction with other organisms:****Distribution****Status/origin:** Native.**Botanical subregions:** CC SC CT ST.**Distribution Sydney area:** Woronora Plateau to Budawang.**Select locations:** CC: Agnes Banks, Gladesville (1914), Kogarah (1896), Wedderburn, Heathcote, Lucas Heights, Cordeaux Dam, Bargo River. CT: Bundanoon.

Habitat

Habitat: Ridgetops.

Altitude: 0–600 m

Annual rainfall: 900–1400 mm

Typical local abundance: Frequent.

Vegetation: Woodland e.g. with *Eucalyptus sclerophylla*, *Angophora bakeri*, *Eucalyptus sieberi*, *E. haemastoma*, *Corymbia gummifera*; heath e.g. with *Angophora hispida*, *Kunzea ambigua*, *Banksia marginata*, *Brachyloma daphnoides*, *Lissanthe strigosa*.

Substrate: Sandy soils from sandstone, low nutrient soils.

Exposure: Full sun to light shade.

Conservation

Conservation: Agnes Banks is northern geographical limit. Reported in Lane Cove NP, Royal NP. Conservation status unknown.

Stenocarpus salignus**PROTEACEAE**

Scrub Beefwood

Life history

Growth form: Multistemmed shrub to 2 m high or tree to 30 m high, with dark brown fissured and finely scaly bark.

Vegetative spread: No.

Longevity:

Primary juvenile period:

Flowers: Yellowish–greenish, mainly October–January, peak November–December. Nectar obtained from flowers by honeybees, native bees, flies and possibly beetles (P. Kubiak pers. comm.).

Fruit/seed: Pod-like fruit 4–6 cm long, with flat, winged seeds 10 mm long, released at maturity. Fruit mature March–June.

Dispersal, establishment & growth: Diaspore: seed, wind-dispersed short distance locally. Seeds germinate readily (Floyd 1989).

Fire response: Resprouted from base after high-intensity fire (at Katandra 1/94) (L.McD.). Secondary juvenile period 3 years after high intensity fire 1/94 (at Lane Cove, P. Kubiak pers. comm.).

Interaction with other organisms: Dark red timber suitable for furniture etc. (Floyd 1989).

Distribution

Status/origin: Native.

Botanical subregions: NC CC SC NT CT CWS; Qld.

Distribution Sydney area: Widespread.

Select locations: CC: Morisset, Yarramalong, Ourimbah, Gosford, Bilpin, Maroota, Glenbrook, Hornsby, Epping, Killara, Oxford Falls, Wedderburn, Douglas Park, Albion Park, Cambewarra. CT: Rylstone, Hill Top, Roberson, Wingello.

Habitat

Habitat: Creek banks, gullies.

Altitude: 0–600 m

Annual rainfall: 800–1400 mm

Typical local abundance: Rare–occasional.

Vegetation: Rainforest e.g. with *Ceratopetalum gummiferum*, *Doryphora sassafras*, *Cryptocarya glaucescens*, *Parsonia velutina*, *Acmena smithii*; moist open-forest e.g. with *Eucalyptus piperita*, *E. deanei*, *Angophora floribunda*, *Synoum glandulosum*, *Elaeocarpus reticulatus*, *Allocasuarina torulosa*; riparian scrub e.g. with *Lomatia myricoides*, *Tristania neriifolia*, *Backhousia myrtifolia*, *Tristaniopsis laurina*, *Callicoma serratifolia*.

Substrate: Sandy alluvium, Narrabeen Sandstones, clay soils on basalt, medium to high nutrient soils.

Exposure: Light to medium shade.

Conservation

Conservation: Conservation status unknown. Occasional at Gosford only in a few gullies (R. Payne pers. com.). Creekside habitat is vulnerable to weed invasion e.g. *Ageratina riparia*. Reported in Brisbane Water NP, Marramatta NP, Ku-ring-gai Chase NP, Garigal NP, Lane Cove NP, Royal NP.

Symphionema montanum

PROTEACEAE

Life history**Growth form:** Multistemmed subshrub 40–80 cm high.**Vegetative spread:****Longevity:****Primary juvenile period:****Flowers:** Pale yellow, September–November.**Fruit/seed:** Nut, with 1 seed.**Dispersal, establishment & growth:** Diaspore: nut, probably shed at maturity (P. Myerscough pers. comm.).**Fire response:** Probably killed.**Interaction with other organisms:**

Distribution**Status/origin:** Native.**Botanical subregions:** CC CT.**Distribution Sydney area:** Mainly higher parts of Blue Mountains.**Select locations:** CC: Kurrajong Heights, Springwood, Woodford. CT:

Kekeelbon Mountains, Mt Cameron, Bell, Lithgow, Newnes Junction, Mt Wilson, Mount Tomah, Mt Victoria, Blackheath, Wentworth Falls.

Habitat**Habitat:** Ridges, cliff faces.**Altitude:** 600–1000 m **Annual rainfall:** 1000–1400 mm**Typical local abundance:** Frequent–occasional.**Vegetation:** Heath e.g. with *Hakea dactyloides*, *Lambertia formosa*, *Caustis flexuosa*, *Persoonia levis*, *Acacia suaveolens*; open-forest e.g. with *Eucalyptus sclerophylla*, *E. piperita*, *E. sparsifolia*, *Corymbia gummifera*.**Substrate:** Sandy soils on sandstone, low nutrients, sometimes poorly-drained.**Exposure:**

Conservation**Conservation:** Conservation status unknown. Reported in Blue Mountains NP.***Symphionema paludosum***

PROTEACEAE

Life history**Growth form:** Slender subshrub 30–50 cm high.**Vegetative spread:****Longevity:****Primary juvenile period:** Primary juvenile period 2–5 years (D. Keith pers. comm.).**Flowers:** Pale yellow, August–November, peak September.**Fruit/seed:** Nut, with one seed, probably shed at maturity (P. Myerscough pers. comm.).**Dispersal, establishment & growth:** Diaspore: nut. Recruitment mainly after fire (D. Keith pers. comm.). Found in small patches with other subshrubs, herbs and sedges etc. but population may decline as it is out-competed by taller shrubs e.g. *Banksia ericifolia* and *Hakea teretifolia* (L.McD.).**Fire response:** Killed by fire (D. Keith pers. comm.).**Interaction with other organisms:**

Distribution**Status/origin:** Native.**Botanical subregions:** NC CC SC CT ST.**Distribution Sydney area:** Coast and Southern Highlands.**Select locations:** CC: Somersby, Gosford, Calga, Ku-ring-gai Chase, Frenchs Forest, Willoughby, Manly, Centennial Park, La Perouse, Heathcote, Helensburgh, Appin. CT: Robertson, Carrington Falls, Bundanoon.

Habitat

Habitat: Moist sites.

Altitude: 0–700 m **Annual rainfall:** 1200–1600 mm

Typical local abundance: Frequent–occasional.

Vegetation: Open-forest e.g. with *Eucalyptus sieberi*, *E. piperita*, *Corymbia gummifera*, *Angophora costata*, *Eucalyptus haemastoma*; wet open-heath e.g. with *Banksia ericifolia*, *Sprengelia incarnata*, *Epacris obtusifolia*, *Lepidosperma flexuosum*.

Substrate: Clay soils on sandstone, with continuous moisture, low nutrients.

Exposure: Full sun to light shade.

Conservation

Conservation: Conservation status unknown. Reported in Ku-ring-gai Chase NP, Heathcote NP. The main populations in Frenchs Forest area not conserved, just outside the boundary of Garigal NP (L.McD.).

Telopea mongaensis**PROTEACEAE**

Monga or Braidwood Waratah

Life history

Growth form: Multi-stemmed shrub to 6 m high, with rusty hairs on young branchlets; with lignotuber.

Vegetative spread:

Longevity:

Primary juvenile period:

Flowers: Pink to greenish, in loose heads, October–November.

Fruit/seed: Dry woody fruit 4–6 cm long, with winged seeds, released at maturity.

Dispersal, establishment & growth: Diaspore: seed, wind-dispersed short distance.

Fire response: Probably resprouts from lignotubers.

Interaction with other organisms:

Distribution

Status/origin: Native.

Botanical subregions: CT ST.

Distribution Sydney area: Moss Vale.

Select locations: CT: Bundanoon Creek, Meryla.

Habitat

Habitat: Creekbanks.

Altitude: 500–750 m **Annual rainfall:** 1000–1100 mm

Typical local abundance: Frequent–occasional.

Vegetation: Open-forest e.g. with *Eucalyptus sieberi*, *E. dives*, *E. piperita*, *Gleichenia* sp., *Lambertia formosa*, *Banksia spinulosa*, *Gahnia* sp.

Substrate: Sandy alluvial soil over sandstone, low nutrients.

Exposure:

Conservation

Conservation: Meryla is northern geographical limit. Rare, possibly vulnerable (P. Weston pers. comm.).

Telopea speciosissima**PROTEACEAE**

Waratah

Life history

Growth form: Multistemmed, shrub to 3 m high, with lignotuber; leaves usually toothed and with raised veins. There is one record of a hybrid *T. speciosissima* X *mongaensis* collected from the wild (P. Weston pers. comm.).

Vegetative spread: No.

Longevity: Long

Primary juvenile period: 5 years to flowering (Offord 1993).

Flowers: Red, rarely white in a large compact head surrounded by conspicuous pink to red bracts. September–October on coast, November–December on higher mountains. Pollinated by honeyeater birds. Flowers abundantly only after fire (Keith 1996).

Fruit/seed: Dry woody fruit 8–15 cm long, with winged seeds. Mean weight of seed 72 mg (Westoby et al. 1990), released at maturity, March–May, about 6 months after flowering. There may be more than 250 seeds in one flowerhead in a good year, taller individuals have fewer flowers and set less seed (Offord 1993). Fruit set per inflorescence tends to increase with inflorescence height (Pyke 1981), limited by some factor other than amount of pollen received (Pyke 1982).

Dispersal, establishment & growth: Diaspore: winged seed, wind-dispersed locally (Westoby et al. 1990). Seed with no dormancy (Offord 1993). Seedling establishment 2–5 years after fire (Bradstock & Auld 1987).

Fire response: Stems killed, resprouts from lignotuber. Percentage of plants in flower, average number of flowers/inflorescence and average number of fruits/inflorescence appear to peak 2 years after a summer fire and decline thereafter. The average height of the inflorescence above the ground increases following fire (Pyke, 1983). Juveniles take 8 years to become resistant to low intensity fire (Bradstock & Auld 1987). Fire regimes of less than 10 years will result in a decline in population size (Bradstock 1995).

Interaction with other organisms: Host to Cup Moth larvae *Mecytha fasciata* (Common 1990), light brown Apple Moth *Epiphyas postvittana*, Oleander Scale *Aspidiotus nerii*, Waratah bud borer larva *Xylorycta luteotactella*; fungi recorded from the leaves: *Colletotrichum* sp., *Phyllosticta telopeae*, *Periconiella telopeae*, *Meliola laarosa*, *Leptosphaeria telopeae*, *Restatolcopsis* sp. (B. Summerell pers. comm.).

Distribution

Status/origin: Native. Widely cultivated.

Botanical subregions: CC SC ST CT.

Distribution Sydney area: Widespread.

Select locations: CC: Cooranbong, Calga, Maroota, Kurrajong Heights, Springwood, Terrey Hills, Engadine, Oakdale, Albion Park. CT: Clarence, Mt Wilson, Blackheath, Katoomba, Kings Tableland, Mittagong, Carrington Falls.

Habitat

Habitat: Plateaus, hillsides.

Altitude: 0–1100 m **Annual rainfall:** 900–1400 mm

Typical local abundance: Frequent–occasional.

Vegetation: Woodland and open-forest e.g. with *Eucalyptus sieberi*, *E. piperita*, *E. sclerophylla*, shrubby understorey e.g. with *Lambertia formosa*, *Leptospermum trinervium*, *Persoonia levis*, *Banksia spinulosa*.

Substrate: Deep, brown or yellow clay soils over sandstone, low to medium nutrients, well-drained. Deep soils give best results in cultivation.

Exposure: Light shade to full sun.

Conservation

Conservation: Reported in Bouddi NP, Brisbane Water NP, Muogamarra Nature Reserve, Ku-ring-gai Chase NP, Garigal NP, Lane Cove NP, Sydney Harbour NP, Blue Mountains NP.

Xylomelum pyriforme

PROTEACEAE

Life history

Growth form: Small tree or tall shrub, young shoots and inflorescences covered with rust coloured hairs. Trees to 15 m high reported from Howes Valley.

Vegetative spread:

Longevity:

Primary juvenile period:

Flowers: Rusty red, September–November, peak October. Possibly pollinated by diurnal moths, flies, and honeybees (P. Kubiak pers. comm.).

Fruit/seed: Large, pear-shaped woody capsule 6–9cm long with 2 winged seeds, which may remain on plant for a considerable period, before opening or until burnt.

Dispersal, establishment & growth: Diaspore: winged seed, wind-dispersed locally.

Fire response: Resprouts from trunk and lignotuber and suckers from exposed roots, possibly explaining localised patches of individuals.

Interaction with other organisms: Fungus *Giugnardia* causes leaf spot and *Cephaleutos virescens* causes algal leaf spot (B. Summerell pers. comm.).

Distribution

Status/origin: Native.

Botanical subregions: NC CC CT.

Distribution Sydney area: Widespread, coast and sandstone plateaus.

Select locations: CC: Howes Valey, Yengo, Colo Heights, Kulnura, Berowra, Newport, Narrabeen, Pennant Hills, Glenbrook, Rose Bay, Bents Basin, La Perouse, Kurnell, Leumeah, Bundeena, Burragorang, Thirlmere Lakes. CT: Kings Tableland, Wentworth Falls, Lawson, Hill Top, Mittagong.

Habitat

Habitat: Ridges and hillsides.

Altitude: 0–1000 m

Annual rainfall: 900–1400 mm

Typical local abundance: Occasional–frequent.

Vegetation: Open-forest e.g. with *Corymbia eximia*, *C. gummifera*, *Eucalyptus haemastoma*, *E. sieberi*, *E. capitellata*, *E. punctata*, *E. sclerophylla*.

Substrate: Deep soils, often deep sands on sandstone, low nutrients, well-drained.

Exposure:

Conservation

Conservation: Probably adequately conserved. Reported in Bouddi NP, Brisbane Water NP, Marramarra NP, Ku-ring-gai Chase NP, Garigal NP, Lane Cove NP, Sydney Harbour NP, Botany Bay NP, Royal NP.

***Batrachium trichophyllum* *** (*Ranunculus trichophyllum*)

RANUNCULACEAE

Life history

Growth form: Submerged aquatic plant, with finely divided leaves repeatedly dividing three ways and set singly along the stem (Romanowski 1998).

Vegetative spread:

Longevity:

Primary juvenile period:

Flowers: Small whitish, with yellow centres, often purplish on outside (Romanowski 1998), November–April.

Fruit/seed: Head of 15–35 hairy achenes

Dispersal, establishment & growth:

Fire response:

Interaction with other organisms: Foodplant of Black Swan *Cygnus atratus* (Barker & Vestjens 1989,1990).

Distribution

Status/origin: Exotic, native to Europe, Asia, N America.

Botanical subregions: NT CT ST CWS; Vic., Tas., S.A.

Distribution Sydney area:

Select locations: CT: Sofala, Lowther, Hampton, Edith, Oberon.

Habitat

Habitat: Creeks, rivers.

Altitude: 600–1000 m **Annual rainfall:** 600–900 mm

Typical local abundance: Occasional.

Vegetation: With other aquatic herbs e.g. *Myriophyllum*, *Potamogeton*.

Substrate: Still or slowly flowing water, and mud on stream bank.

Exposure:

Conservation

Conservation: Naturalised weed. Conservation impact unknown.

Clematis aristata

RANUNCULACEAE

Traveller's Joy

Life history

Growth form: Vigorous, woody climber to 6 m high.

Vegetative spread: No (McIntyre et al. 1995), though plants at Penrose have tuberous roots up to 30 cm deep, branching underground, possibly capable of giving rise to separate plants.

Longevity:

Primary juvenile period:

Flowers: White, September–December. Moth larvae *Phrissogonus laticostata* reported on flowers (Common 1990).

Fruit/seed: Head of achenes with feather-like appendages. Achene weight 4–5 mg (Westoby et al. 1990).

Dispersal, establishment & growth: Diaspore: achene, wind-dispersed (Westoby et al. 1990).

Fire response: Resprouted after high intensity fire 1/94, flowering in 38 weeks (at Lane Cove, P. Kubiak pers. comm.).

Interaction with other organisms:

Distribution

Status/origin: Native.

Botanical subregions: NC CC SC NT CT ST SWS; Qld, Vic., Tas., W.A.

Distribution Sydney area: Widespread, coast & mountains.

Select locations: CC: Ourimbah, Gosford, Hornsby, Silverwater, La Perouse, Stanwell Park, Shellharbour, Springwood. CT: Newnes Plateau, Mount Tomah, Robertson, Megalong Valley, Mt Werong, Robertson.

Habitat

Habitat: Creek banks, gullies, lower slopes.

Altitude: 0–1200 m **Annual rainfall:** 1000–1400 mm

Typical local abundance: Frequent–occasional.

Vegetation: Rainforest canopy e.g. with *Ceratopetalum apetalum*, *Atherosperma moschatum*, and eucalypt forest e.g. with *Eucalyptus pilularis*, *E. saligna*, *Syncarpia glomulifera*.

Substrate: Soil variable, shallow sandy soils to gravelly alluvium, clay soils on shale and basalt, Narrabeen Sandstones.

Exposure: Mid shade to full sun.

Conservation

Conservation: Status uncertain. Conserved in Western Sydney (James et al. 1999)

(*C. aristata* appears to be relatively rare in Western Sydney compared with *C. glycinoides*).

Ecological differences between *C. aristata* and *C. glycinoides* need investigation.

Clematis glycinoides* var. *glycinoides**RANUNCULACEAE**

Headache Vine

Life history

Growth form: Woody climber to 2.5 m high, often in drier sites than *C. aristata*.

Vegetative spread: No.

Longevity: Possibly 10–20 years.

Primary juvenile period: Possibly 3–5 years.

Flowers: White, July–Dec, peak September.

Fruit/seed: Head of achenes each with featherlike appendage. Achene weight 3–5 mg (Westoby et al. 1990), mature mainly November–December, shed at maturity.

Dispersal, establishment & growth: Diaspore: achene, wind-dispersed (Westoby et al. 1990). Coloniser, though growth rate appears slow.

Fire response: Probably killed.

Interaction with other organisms: Flowers visited by honeybees for pollen (P. Kubiak pers. comm.).

Distribution

Status/origin: Native.

Botanical subregions: NC CC SC NT CT ST NWS CWS; Qld, Vic.

Distribution Sydney area: Widespread.

Select locations: CC: Ocean Beach, Cheltenham, Auburn, Cronulla, Kurrajong, Cobbitty, Razorback, Seven Mile Beach. CT: Bell, Limekilns, Glanmire, Wombeyan Caves.

Habitat

Habitat: Gullies, creekbanks.

Altitude: 0–1000 m **Annual rainfall:** 700–1400 mm

Typical local abundance: Occasional–frequent.

Vegetation: Open-forest e.g. with *Backhousia myrtifolia*, *Eucalyptus paniculata*, *E. viminalis*, *Backhousia myrtifolia*. Floodplain tall open-forest e.g. with *Eucalyptus amplifolia*, *Angophora subvelutina* (Scholer 1974); woodland, sometimes heath.

Substrate: Well-drained soils from basalt, limestone, shale, slate, sandstone medium nutrients. Sometimes in disturbed sites. Often in drier sites than *C. aristata*.

Exposure: Light shade–full sun.

Conservation

Conservation: Conservation status unknown.

Clematis microphylla* var. *microphylla

RANUNCULACEAE

Small-leaved Clematis

Life history**Growth form:** Woody climber to 3 m high.**Vegetative spread:****Longevity:****Primary juvenile period:****Flowers:** Creamy white, usually July–December.**Fruit/seed:** Head of achenes with feather-like appendages.**Dispersal, establishment & growth:** Diaspore: achene, wind-dispersed.**Fire response:****Interaction with other organisms:**

Distribution**Status/origin:** Native.**Botanical subregions:** NT CT NWS CWS NWP SWP NFWP SFWP; Qld, Vic., Tas., S.A., W.A.**Distribution Sydney area:** Abercrombie Caves.**Select locations:** CT: Abercrombie Caves.

Habitat**Habitat:****Altitude:** 800 m**Annual rainfall:** 800 mm**Typical local abundance:****Vegetation:****Substrate:****Exposure:**

Conservation**Conservation:** Abercrombie Caves (1940) is only Sydney area record. Conservation status unknown.***Ranunculus amphitrichus* (*R. rivularis* incorrect)**

RANUNCULACEAE

Life history**Growth form:** Aquatic perennial herb, often with floating leaves and emergent flowers.**Vegetative spread:** Stoloniferous.**Longevity:****Primary juvenile period:****Flowers:** Pale golden-yellow, October–December.**Fruit/seed:** Head of 10–25 achenes, each 1–2 mm long, December.**Dispersal, establishment & growth:****Fire response:****Interaction with other organisms:**

Distribution**Status/origin:** Native.**Botanical subregions:** SC CT ST; Vic., Tas., N.Z.**Distribution Sydney area:** Tablelands.**Select locations:** CT: Orange, Hampton, Edith, Oberon.

Habitat**Habitat:** Creekbanks and swamps.**Altitude:** 900–1200 m**Annual rainfall:** 900–1000 mm**Typical local abundance:** Frequent.**Vegetation:****Substrate:** Standing water and clayey alluvium, medium nutrients.**Exposure:**

Conservation**Conservation:** Rarely recorded, conservation status unknown.

Ranunculus collinus

RANUNCULACEAE

Life history

Growth form: Perennial herb 10 cm high.**Vegetative spread:** Stoloniferous.**Longevity:****Primary juvenile period:****Flowers:** Bright golden-yellow, October–December.**Fruit/seed:** Head of 10–30 achenes, each 3 mm long, November–December.**Dispersal, establishment & growth:****Fire response:****Interaction with other organisms:**

Distribution

Status/origin: Native.**Botanical subregions:** CT ST; Vic., Tas.**Distribution Sydney area:****Select locations:** CT: Mt Coricudgy, Hampton, Little River, Jenolan Caves, Mt Werong, Oberon.

Habitat

Habitat: Creekbanks, moist forest.**Altitude:** 1000–1200 m **Annual rainfall:** 800–1200 mm**Typical local abundance:** Frequent.**Vegetation:** Eucalypt open-forest e.g. with *Eucalyptus viminalis*, *E. blaxlandii*, *E. cypellocarpa*, *E. dalrympleana*.**Substrate:** Clay loam on basalt, sandy loam on limestone and granite, medium to high nutrients.**Exposure:**

Conservation

Conservation: Conservation status unknown.**Ranunculus flammula ***

RANUNCULACEAE

Lesser Spearwort

Life history

Growth form: Perennial herb, with leafy flowering stems 8–50 cm long and basal leaves.**Vegetative spread:** Rhizomatous or stoloniferous.**Longevity:****Primary juvenile period:****Flowers:** Yellow, spring–summer.**Fruit/seed:** Head of 20–50 achenes, each 1–2 mm long.**Dispersal, establishment & growth:****Fire response:****Interaction with other organisms:**

Distribution

Status/origin: Exotic, native to Europe, N Africa.**Botanical subregions:** CT.**Distribution Sydney area:** Wingecarribee Swamp.**Select locations:** CT: Wingecarribee Swamp (1987).

Habitat

Habitat: Wet pastures**Altitude:** 700 m **Annual rainfall:** 1600 mm**Typical local abundance:** Occasional.**Vegetation:** Margin of swamp.**Substrate:** Peaty sand, low nutrients, poorly-drained.**Exposure:**

Conservation

Conservation: Weed, naturalised at Wingecarribee Swamp (1987), potential to spread locally and elsewhere unknown.

Ranunculus inundatus**RANUNCULACEAE****Life history**

Growth form: Perennial herb, 7–30 cm high, with stolons partly rooted, sometimes free-floating.

Vegetative spread: Stoloniferous.

Longevity:

Primary juvenile period:

Flowers: Yellow, September–December, March.

Fruit/seed: Head of 10–40 achenes, mature October–January.

Dispersal, establishment & growth: Diaspore: fruit.

Fire response:

Interaction with other organisms:

Distribution

Status/origin: Native.

Botanical subregions: NC CC SC NT CT ST SWS SWP; Vic., S.A.

Distribution Sydney area: Widespread.

Select locations: CC: Mt Yengo, Wyong, Agnes Banks, Rockdale, St Marys, Macquarie Fields, Corrimal, Bargo, Berry, Wingecarribee. CT: Glanmire, Oberon.

Habitat

Habitat: Freshwater swamp, ponds or streams.

Altitude: 0–800 m

Annual rainfall: 700–1000 mm

Typical local abundance: Frequent.

Vegetation: Sedgeland e.g. with *Eleocharis*, *Carex*, *Juncus*, *Geranium*.

Substrate: Ponds or streams in wet mud or peat, alluvial, often shale-derived, low–medium nutrients. Water table mostly high, moisture supply more or less continuous, fresh.

Exposure: Full sun–light shade.

Conservation

Conservation:

Ranunculus lappaceus**RANUNCULACEAE**

Common Buttercup

Life history

Growth form: Erect perennial herb 10–60 cm high, with flowering stems 15–50 cm high.

Vegetative spread: No (McIntyre et al. 1995).

Longevity:

Primary juvenile period:

Flowers: Golden-yellow, July to May, peak September–November.

Fruit/seed: Head of 20–50 achenes, each 2–4 mm long, October–June.

Dispersal, establishment & growth: Diaspore with morphology for dispersal by adhesion (McIntyre et al. 1995).

Fire response:

Interaction with other organisms:

Distribution

Status/origin: Native.

Botanical subregions: NC CC SC NT CT ST NWS CWS SWS SWP; Qld, Vic., Tas., S.A.

Distribution Sydney area: Widespread.

Select locations: CC: Wyong, Galston, Oatley, Rookwood, Camden, Otford, Corrimal, Albion Park, Springwood. CT: Mt Kindarun, Mt Coricudgy, Ben Bullen SF, Bathurst (1892), Mt Canobolas, Jenolan Caves (1899), Abercrombie Caves, Mt Werong, Bowral.

Habitat

Habitat: Damp sites.

Altitude: 0–1200 m

Annual rainfall: 700–1200 mm

Typical local abundance: Frequent–occasional.

Vegetation: Grassland, forest e.g. with *Eucalyptus deanei*, *E. viminalis*, *E. tereticornis*, *Melaleuca styphelioides*.

Substrate: Clay soils on Wianamatta Shale, alluvium, basalt, granite, medium to high nutrients.

Exposure:

Conservation

Conservation: Vulnerable in Western Sydney (James et al. 1999). Conservation status elsewhere unknown.

Ranunculus muricatus* **RANUNCULACEAE**

Sharp Buttercup

Life history**Growth form:** Herb with flowering stems to 50 cm high.**Vegetative spread:** No.**Longevity:** Less than 1 year.**Primary juvenile period:** Less than 1 year.**Flowers:** Yellow, September–October.**Fruit/seed:** Head of achenes, each 8 mm long, September–October.**Dispersal, establishment & growth:** Vegetative dispersal by bulbs (Whittet 1958).**Fire response:****Interaction with other organisms:** Suspected of poisoning stock, but seldom eaten because of its acrid juice (Whittet 1958).**Distribution****Status/origin:** Exotic, native to S Europe. Widely naturalised.**Botanical subregions:** NC CC SC ST CT CWS SWS NWP SWP; Qld, Vic., Tas., S.A.**Distribution Sydney area:** Mainly Sydney suburban area.**Select locations:** CC: Pennant Hills, Parramatta, Bexley (1894), Liverpool, Woronora River, Otford, Bomaderry. CT: Bathurst.**Habitat****Habitat:** Stockyards, drains.**Altitude:** 0–900 m**Annual rainfall:** 700–1600 mm**Typical local abundance:** Occasional.**Vegetation:****Substrate:** Probably on sandy soils. Thrives in wet places (Whittet 1958).**Exposure:****Conservation****Conservation:** Widely naturalised, probably a minor weed.***Ranunculus papulentus*****RANUNCULACEAE****Life history****Growth form:** Small or robust perennial herb, with flowering stems 3–30 cm high.**Vegetative spread:****Longevity:****Primary juvenile period:****Flowers:** Yellow, spring–autumn.**Fruit/seed:** Head of 12–36 achenes, each 4 mm long, November–March.**Dispersal, establishment & growth:****Fire response:****Interaction with other organisms:****Distribution****Status/origin:** Native.**Botanical subregions:** CT ST SWS; Vic., S.A.**Distribution Sydney area:** Tablelands.**Select locations:** CT: Boyd Plateau, Bathurst, Wingecarribee Swamp, Blayney.**Habitat****Habitat:** Wet sites in mud or pools.**Altitude:** 700–1200 m**Annual rainfall:** 600–1600 mm**Typical local abundance:** Occasional.**Vegetation:** Open-heath with sedgeland e.g. with *Empodisma minus*, *Restio australis*, *Xyris*.**Substrate:** Peaty, low nutrient, permanently moist. Recorded on saline sites in western NSW (Semple 1993).**Exposure:****Conservation****Conservation:** Conservation status unknown.

Ranunculus pimpinellifolius**RANUNCULACEAE****Life history**

Growth form: Perennial herb, with flowering stems 2–25 cm high.

Vegetative spread:

Longevity:

Primary juvenile period:

Flowers: Yellow, November–February.

Fruit/seed: Head of 8–40 achenes, each 2–3 mm long, December–February.

Dispersal, establishment & growth:

Fire response:

Interaction with other organisms:

Distribution

Status/origin: Native.

Botanical subregions: NT CT ST; Vic, Tas.

Distribution Sydney area: Oberon–Boyd Plateau.

Select locations: CT: Boyd Plateau, Jenolan Caves, Oberon.

Habitat

Habitat: Upland swamps.

Altitude: 1000–1200 m **Annual rainfall:** 800–1000 mm

Typical local abundance: Occasional.

Vegetation: Along narrow shallow streams e.g. with *Gratiola peruviana*; open heath with sedgeland e.g. with *Empodisma minus*, *Restio australis*, *Xyris* sp.

Substrate: Peaty, low nutrient, permanently moist.

Exposure:

Conservation

Conservation: Rare, localised occurrence, only one recent record (Kanangra- Boyd NP).

Ranunculus plebeius**RANUNCULACEAE****Life history**

Growth form: Hairy perennial herb, with flowering stems 8–80 cm high.

Vegetative spread:

Longevity:

Primary juvenile period:

Flowers: Golden-yellow, November–March.

Fruit/seed: Head of achenes, each 2–3 mm long, November–April.

Dispersal, establishment & growth:

Fire response:

Interaction with other organisms:

Distribution

Status/origin: Native.

Botanical subregions: NC CC SC CT ST; Qld, Vic.

Distribution Sydney area: Widespread.

Select locations: CC: Avoca, Gordon, Rockdale, Minto, Albion park, Bulli, Kangaroo Valley.

CT: Kowmung Creek, Moss Vale.

Habitat

Habitat: Creekbanks, swamp edges, moist sites.

Altitude: 0–700 m **Annual rainfall:** 700–1400 mm

Typical local abundance: Occasional.

Vegetation: Forest, woodland e.g. with *Eucalyptus dalrympleana*; swamp forest e.g. with *Melaleuca quinquenervia*.

Substrate: Sandy to clayey alluvial soils, basalt, medium to high nutrients.

Exposure:

Conservation

Conservation: Vulnerable in Western Sydney (James et al. 1999), conservation status elsewhere unknown.

Ranunculus pumilio* var. *politus**RANUNCULACEAE****Life history****Growth form:** Herb, with flowering stems to 40 cm high.**Vegetative spread:** No.**Longevity:** Less than 1 year.**Primary juvenile period:** Less than 1 year.**Flowers:** Yellow, late winter to early summer.**Fruit/seed:** Head of achenes, each about 2 mm long.**Dispersal, establishment & growth:****Fire response:****Interaction with other organisms:****Distribution****Status/origin:** Native, introduced to Sydney area.**Botanical subregions:** *CC NT CWS SWS NWP SWP; Vic.**Distribution Sydney area:****Select locations:** CC: Hawkesbury Agricultural College (1910) (now University of Western Sydney).**Habitat****Habitat:** Intermittently moist sites.**Altitude:** 0–50 m**Annual rainfall:** 800 mm**Typical local abundance:****Vegetation:** Grassland, woodland.**Substrate:****Exposure:****Conservation****Conservation:** Native species of inland NSW recorded once (in 1910) in Sydney area. Probably introduced with stock.***Ranunculus pumilio* var. *pumilio*****RANUNCULACEAE****Life history****Growth form:** Herb, with flowering stems to 40 cm high.**Vegetative spread:****Longevity:** Less than 1 year.**Primary juvenile period:** Less than 1 year.**Flowers:** Yellow, late winter to early summer.**Fruit/seed:** Head of achenes, each about 2 mm long.**Dispersal, establishment & growth:****Fire response:****Interaction with other organisms:** Foodplant of Stubble Quail *Coturnix pectoralis* (Barker & Vestjens 1989, 1990).**Distribution****Status/origin:** Native.**Botanical subregions:** CT ST NWS CWS SWS NWP SWP NFWP SFWP; Qld, Vic., Tas., N.T., S.A., W.A.**Distribution Sydney area:** Duckmaloi River.**Select locations:** CT: Edith, Oberon.**Habitat****Habitat:** Riverbanks, intermittently moist sites.**Altitude:** 1000 m**Annual rainfall:** 800 mm**Typical local abundance:****Vegetation:** Grassland, woodland.**Substrate:** Clay soils.**Exposure:****Conservation****Conservation:** Few records for Sydney area, conservation status unknown.

Ranunculus repens* **RANUNCULACEAE**

Creeping Buttercup

Life history

Growth form: Creeping herb, with leaves clustered along stem; flowering stems 5–60 cm high. Forming dense clumps.

Vegetative spread: Stolons up to 0.6 m long, rooting at nodes, all nodes capable of regrowth. Single plant can colonise 4 sq metres per year (Chancellor 1980).

Longevity: Perennial.

Primary juvenile period:

Flowers: Golden yellow, September–March, peak October. Possibly pollinated by honeybees and hoverflies (P. Kubiak pers. comm.).

Fruit/seed: Head of achenes, each 3 mm long, mature October. Low seed set (Harden 1990). Seed can survive in soil for several decades (Chancellor 1980).

Dispersal, establishment & growth: Bird-dispersed (Chancellor 1980).

Fire response: Resprouted after high intensity fire 1/94, secondary juvenile period less than 1 year (at Lane Cove, P. Kubiak pers. comm.).

Interaction with other organisms:

Distribution

Status/origin: Exotic, native to Eurasia.

Botanical subregions: NC CC SC NT CT ST; Vic., Tas., S.A.

Distribution Sydney area:

Select locations: CC: Matcham, Oxford Falls, Beecroft, Epping, Ingleburn, Camden, Campbelltown, Austinmer, Wollongong, Gerringong. CT: Wingecarribee River.

Habitat

Habitat: Drains, creekbanks, roadsides, moist disturbed sites.

Altitude: 0–700 m **Annual rainfall:** 700–1400 mm

Typical local abundance: Frequent.

Vegetation: With other weed species.

Substrate: Damp ground, clay soils, alluvium, medium to high nutrient soils, poorly-drained.

Exposure:

Conservation

Conservation: Weed of moist, disturbed sites, mainly Sydney and coast but also reported from Southern Highlands. Potential to spread into bushland. For control remove all nodes as they are capable of regrowth (Buchanan 1981).

Ranunculus sceleratus* **RANUNCULACEAE**

Celery Buttercup

Life history**Growth form:** Herb, with flowering stems 20–60 cm high.**Vegetative spread:****Longevity:** Usually less than 1 year.**Primary juvenile period:** Usually less than 1 year.**Flowers:** Pale yellow, September–April.**Fruit/seed:** Head of achenes, each less than 1 mm long, September–January.**Dispersal, establishment & growth:****Fire response:****Interaction with other organisms:** Poisonous to stock (Harden 1991).**Distribution****Status/origin:** Exotic, native to Europe.**Botanical subregions:** NC CC ST SWS SWP; Vic.**Distribution Sydney area:** Mainly western Sydney.**Select locations:** CC: Richmond, Riverstone, Waterloo (1912), Doonside, Kogarah, Menangle.**Habitat****Habitat:** Creekbanks, ponds.**Altitude:** 0–200 m **Annual rainfall:** 700–1000 mm**Typical local abundance:** Occasional.**Vegetation:****Substrate:** Shallow water, wet mud.**Exposure:****Conservation****Conservation:** Conservation impact unknown.***Ranunculus sessiliflorus* var. *sessiliflorus*****RANUNCULACEAE****Life history****Growth form:** Herb, with flowering stems to 35 cm long.**Vegetative spread:** No.**Longevity:** Less than 1 year.**Primary juvenile period:** Less than 1 year.**Flowers:** Yellow, September–October.**Fruit/seed:** Head of achenes, each 2 mm long, September–October.**Dispersal, establishment & growth:** No particular morphology for dispersal (McIntyre et al. 1995).**Fire response:****Interaction with other organisms:****Distribution****Status/origin:** Native.**Botanical subregions:** NC CC NT CT ST NWS CWS SWS NWP SWP NFWP SFWP; Qld, Vic., Tas., S.A., W.A.**Distribution Sydney area:** Widespread.**Select locations:** CC: Howes Valley, Nortons Basin. CT: Jenolan Caves, Abercrombie Caves, Abercrombie River.**Habitat****Habitat:** Intermittently moist sites, riparian, steep slopes.**Altitude:** 0–900 m **Annual rainfall:** 800–1000 mm**Typical local abundance:****Vegetation:** Riverflat Forest e.g. with *Casuarina cunninghamiana*, *Acacia binervia*, *Stellaria flaccida*; woodland e.g. with *Eucalyptus rossii*, *E. polyanthemos*, *Cassinia longifolia*.**Substrate:** In crevices amongst rocks on limestone, also diatremes, medium nutrients.**Exposure:****Conservation****Conservation:** Widespread but localised native annual species with nothing known about its dispersal agents or biology. Vulnerable in Western Sydney (James et al. 1999). Conservation status elsewhere unknown.

Reseda lutea* **RESEDACEAE**

Cut-leaved Mignonette

Life history**Growth form:** Annual or perennial herb 20–80 cm high, with basal rosette.**Vegetative spread:** Spread by stolons and root fragments (Heap et al. 1987).**Longevity:** Indeterminate (Heap et al. 1987).**Primary juvenile period:****Flowers:** Cream, yellow, summer. Pollinated by honeybees (Heap et al. 1987).**Fruit/seed:** Oblong capsule 10–15 mm long, with numerous kidney-shaped seeds. Seed production is variable depending on the environment; seed numbers estimated to be 14 000–220 000 on a single plant (Heap et al. 1987).**Dispersal, establishment & growth:** Diaspore: seed, shaken from ripe capsule by wind, ants and birds are thought to aid distribution, with long distant spread as a grain contaminant. Cold may stimulate germination; seed passed through gastrointestinal tract of sheep and cattle retain some viability (Heap et al. 1987).**Fire response:****Interaction with other organisms:** Grazed by stock but rejected if more palatable feed is available; may taint mutton, beef fat, milk and butter (Heap et al. 1987).**Distribution****Status/origin:** Exotic, native to Mediterranean–Asia. Probably introduced to Australia in ballast (Heap et al. 1987).**Botanical subregions:** CC CT NWS CWS SWS; Qld, Vic., Tas., S.A., W.A.**Distribution Sydney area:****Select locations:** CC: Richmond (1902). CT: Mittagong (1947).**Habitat****Habitat:** Pastures and wasteland.**Altitude:** 0–700 m**Annual rainfall:** 700–900 mm**Typical local abundance:****Vegetation:****Substrate:** Cultivated areas, calcareous soils.**Exposure:** Full sun, drought tolerant.**Conservation****Conservation:** Weed of agriculture, mainly in SA where it is an exceptionally persistent, competitive and proclaimed noxious species, well adapted to cropping areas (Heap et al. 1987). No evidence of invasion into bushland in Sydney region.

***Reseda luteola* ***

RESEDACEAE

Weld

Life history**Growth form:** Perennial herb to 1.5 m high.**Vegetative spread:****Longevity:****Primary juvenile period:****Flowers:** Pale yellowish, summer.**Fruit/seed:** Roundish capsule 5 mm long, with numerous kidney-shaped seeds.**Dispersal, establishment & growth:****Fire response:****Interaction with other organisms:** Formerly cultivated to produce a yellow dye (Harden 1991). Suspected of producing anti-thyroid activity and death in sheep (Heap et al. 1987).**Distribution****Status/origin:** Exotic, native to Europe–Afghanistan.**Botanical subregions:** CC NT CT ST NWS CWS SWS NWP SWP; Qld, Vic., Tas., S.A., W.A.**Distribution Sydney area:** Widespread.**Select locations:** CC: Richmond, Ingleburn, Yellow Rock. CT: Orange, Kowmung, Rockley (1922), Medlow Bath, Mittagong, Bullio.**Habitat****Habitat:** Pastures and wasteland.**Altitude:** 0–1000 m **Annual rainfall:** 800–1400 mm**Typical local abundance:** Frequent–occasional.**Vegetation:****Substrate:** Sandy alluvium, medium nutrients.**Exposure:****Conservation****Conservation:** Widespread weed, but no evidence of invasion in bushland.

Alphitonia excelsa

RHAMNACEAE

Red Ash

Life history**Growth form:** Small to medium-sized tree.**Vegetative spread:** No.**Longevity:****Primary juvenile period:**

Flowers: Creamy green, fragrant, March–June. Pollination by honeybee *Apis mellifera* and native bees *Trigona carbonaria*, *?Pachyprosopis* sp., *Exoneura lawsoni*, *Leiproctus ?cristatus*, *Amphylaeus nubilosellus*, *Heterapoides* spp., *Hyalaeus cyanophilus*, *H. ?jacksoniae*, *H. rotundiceps*, *Homalictus brisbanensis*, *H. flindersi*, *H. megastigmus*, *Lasioglossum* spp. (Williams & Adam 1997).

Pollen carried by jewel beetles *Castiarina acuminata*, *C. neglecta*, *C. producta*; dung beetles *Eupoecila australasiae*, *Glycyphana brunnipes*, *Polystigma punctatum*; blowfly *Paramenia* sp.; hover fly *Dideopsis* sp.; Ichneumon wasp *Echthromorpha intricatoria*; hairy flower wasps *Camsomeris ?tasmaniensis*, *Scolia verticollis*; sand wasps *Bembicinus* sp., *Bembix promontorii*, *Bembix* sp., *Sphex ephippium*, *S. fumipennis*, *Tachysphex* sp.; flower wasps *Anthobosca ?signata*, *Diamma bicolor*, *Thagisgaster* sp., *Zaspilothynnus* sp.; paper wasps *Polistes humilis*, *P. tepidus* (Williams & Adam 1998).

Fruit/seed: Black, drupaceous fruit, 5–10 mm diam. containing 2 glossy dark brown flattened oval seeds about 4 mm long, covered by a thin dark orange-red shiny skin; 9500 fruits and 21 500 seeds per kilogram (Floyd 1989). Fruit mature August–May but remains on tree for some months.

Dispersal, establishment & growth: Diaspore: fruit. Germination very slow, 8 months for 70% germination; fracturing of hard coat reduces dormancy; seed stored at room temperature 15–20 years was 30–70% viable (Floyd 1989). Coloniser species, although seen on edges can also occur as mature specimens in gully rainforest (R. Payne pers. comm).

Fire response:

Interaction with other organisms: Food plant of butterfly larvae *Danis hymetus taygetus* (Common & Waterhouse 1981), *Hypochrypsops delicia*, *H. ignita* (Braby 2000). Fruit eaten by Grey-headed Flying Fox *Pteropus poliocephalus* (Eby 1995), Brown Cuckoo-dove, Green Catbird, Lewin's Honeyeater, Olive-backed Oriole, Pied Currawong, Silvereye, Regent Bowerbird (Floyd 1989), Brown Pigeons (R. Payne pers. comm.).

Distribution**Status/origin:** Native.**Botanical subregions:** NC CC SC NWS CWS NWP; Qld, N.T., W.A.**Distribution Sydney area:** Hawkesbury area, lower Blue Mountains and Illawarra.

Select locations: CC: Ourimbah, North Avoca, Wisemans Ferry, Liverpool, Grose Vale, Warragamba, Razorback, Bass Point, Albion Park, Minnamurra Falls. CT: Mt Victoria, Macquarie Pass.

Habitat**Habitat:** Sheltered gullies, steep slopes, or along creeks.**Altitude:** 0–1000 m **Annual rainfall:** 700–1400 mm**Typical local abundance:** Occasional.

Vegetation: Warmer rainforest e.g. with *Doryphora sassafras*, *Sloanea australis*; drier rainforest e.g. with *Brachychiton populneus*, *Clerodendrum tomentosa*, *Hibiscus heterophyllus*; scrub and open forest e.g. with *Eucalyptus robusta*, *Callicoma serratifolia*, *Duboisia myoporoides*, *Glochidion ferdinandi*.

Substrate: Soils on alluvium, shale, medium to high nutrients, well-drained.**Exposure:** Sheltered, mid shade. Able to withstand seaside conditions at Wollongong (Fuller 1980).**Conservation**

Conservation: Conservation status unknown. There appear to be no early records for the North Shore area — plants there now may be garden escapes. Reported in Wambina NR, Brisbane Water NP, Marramarra NP, Muogamarra NP, Ku-ring-gai Chase NP, Royal NP.

Cryptandra amara* var. *amara

RHAMNACEAE

Life history**Growth form:** Small heath-like shrub to 60 cm high.**Vegetative spread:** No.**Longevity:****Primary juvenile period:****Flowers:** White to pinkish, clustered at the ends of branches, April–October, peak August. Possibly pollinated by native bees, flies and butterflies (P. Kubiak pers. comm.).**Fruit/seed:** Capsule, enclosed in a persistent flora tube. Seed weight 0.6 mg (Westoby et al. 1990).**Dispersal, establishment & growth:** Diaspore: seed, with food body ant-adapted for dispersal (Westoby et al. 1990).**Fire response:** Stems killed, resprouts from base.**Interaction with other organisms:**

Distribution**Status/origin:** Native.**Botanical subregions:** NC CC SC NT CT ST NWS CWS SWS NWP SWP; Qld, Vic., Tas., S.A.**Distribution Sydney area:** Widespread on coast and ranges.**Select locations:** CC: Wilberforce, Kenthurst, Botany Bay, Canterbury (1887), Menai, Audley.

CT: Winburndale NR, Mittagong, Penrose SF, Barbers Creek.

Habitat**Habitat:** Ridges and plateaus.**Altitude:** 0–800 m**Annual rainfall:** 700–1200 mm**Typical local abundance:** Rare–frequent.**Vegetation:** Woodland e.g. with *Corymbia gummifera*, *Eucalyptus punctata*, *E. racemosa*, *E. sieberi*, *Banksia spinulosa*, *B. oblongifolia*; heath e.g. with *Grevillea speciosa*, *Banksia marginata*, *B. ericifolia*, *Angophora hispida*, *Kunzea ambigua*.**Substrate:** Sandy soil over sandstone, low nutrients.**Exposure:** Full sun to light shade.

Conservation**Conservation:** Reported in Marramorra NP, Garigal NP, Sydney Harbour NP, Royal NP.

Probably adequately conserved.

Cryptandra amara* var. *floribunda

RHAMNACEAE

Life history**Growth form:** Small heath-like shrub to 60 cm high.**Vegetative spread:****Longevity:****Primary juvenile period:****Flowers:** White, clustered at the ends of branches, September–October.**Fruit/seed:** Capsule.**Dispersal, establishment & growth:****Fire response:****Interaction with other organisms:**

Distribution**Status/origin:** Native.**Botanical subregions:** NT CT ST NWS CWS NWP SWP; Qld, Vic.**Distribution Sydney area:** Widespread on Tablelands.**Select locations:** CT: Kandos Weir, Inglewood, Ben Bullen, Winburndale NR.

Habitat**Habitat:** Sandstone outcrops, ridges.**Altitude:** 600–900 m**Annual rainfall:** 600–800 mm**Typical local abundance:** Occasional.**Vegetation:** Eucalypt open-forest and heath e.g. with *Leptospermum parvifolium*.**Substrate:** Sandy soil on sandstone, low nutrients.**Exposure:**

Conservation**Conservation:** Conservation status unknown.

Cryptandra amara* var. *longiflora

RHAMNACEAE

Life history**Growth form:** Small heath-like shrub to 60 cm high.**Vegetative spread:****Longevity:****Primary juvenile period:****Flowers:** White, June–November, peak September.**Fruit/seed:** Capsule.**Dispersal, establishment & growth:****Fire response:****Interaction with other organisms:**

Distribution**Status/origin:** Native.**Botanical subregions:** NC CC NT CT ST NWS CWS SWS SWP; Qld, Vic., Tas.**Distribution Sydney area:** Mostly Tablelands.**Select locations:** CC: Como (1887), Glenfield (1964). CT: Currant Mountain Gap, Orange, Kowmung River, Kings Tableland

Habitat**Habitat:** Rocky hillside, roadside.**Altitude:** 0–1000 m**Annual rainfall:** 700–1200 mm**Typical local abundance:** Frequent–occasional.**Vegetation:****Substrate:** Clay soils on slate, shale, Devonian quartzite.**Exposure:**

Conservation**Conservation:** Possibly now extinct in Western Sydney. Conservation status unknown.***Cryptandra buxifolia***

RHAMNACEAE

Life history**Growth form:** Spreading heath-like shrub 15–60 cm high.**Vegetative spread:****Longevity:****Primary juvenile period:****Flowers:** Whitish, hairy, surrounded by brown bracts, mainly winter–spring.**Fruit/seed:** Capsule, enclosed in a persistent flora tube.**Dispersal, establishment & growth:****Fire response:****Interaction with other organisms:**

Distribution**Status/origin:** Native.**Botanical subregions:** NC CC CT ST CWS.**Distribution Sydney area:** Upper Hunter Valley, Howes Valley.**Select locations:** CC: Yengo NP.

Habitat**Habitat:** Forest.**Altitude:** 300–400 m**Annual rainfall:** 1000 mm**Typical local abundance:** Occasional.**Vegetation:** Open-forest**Substrate:** Sandy loam on sandstone.**Exposure:**

Conservation**Conservation:** Reported in Yengo NP. Conservation status unknown.

Cryptandra ericoides

RHAMNACEAE

Life history**Growth form:** Heath-like shrub to 60 cm high, with leaves often appearing clustered.**Vegetative spread:** No.**Longevity:** 25–60 years (D. Keith pers. comm.).**Primary juvenile period:** 3 years (Benson 1985, Keith 1996).**Flowers:** Whitish to pinkish, with brown bracts, February–May.**Fruit/seed:** Capsule, enclosed in a persistent flora tube. Seed 0.4 mg (Westoby et al. 1990).**Dispersal, establishment & growth:** Diaspore: seed, with a food body, dispersed by ants (Westoby et al. 1990, Rice & Westoby 1981). Recruitment mainly after fire (D. Keith pers. comm.).**Fire response:** Killed by fire (Keith 1996).**Interaction with other organisms:** Probably eaten by rabbits (P. Kubiak pers. comm.).**Distribution****Status/origin:** Native.**Botanical subregions:** CC SC CT.**Distribution Sydney area:** Mainly coastal, south from Gosford.**Select locations:** CC: Brisbane Water NP, Frenchs Forest, Rose Bay, La Perouse, Kurnell, Heathcote, Leumeah. CT: Mount Banks, Kings Tableland, Woodford, Robertson.**Habitat****Habitat:** Ridges.**Altitude:** 0–1000 m**Annual rainfall:** 800–1400 mm**Typical local abundance:** Rare–frequent.**Vegetation:** Heath e.g. with *Angophora hispida*, *Allocasuarina distyla*, *Banksia ericifolia*.**Substrate:** Damp sandy soil on sandstone, low nutrients.**Exposure:** Light shade.**Conservation****Conservation:** Gosford is the northern geographical limit. Reported from Brisbane Water, Ku-ring-gai Chase, Garigal, Royal and Blue Mountains National Parks. Conservation status unknown.***Cryptandra propinqua***

RHAMNACEAE

Life history**Growth form:** Rigid much-branched heath-like shrub to 1 m high, with star-like hairs on branches.**Vegetative spread:** No.**Longevity:****Primary juvenile period:****Flowers:** In a spike-like arrangement, April–September, peak April–May.**Fruit/seed:** Capsule, enclosed in a persistent flora tube.**Dispersal, establishment & growth:****Fire response:****Interaction with other organisms:****Distribution****Status/origin:** Native.**Botanical subregions:** NC CC SC NT CT ST NWS NWP SWP SFWP; Qld, Vic., S.A., W.A.**Distribution Sydney area:****Select locations:** CC: Belmont, Maroota, Brooklyn, Paramatta River, Hurstville, Blakehurst, Revesby. CT: Bathurst.**Habitat****Habitat:** Gullies.**Altitude:** 0–200 m**Annual rainfall:** 600–1200 mm**Typical local abundance:****Vegetation:****Substrate:** Sandy soil on sandstone, low nutrients.**Exposure:****Conservation****Conservation:** Conservation status unknown, though many Sydney localities have now been destroyed by urban expansion.

Cryptandra species **A****RHAMNACEAE****Life history**

Growth form: Heath-like shrub to 120 cm high, sometimes with numerous stems from a woody rootstock.

Vegetative spread:

Longevity:

Primary juvenile period:

Flowers: With brown bracts, winter.

Fruit/seed: Capsule, enclosed in a persistent flora tube.

Dispersal, establishment & growth:

Fire response:

Interaction with other organisms:

Distribution

Status/origin: Native.

Botanical subregions: CC.

Distribution Sydney area: Lake Burratorang district.

Select locations: CC: Lake Burratorang.

Habitat

Habitat:

Altitude: 0–500 m

Annual rainfall: 800 mm

Typical local abundance:

Vegetation: Open-forest.

Substrate: Probably on sandstone.

Exposure:

Conservation

Conservation: Rare local endemic, confined to the Lake Burratorang district, very few collections. Conservation status unknown.

Cryptandra spinescens**RHAMNACEAE****Life history**

Growth form: Straggling, much-branched heath-like shrub to 1 m high.

Vegetative spread:

Longevity:

Primary juvenile period:

Flowers: White, May–November, peak August–October.

Fruit/seed: Capsule, enclosed in a persistent flora tube, September–October.

Dispersal, establishment & growth:

Fire response:

Interaction with other organisms:

Distribution

Status/origin: Native.

Botanical subregions: NC CC CT CWS.

Distribution Sydney area:

Select locations: CC: Howes Valley, Mogo Creek, Doonside, St Marys, Cabramatta, Liverpool, Campbelltown. CT: Mount Canobolas, Barbers Creek.

Habitat

Habitat: Rocky sites.

Altitude: 0–1400 m

Annual rainfall: 700–1000 mm

Typical local abundance: Occasional.

Vegetation: Woodland e.g. with *Eucalyptus fibrosa*, *Melaleuca decora*, *Eucalyptus eugenioides*, *Angophora floribunda*, *Melaleuca nodosa*, *Themeda australis*.

Substrate: Clay soil on Tertiary alluvium, Wianamatta Shale, sandy loam on sandstone, low nutrients, well-drained.

Exposure:

Conservation

Conservation: Vulnerable in Western Sydney (James et al. 1999). Conservation status elsewhere unknown.

Discaria pubescens

RHAMNACEAE

Australian Anchor Plant

Life history

Growth form: Much-branched rigid shrub to 2.5 m high, with prominent spines and leaves often falling early.

Vegetative spread:

Longevity:

Primary juvenile period:

Flowers: Clustered in groups at base of spines, October–November.

Fruit/seed: Capsule 4–5 mm in diam., November–December.

Dispersal, establishment & growth:

Fire response:

Interaction with other organisms:

Distribution

Status/origin: Native.

Botanical subregions: NT CT ST NWS; Qld, Vic., Tas.

Distribution Sydney area: Tablelands.

Select locations: CT: Ophir, Lett River, Jenolan Caves, Abercrombie Caves, Tuena, Wombeyan Caves.

Habitat

Habitat: Rocky hillsides.

Altitude: 600–800 m **Annual rainfall:** 600–800 mm

Typical local abundance: Occasional–frequent.

Vegetation: Woodland e.g. with *Eucalyptus viminalis*.

Substrate: Sandy to clay soils on granite, limestone conglomerate and sediments, medium nutrients.

Exposure:

Conservation

Conservation: Widespread but rare, coded 3RCa on national rare species list (Briggs & Leigh 1996).

Emmenosperma alphonoides

RHAMNACEAE

Life history**Growth form:** Medium-sized tree, with leaves mostly opposite.**Vegetative spread:** No.**Longevity:****Primary juvenile period:****Flowers:** White, October.**Fruit/seed:** Fleshy, orange–yellow fruit, 4–8 mm diam., with 2–3 seeds, mature March–July; 30 000 seeds per kilogram (Floyd 1989).**Dispersal, establishment & growth:** Diaspore: seed. Germination difficult unless lightly filed (Floyd 1989).**Fire response:****Interaction with other organisms:** Timber pale yellow to golden brown, hard and straight-grained, difficult to work; suitable for tool handles and boat building and is good bending timber (Floyd 1989).

Distribution**Status/origin:** Native.**Botanical subregions:** NC CC; Qld.**Distribution Sydney area:** Coastal.**Select locations:** CC: Yarramalong, Wyong, Ourimbah, Gosford, Kurrajong Heights, Royal NP, Whispering Gallery, Albion Park, Minnamurra Falls, Nowra.

Habitat**Habitat:** Along creeks.**Altitude:** 0–500 m**Annual rainfall:** 1200–1600 mm**Typical local abundance:** Rare.**Vegetation:** Rainforest with *Doryphora sassafras*, *Ceratopetalum apetalum*, *Cryptocarya glaucescens*; drier rainforest e.g. with *Ficus coronata*, *Alectryon subcinereus*, *Backhousia myrtifolia*.**Substrate:** Alluvial soil, scree slopes, medium nutrients.**Exposure:** Sheltered.

Conservation**Conservation:** Uncommon in Gosford area, known only from Ourimbah (R. Payne pers. comm.), conservation status elsewhere unknown. Meroo, Nowra is southern limit.***Pomaderris adnata***

RHAMNACEAE

Life history**Growth form:** Spreading shrub to 2 m high, with hairy young stems (Walsh & Coates 1997).**Vegetative spread:** No.**Longevity:** 10–25 years (N. Walsh pers. comm.).**Primary juvenile period:****Flowers:** Cream, usually with petals, September. Buds present for many months before flowers open (Harden 2000a).**Fruit/seed:** Egg-shaped, blackish hairy capsule 3 mm long, separating into 3 segments, with seed 1.8 mm long, mature November–December.**Dispersal, establishment & growth:****Fire response:** Probably killed (N. Walsh pers. comm.).**Interaction with other organisms:**

Distribution**Status/origin:** Native.**Botanical subregions:** CC.**Distribution Sydney area:** Bulli.**Select locations:** CC: Sublime Point (Bulli).

Habitat

Habitat: Plateau behind escarpment.

Altitude: 300 m **Annual rainfall:** 1400 mm

Typical local abundance: Rare.

Vegetation: Heathy woodland e.g. with *Eucalyptus sieberi*, *Corymbia gummifera*, *Acacia longifolia*, *Aotus ericoides*, *Lambertia formosa*.

Substrate: Sandy loam over sandstone, low nutrients.

Exposure:

Conservation

Conservation: Very restricted local endemic, known from a population of less than 10 plants on the Illawarra escarpment. Listed as Endangered (Schedule 1) NSW *Threatened Species Conservation Act 1995*. Coded 1V in terms of Briggs and Leigh (1988) (Walsh & Coates 1997). Inadequately conserved.

Pomaderris andromedifolia* subsp. *andromedifolia**RHAMNACEAE****Life history**

Growth form: Shrub 1–2 m high with young stems rusty-hairy.

Vegetative spread: No.

Longevity: 10–25 years (N. Walsh pers. comm.).

Primary juvenile period:

Flowers: Cream to yellow, with petals, September–October. Buds present for many months before flowers open (Harden 2000a).

Fruit/seed: Capsule 4 mm long with long whitish hairs, separating into 3 segments; seed 2 mm long.

Dispersal, establishment & growth:

Fire response: Probably killed (N. Walsh pers. comm.).

Interaction with other organisms: Food plant of butterfly larvae *Hypochrysops byzos byzos* (Common & Waterhouse 1981).

Distribution

Status/origin: Native.

Botanical subregions: NC CC SC NT CT ST CWS NWP; Qld, Vic.

Distribution Sydney area: Woronora Plateau, Blue Mountains.

Select locations: CC: Waterfall, O'Hares Creek, Appin, Kentlyn, Woronora River, Buxton.

CT: Nullo Mountain, Clarence, Running Stream, Mt Banks, Blackheath, Penrose.

Habitat

Habitat: Ridges and escarpments.

Altitude: 0–1000 m **Annual rainfall:** 900–1400 mm

Typical local abundance: Occasional.

Vegetation: Open-forest e.g. with *Eucalyptus piperita*, *Angophora costata*, *Eucalyptus sieberi*, *E. agglomerata*.

Substrate: Moist sandy loam on sandstone, low nutrients.

Exposure:

Conservation

Conservation: Conservation status unknown.

***Pomaderris andromedifolia* subsp. *confusa* (P. sp. A)**

RHAMNACEAE

Life history**Growth form:** Shrub 1–2 m high with greyish- or rusty-hairy young stems .**Vegetative spread:** No.**Longevity:** 10–25 years (N. Walsh pers. comm.).**Primary juvenile period:****Flowers:** Cream, with petals, September–October. Buds present for many months before flowers open (Harden 2000a).**Fruit/seed:** Capsule 4 mm long with long whitish hairs, separating into 3 segments; seed 2 mm long, mature December.**Dispersal, establishment & growth:****Fire response:** Probably killed (N. Walsh pers. comm.).**Interaction with other organisms:**

Distribution**Status/origin:** Native.**Botanical subregions:** SC CC CT ST.**Distribution Sydney area:****Select locations:** CC: Woolwash (1968). CT: Ophir Creek (1899), Coxs River (1904).

Habitat**Habitat:** Riparian scrub, ridge top shrubland, woodland and forest (Walsh & Coates 1997).**Altitude:** 0–800 m**Annual rainfall:** 800–900 mm**Typical local abundance:****Vegetation:** Open-forest; woodland; shrubland; riparian scrub**Substrate:** Shallow or skeletal soils.**Exposure:**

Conservation**Conservation:** Uncommon in Sydney area and at northern limit of distribution.

Conservation status unknown.

Pomaderris angustifolia

RHAMNACEAE

Life history**Growth form:** Shrub to 3 m high, with a covering of dense intertwined stellate hairs; leaves narrow-oblong about 1.5 cm long.**Vegetative spread:** No.**Longevity:** 10–25 years (N. Walsh pers. comm.).**Primary juvenile period:****Flowers:** Creamish, petals absent. Buds present for many months before flowers open (Harden 2000a).**Fruit/seed:** Capsule, separating into 3 segments.**Dispersal, establishment & growth:****Fire response:** Probably killed (N. Walsh pers. comm.).**Interaction with other organisms:**

Distribution**Status/origin:** Native.**Botanical subregions:** NT CT ST NWS CWS SWS; Vic.**Distribution Sydney area:** Tablelands.**Select locations:** CT: Ophir, Winburndale NR, Tarana, Glenowlan Mountain, Coxs River, Abercrombie River.

Habitat**Habitat:** Near creeks.**Altitude:** 400–800 m**Annual rainfall:** 600–900 mm**Typical local abundance:** Frequent.**Vegetation:** Open-forest and woodland e.g. with *Angophora floribunda*, *Eucalyptus punctata*, *Acacia parvipinnula*, *Cassinia longifolia*.**Substrate:** Sandy or clay soils, low nutrients.**Exposure:**

Conservation**Conservation:** Conservation status unknown. Reported Winburndale Nature Reserve.

Pomaderris aspera (*P. apetala* misapplied)

RHAMNACEAE

Hazel Pomaderris

Life history**Growth form:** Shrub to 10 m high, with young stems rusty-hairy.**Vegetative spread:** No.**Longevity:** 10–25 years (N. Walsh pers. comm.).**Primary juvenile period:****Flowers:** Greenish yellow, petals absent, October–November. Buds present for many months before flowers open (Harden 2000a).**Fruit/seed:** Capsule, separating into 3 segments, November–January.**Dispersal, establishment & growth:** Ant-dispersed (Rice & Westoby 1981). Soil-stored seed germinates after forest fires (Langkamp 1987). Seedbank in soil 0–5 cm deep in 54-year old forest but absent from younger forest up to 18 years (Wang 1997).**Fire response:** Probably killed (N. Walsh pers. comm.).**Interaction with other organisms:** Foodplant of moth caterpillar *Casbia eccentricis* (Coupar & Coupar 1992) and butterfly larvae *Hypochrypsops byzos* (Braby 2000).**Distribution****Status/origin:** Native.**Botanical subregions:** NC CC SC NT CT ST CWS SWS; Vic., Tas.**Distribution Sydney area:** Widespread, mainly Illawarra and Blue Mountains.**Select locations:** CC: Nortons Basin, Razorback, Dapto, Albion Park, Shellharbour.

CT: Mt Coricudgy, Mount Wilson, Wentworth Falls, Mount Werong, Wombeyan Caves, Hill Top, Berrima, Bundanoon.

Habitat**Habitat:** Moist forest, along streams, gullies.**Altitude:** 0–1100 m **Annual rainfall:** 900–1400 mm**Typical local abundance:** Frequent–occasional.**Vegetation:** Moist forest e.g. with *Eucalyptus quadangulata*; rainforest e.g. with *Acacia binervata*.**Substrate:** Gravelly alluvium, soils on sandstone, granite, shale, basalt, low to medium nutrients.**Exposure:****Conservation****Conservation:** Conservation status unknown.***Pomaderris betulina*** subsp. *betulina*

RHAMNACEAE

Life history**Growth form:** Shrub 1–4 m high, with a covering of rusty dense intertwined stellate hairs on young stems.**Vegetative spread:** No.**Longevity:** 10–25 years (N. Walsh pers. comm.).**Primary juvenile period:****Flowers:** Yellowish, petals absent. Buds present for many months before flowers open (Harden 2000a).**Fruit/seed:** Capsule 4 mm long, separating into 3 segments, with seed 2 mm long.**Dispersal, establishment & growth:****Fire response:** Probably killed (N. Walsh pers. comm.).**Interaction with other organisms:****Distribution****Status/origin:** Native.**Botanical subregions:** NC SC NT CT ST; Vic.**Distribution Sydney area:****Select locations:** CT: Abercrombie River.**Habitat****Habitat:** Damp places.**Altitude:** 500 m **Annual rainfall:** 900–1000 mm**Typical local abundance:** Frequent.**Vegetation:** Riparian vegetation e.g. with *Casuarina cunninghamiana*, *Acacia amoena*, *A. dealbata*.**Substrate:** Sandy alluvial soil.**Exposure:****Conservation****Conservation:** Conservation status unknown.

Pomaderris brunnea

RHAMNACEAE

Life history**Growth form:** Shrub to 2–3 m high, with characteristic hairs on leaf vein endings.**Vegetative spread:** No.**Longevity:** 10–25 years (N. Walsh pers. comm.).**Primary juvenile period:****Flowers:** Yellowish, without petals, August–October. Buds present for many months before flowers open (Harden 2000a).**Fruit/seed:** Capsule with long rusty hairs, separating into 3 segments, November–January.**Dispersal, establishment & growth:** Diaspore: seed.**Fire response:** Probably killed (N. Walsh pers. comm.).**Interaction with other organisms:****Distribution****Status/origin:** Native.**Botanical subregions:** CC.**Distribution Sydney area:** Mainly Colo River, Camden–Picton area.**Select locations:** CC: Boorai Creek, Elderslie, Camden Park, Wirrimbirra Creek.**Habitat****Habitat:** Creek and riverbanks.**Altitude:** 0–300 m**Annual rainfall:** 800–1000 mm**Typical local abundance:** Frequent–occasional.**Vegetation:** Riverine forest e.g. with *Eucalyptus elata*, *E. tereticornis*, *E. amplifolia*, *E. baueriana*, *E. elata*, *Bursaria spinosa*, *Stipa verticillata*, *Acacia floribunda*.**Substrate:** Sandy loam from riverine alluvium or sandstone, low nutrient, well-drained.**Exposure:****Conservation****Conservation:** Local endemic listed as Vulnerable (Schedule 2) NSW *Threatened Species**Conservation Act 1995*. Coded 2VC- on national rare species list (Briggs & Leigh 1996).

Poorly-known and not adequately conserved. Vulnerable in Western Sydney (James et al. 1999).

Confined to Colo River and upper Nepean River.

Pomaderris cotoneaster

RHAMNACEAE

Life history**Growth form:** Shrub 1–2 m high, with covering of short whitish dense interwoven stellate hairs.**Vegetative spread:** No.**Longevity:** 10–25 years (N. Walsh pers. comm.).**Primary juvenile period:****Flowers:** Creamish, petals absent. Buds present for many months before flowers open (Harden 2000a).**Fruit/seed:** Capsule not seen; *Pomaderris* capsules separate into 3 segments (Harden 2000a).**Dispersal, establishment & growth:****Fire response:** Probably killed (N. Walsh pers. comm.).**Interaction with other organisms:** Foodplant of butterfly larvae *Hypochrysops byzos* (Braby 2000).**Distribution****Status/origin:** Native.**Botanical subregions:** SC CT ST; Vic.**Distribution Sydney area:** Southern Highlands.**Select locations:** CT: Tallong, Wingello.**Habitat****Habitat:** Open-forest.**Altitude:** 600–700 m**Annual rainfall:** 1000–1100 mm**Typical local abundance:** Rare.**Vegetation:** Open-forest.**Substrate:** Sandy soils on Shoalhaven sandstone, low nutrients.**Exposure:****Conservation****Conservation:** Listed as Endangered (Schedule 1) NSW *Threatened Species Conservation Act 1995*. Wingello is northern geographical limit.

Pomaderris discolor**RHAMNACEAE****Life history**

Growth form: Shrub 1–3 m high; stems with a whitish covering of short stellate hairs and scattered longer simple hairs.

Vegetative spread: No.

Longevity: 10–25 years (N. Walsh pers. comm.).

Primary juvenile period: About 3 years after high intensity fire 1/94 (at Lane Cove, P. Kubiak pers. comm.).

Flowers: Pale yellowish, petals absent or falling early, September–October. Buds present for many months before flowers open (Harden 2000a). Peak flowering period less than 5 years after high intensity fire 1/94 (at Lane Cove); possibly pollinated by native bees and honey-bees P. Kubiak pers. comm.).

Fruit/seed: Hairy capsule, separating into 3 segments, November.

Dispersal, establishment & growth:

Fire response: Killed after high intensity fire 1/94 (at Lane Cove, P. Kubiak pers. comm.).

Interaction with other organisms:

Distribution

Status/origin: Native.

Botanical subregions: NC CC SC CT SWS; Qld, Vic.

Distribution Sydney area: Mainly coast.

Select locations: CC: Hornsby, Gordon, Liverpool, Waterfall, Kentlyn, Thirlmere, Kangaroo Valley. CT: Bowral, Yerranderie.

Habitat

Habitat: Gullies and along creeks.

Altitude: 0–600 m

Annual rainfall: 800–1400 mm

Typical local abundance:

Vegetation: Open-forest

Substrate: Sandy soils on sandstone, alluvium, low nutrients.

Exposure:

Conservation

Conservation: Conservation status unknown, reported from Marramarra NP, Lane Cove NP, Royal NP.

Pomaderris elliptica* var. *elliptica* (*P. multiflora*)*RHAMNACEAE****Life history**

Growth form: Shrub 1–4 m high, with short close covering of stellate hairs; leaves elliptic to lanceolate, usually 5–7 cm long.

Vegetative spread: No.

Longevity: 10–25 years (N. Walsh pers. comm.).

Primary juvenile period:

Flowers: Yellow, with petals, September–October. Buds present for many months before flowers open (Harden 2000a). Visited by native bees for pollen (P. Kubiak pers. comm.).

Fruit/seed: Capsule, separating into 3 segments, October–December.

Dispersal, establishment & growth:

Fire response: Probably killed (N. Walsh pers. comm.).

Interaction with other organisms: Foodplant of butterfly larvae *Hypochrysops byzos*, *H. ignita* (Common & Waterhouse 1972).

Distribution

Status/origin: Native.

Botanical subregions: NC CC SC CT ST CWS; Vic., Tas.

Distribution Sydney area:

Select locations: CC: Narrabeen, Neutral Bay, O'Hares Creek, Douglas Park, Bulli, Macquarie Pass, Woodford, Springwood. CT: Wentworth Falls, Hill Top, Belmore Falls, Bundanoon, Wingello.

Habitat

Habitat: Creek banks, gullies.

Altitude: 0–1000 m

Annual rainfall: 800–1400 mm

Typical local abundance: Frequent–occasional.

Vegetation: Open-forest e.g. with *Angophora costata*, *Eucalyptus piperita*, *E. sieberi*, *E. mannifera*, *E. deanei*.

Substrate: Sandy alluvium, medium nutrients.

Exposure:

Conservation

Conservation: Conservation status unknown. Reported in Brisbane Water NP, Garigal NP, Sydney Harbour NP.

Pomaderris eriocephala**RHAMNACEAE****Life history**

Growth form: Spreading shrub to 3 m high, often multistemmed.

Vegetative spread: No.

Longevity: 10–25 years (N. Walsh pers. comm.).

Primary juvenile period:

Flowers: Yellow, petals absent, September–October. Buds present for many months before flowers open (Harden 2000a).

Fruit/seed: Capsule with long rusty hairs, separating into 3 segments, October.

Dispersal, establishment & growth:

Fire response: Probably killed (N. Walsh pers. comm.).

Interaction with other organisms: Foodplant of butterfly larvae *Hypochrysops byzos* (Braby 2000).

Distribution

Status/origin: Native.

Botanical subregions: NC CC SC NT CT ST NWS; Vic.

Distribution Sydney area: Mainly at higher altitudes on the ranges.

Select locations: CC: Boorai Creek, Lake Burragorang. CT: Jenolan Caves, Mt Werong, Canyonleigh.

	Habitat
Habitat: Ridges and slopes.	
Altitude: 0–1000 m	Annual rainfall: 800–1400 mm
Typical local abundance:	
Vegetation: Open-forest.	
Substrate:	
Exposure:	
	Conservation
Conservation: Mainly at higher altitudes on the ranges. Conservation status unknown.	

Pomaderris ferruginea**RHAMNACEAE**

	Life history
Growth form: Shrub 1–4 m high, stems with rusty, simple hairs.	
Vegetative spread: No.	
Longevity: 10–25 years (N. Walsh pers. comm.).	
Primary juvenile period: About 3 years after high intensity fire 1/94 (at Lane Cove, P. Kubiak pers. comm.).	
Flowers: Yellow, with petals, flowers scented, September–October, peak September. Buds present for many months before flowers open (Harden 2000a). Peak flowering period about 5 years after high intensity fire 1/94 (at Lane Cove); possibly pollinated by native bees, flies, beetles and bugs P. Kubiak pers. comm.).	
Fruit/seed: Capsule with long silky hairs, separating into 3 segments, October–November.	
Dispersal, establishment & growth: Diaspore: seed, probably with soil-stored seedbank.	
Fire response: Killed after high intensity fire 1/94 (at Lane Cove, P. Kubiak pers. comm.).	
Interaction with other organisms: Food plant of butterfly larvae <i>Hypochrypsops byzos byzos</i> (Common & Waterhouse 1981).	
	Distribution

Status/origin: Native.
Botanical subregions: NC CC SC CT ST CWS; Qld, Vic.
Distribution Sydney area: Widespread.
Select locations: CC: Terrigal, West Head, Narrabeen, Lane Cove, Newington, Casula, Grose Vale, Glenbrook, Werombi, Douglas Park. CT: Rylstone, Katoomba, Kanangra, Mt Werong, Penrose.

	Habitat
Habitat: Ridges, rocky slopes.	
Altitude: 0–1000 m	Annual rainfall: 800–1400 mm
Typical local abundance: Frequent–occasional.	
Vegetation: Open-forest e.g. with <i>Syncarpia glomulifera</i> , <i>Eucalyptus piperita</i> , <i>Angophora costata</i> , <i>Eucalyptus paniculata</i> , <i>E. punctata</i> ; woodland e.g. with <i>Eucalyptus eximia</i> , <i>E. gummifera</i> , <i>E. sieberi</i> , <i>E. goniocalyx</i> ; heath e.g. with <i>Banksia ericifolia</i> .	
Substrate: Sandy loam from shales, conglomerate, sandstone, medium nutrient soils.	
Exposure: Mid-shade–light shade.	
	Conservation
Conservation: Vulnerable in Western Sydney (James et al. 1999), though mainly occurs on margins of Cumberland Plain. Reported in Bouddi NP, Brisbane Water NP, Marramarra NP, Ku-ring-gai Chase NP, Garigal NP, Sydney Harbour NP. Status elsewhere unknown.	

Pomaderris intermedia (*P. sieberiana*)

RHAMNACEAE

Life history

Growth form: Shrub to 3 m high, with covering of short dense intertwined stellate hairs on stems and undersurface of leaves; simple hairs present also. Intermediates occur between this species and *P. elliptica* (Harden 2000a).

Vegetative spread: No.

Longevity: 10–25 years (N. Walsh pers. comm.).

Primary juvenile period: 3–4 years (L.McD.). Peak flowering period about 5 years after high intensity fire 1/94 (at Lane Cove)(P. Kubiak pers. comm.).

Flowers: Yellow, with petals, September–October. Buds present for many months before flowers open (Harden 2000a). Possibly pollinated by native bees P. Kubiak pers. comm.).

Fruit/seed: Hairy capsule, separating into 3 segments, November–December.

Dispersal, establishment & growth: Diaspore: seed, soil-stored seedbank.

Fire response: Killed, recruitment from soil-stored seed (L.McD.).

Interaction with other organisms: Food plant of butterfly larvae *Hypochrysops byzos byzos* (Common & Waterhouse 1981).

Distribution

Status/origin: Native.

Botanical subregions: NC CC SC NT CT ST CWS; Vic., Tas.

Distribution Sydney area: Widespread, Coast and Blue Mountains.

Select locations: CC: Narara, Woy Woy, Hornsby, Galston, Wahroonga, Bondi, Picnic Point, Liverpool, Helensburgh, Appin, O'Hares Creek. CT: Coricudgy, Capertee, Blackheath, Katoomba, Megalong Valley, Colo Vale.

Habitat

Habitat: Steep slopes, near creeks, gullies.

Altitude: 0–1000 m **Annual rainfall:** 800–1400 mm

Typical local abundance: Frequent–occasional.

Vegetation: Open-forest e.g. with *Eucalyptus pilularis*, *Angophora costata*, *E. agglomerata*, *E. piperita*; woodland e.g. with *Eucalyptus rossii*.

Substrate: Sandy soil and alluvium, also on shale soils, low nutrients.

Exposure:

Conservation

Conservation: Conservation status unknown. Reported in Brisbane Water NP, Marramarra NP, Garigal NP.

Pomaderris lanigera

RHAMNACEAE

Life history

Growth form: Shrub or small tree 1–5 m high; stems covered with rusty curly hairs.

Vegetative spread: No.

Longevity: 10–25 years (N. Walsh pers. comm.).

Primary juvenile period:

Flowers: Golden, with petals, August–October, peak September. Buds present for many months before flowers open (Harden 2000a). Flowers visited by weevils and small flies (P. Kubiak pers. comm.).

Fruit/seed: Hairy capsule, separating into 3 segments, October–November.

Dispersal, establishment & growth: Coloniser species in absence of fire (at Silverwater).

Fire response: Probably killed (N. Walsh pers. comm.).

Interaction with other organisms: Food plant of butterfly larvae *Hypochrysops byzos byzos* (Common & Waterhouse 1981).

Distribution

Status/origin: Native.

Botanical subregions: NC CC SC NT CT ST NWS CWS; Qld, Vic.

Distribution Sydney area: Coast and ranges.

Select locations: CC: Howes Valley, Woy Woy, Cowan, Thornleigh, Silverwater, Wallacia, Leumeah, Kentlyn, Yerranderie, Cataract Dam, Heathcote, Hilltop, Tahmoor, O'Hares Creek. CT: Mt Coricudgy, Mt Victoria, Newnes Plateau, Mt Werong, Wingello.

	Habitat
Habitat: Gullies, creekbanks.	
Altitude: 0–1000 m	Annual rainfall: 800–1400 mm
Typical local abundance: Frequent.	
Vegetation: Open-forest e.g. with <i>Angophora costata</i> , <i>Eucalyptus agglomerata</i> , <i>E. piperita</i> , <i>E. saligna</i> , <i>Syncarpia glomulifera</i> , <i>Casuarina torulosa</i> , <i>Eucalyptus punctata</i> .	
Substrate: Sandy soil on alluvium and sandstone or occasionally shale, low to medium nutrients.	
Exposure:	
	Conservation
Conservation: Conservation status unknown. Reported in Bouddi NP, Ku-ring-gai Chase NP, Garigal NP, Royal NP, Heathcote NP, Thirlmere Lakes NP.	

Pomaderris ledifolia**RHAMNACEAE**

	Life history
Growth form: Erect shrub to 2 m high, sometimes prostrate in extreme conditions; young stems with short whitish simple hairs. Often confused with <i>P. andromedifolia</i> (Harden 1990).	
Vegetative spread: No.	
Longevity: 10–25 years (N. Walsh pers. comm.).	
Primary juvenile period:	
Flowers: Petals present, September–October. Buds present for many months before flowers open (Harden 2000a).	
Fruit/seed: Capsule with long silvery hairs, separating into 3 segments, December.	
Dispersal, establishment & growth:	
Fire response: Probably killed (N. Walsh pers. comm.).	
Interaction with other organisms:	
	Distribution
Status/origin: Native.	
Botanical subregions: NC CC SC CT ST; Vic, Qld.	
Distribution Sydney area: Woronora Plateau, Blue Mountains.	
Select locations: CC: Heathcote (1915), Woronora River (1902), Appin (1898), Glen Davis, Hilltop. CT: Rylstone, Newnes Plateau, Mt Wilson, Katoomba, Kanangra.	
	Habitat
Habitat: Rocky hillsides, cliffs.	
Altitude: 0–1000 m	Annual rainfall: 900–1400 mm
Typical local abundance: Frequent–occasional.	
Vegetation: Open-forest e.g. with <i>Eucalyptus piperita</i> , <i>E. sieberi</i> , <i>E. globoidea</i> , <i>Syncarpia glomulifera</i> , <i>Eucalyptus punctata</i> , <i>Corymbia gummifera</i> ; heath e.g. with <i>Hakea</i> , <i>Eucalyptus stricta</i> .	
Substrate: Sandy soil on sandstone, low nutrients.	
Exposure:	
	Conservation
Conservation: No recent records for Royal National Park–Woronora River area despite a number of collections made between 1893 and 1915. Conservation status unknown.	

Pomaderris ligustrina subsp. *ligustrina*

RHAMNACEAE

Life history**Growth form:** Shrub 1–2 m high, with rusty covering of short dense stellate hairs and long simple hairs.**Vegetative spread:** No.**Longevity:** 10–25 years (N. Walsh pers. comm.).**Primary juvenile period:****Flowers:** Yellow, petals absent, September–October. Buds present for many months before flowers open (Harden 2000a).**Fruit/seed:** Capsule 3 mm long with long silvery hairs, separating into 3 segments, with seed 2 mm long, November.**Dispersal, establishment & growth:****Fire response:** Probably killed (N. Walsh pers. comm.).**Interaction with other organisms:**

Distribution**Status/origin:** Native.**Botanical subregions:** NC CC SC NT CT; Qld, Vic.**Distribution Sydney area:****Select locations:** CC: Gosford, Narara, Wisemans Ferry, Rookwood, Glen Davis, Kentlyn, Thirlmere, Albion Park, Macquarie Pass. CT: Blackheath, Kings Tableland, Hill Top, Bundanoon.

Habitat**Habitat:** Slopes, gullies, along creeks.**Altitude:** 0–1000 m**Annual rainfall:** 800–1400 mm**Typical local abundance:** Occasional.**Vegetation:** Moist open-forest e.g. with *Eucalyptus saligna*, *Syncarpia glomulifera*, *Angophora costata*, *A. floribunda*; drier open-forest e.g. with *Eucalyptus punctata*, *E. sparsifolia*, *E. racemosa*.**Substrate:** Sandy loam on shales, sandstone, low nutrients.**Exposure:**

Conservation**Conservation:** Conservation status unknown. Reported from Brisbane Water NP.***Pomaderris mediora***

RHAMNACEAE

Life history**Growth form:** Procumbent to erect shrub 1–3 m high, with greyish or rusty simple hairs on young stems.**Vegetative spread:** No.**Longevity:** 10–25 years (N. Walsh pers. comm.).**Primary juvenile period:****Flowers:** Cream, petals absent, September–October (Walsh & Coates 1997). Buds present for many months before flowers open (Harden 2000a).**Fruit/seed:** Brown–grey hairy capsule 3 mm long, separating into 3 segments, with seed 3 mm long, mature October–November (Walsh & Coates 1997).**Dispersal, establishment & growth:****Fire response:** Probably killed (N. Walsh pers. comm.).**Interaction with other organisms:**

Distribution**Status/origin:** Native.**Botanical subregions:** CC.**Distribution Sydney area:** Coast, Hawkesbury River to Bulli.**Select locations:** CC: Turrimetta Head, Whale Beach, Newport, Austinmer, Sublime Point, Lodden Creek.

Habitat**Habitat:** Coastal headlands.**Altitude:** 20–500 m **Annual rainfall:** 1200–1600 mm**Typical local abundance:** Frequent.**Vegetation:** Heathland and scrub e.g. with *Westringia fruticosa*, *Allocasuarina verticillata*, *Leptospermum laevigatum*, *Lomandra longifolia*.**Substrate:** Sandy to clay soils on sandstones and shales of Narrabeen Group (Walsh & Coates 1997), low nutrients.**Exposure:** Full sun.**Conservation****Conservation:** Local endemic, with conservation code 2RC in terms of Briggs and Leigh (1988) (Walsh & Coates 1997). The collection at Bluff Track Frenchs Forest (see Walsh & Coates 1997) is on roadside at the end of a cul-de-sac, most probably introduced here in soil fill and now naturalised (L.McD.). Conservation adequacy unknown.***Pomaderris pauciflora*****RHAMNACEAE****Life history****Growth form:** Shrub to 3 m high; stems covered with dense intertwined stellate hairs.**Vegetative spread:** No.**Longevity:** 10–25 years (N. Walsh pers. comm.).**Primary juvenile period:****Flowers:** Creamish, without petals. Buds present for many months before flowers open (Harden 2000a).**Fruit/seed:** Hairy capsule, separating into 3 segments.**Dispersal, establishment & growth:****Fire response:** Probably killed (N. Walsh pers. comm.).**Interaction with other organisms:****Distribution****Status/origin:** Native.**Botanical subregions:** CT ST CWS; Vic.**Distribution Sydney area:** Berrima.**Select locations:** CT: Coleby.**Habitat****Habitat:****Altitude:** 600–700 m **Annual rainfall:** 900 mm**Typical local abundance:****Vegetation:****Substrate:****Exposure:****Conservation****Conservation:** Coded 3RC- on national rare species list (Briggs & Leigh 1996).

Coleby is at northern distributional limit. Conservation adequacy unknown.

Pomaderris phyllicifolia* subsp. *ericoides

RHAMNACEAE

Life history**Growth form:** Shrub 1–2 m high.**Vegetative spread:** No.**Longevity:** 10–25 years (N. Walsh pers. comm.).**Primary juvenile period:****Flowers:** Pale yellow, petals absent, September–December. Buds present for many months before flowers open (Harden 2000a).**Fruit/seed:** Hairy capsule, separating into 3 segments.**Dispersal, establishment & growth:****Fire response:** Probably killed (N. Walsh pers. comm.).**Interaction with other organisms:**

Distribution**Status/origin:** Native.**Botanical subregions:** CC SC ST CWS SWS; Vic.**Distribution Sydney area:** Ranges south of the Blue Mountains.**Select locations:** CC: Bulli. CT: Mt Wilson, Jenolan, Berrima, Barbers Creek, Tuglow Caves, Richlands.

Habitat**Habitat:** Hillsides.**Altitude:** 0–1000 m **Annual rainfall:** 900–1400 mm**Typical local abundance:** Occasional.**Vegetation:** Eucalyptus woodland.**Substrate:** Sandy stony soils on sandstone, conglomerate, metamorphics, low nutrients.**Exposure:**

Conservation**Conservation:** Conservation status unknown.***Pomaderris phyllicifolia* subsp. *phyllicifolia***

RHAMNACEAE

Life history**Growth form:** Shrub 1–2 m high.**Vegetative spread:** No.**Longevity:** 10–25 years (N. Walsh pers. comm.).**Primary juvenile period:****Flowers:** Pale yellow, petals absent. Buds present for many months before flowers open (Harden 2000a).**Fruit/seed:** Hairy capsule, separating into 3 segments.**Dispersal, establishment & growth:****Fire response:** Probably killed (N. Walsh pers. comm.).**Interaction with other organisms:**

Distribution**Status/origin:** Native.**Botanical subregions:** NT CT ST CWS.**Distribution Sydney area:** Southern Highlands, Jenolan Caves.**Select locations:** CT: Jenolan Caves (1900), Hill Top, Joadja Creek.

Habitat**Habitat:****Altitude:** 600–800 m **Annual rainfall:** 900–1000 mm**Typical local abundance:****Vegetation:** Dry eucalypt forest.**Substrate:** Shallow soils on siltstones, sandstones.**Exposure:**

Conservation**Conservation:**

Pomaderris precaria**RHAMNACEAE****Life history**

Growth form: Slender shrub 1–2 m high, with young stems greyish-rusty hairy.

Vegetative spread: No.

Longevity: 10–25 years (N. Walsh pers. comm.).

Primary juvenile period:

Flowers: Yellow, with petals, September–October. Buds present for many months before flowers open (Harden 2000a).

Fruit/seed: Blackish capsule 5 mm long, separating into 3 segments, with seed 2.5 mm long, mature December (Walsh & Coates 1997).

Dispersal, establishment & growth:

Fire response: Probably killed (N. Walsh pers. comm.).

Interaction with other organisms:

Distribution

Status/origin: Native.

Botanical subregions: CT CWS.

Distribution Sydney area: Rylstone, Capertee Valley.

Select locations: CT: Rylstone, Mt Gundangaroo.

Habitat

Habitat: Rocky ridges or below cliffs.

Altitude: 700–900 m **Annual rainfall:** 600–700 mm

Typical local abundance: Occasional.

Vegetation: Shrubland or dry eucalypt woodland.

Substrate: Skeletal or gravelly soils derived from sandstone (Walsh & Coates 1997).

Exposure:

Conservation

Conservation: Rare localised species, reported from 2 locations, a roadside and adjacent property at Rylstone and from St Johns Point, Mt Gundangaroo in Wollemi National Park but not collected there since 1966. Recommended code 2VC- (sensu Briggs & Leigh 1989) (Walsh & Coates 1997).

Pomaderris prunifolia* var. *prunifolia

RHAMNACEAE

Life history**Growth form:** Shrub 1–3 m high; stems covered with rusty stellate hairs.**Vegetative spread:** No.**Longevity:** 10–25 years (N. Walsh pers. comm.).**Primary juvenile period:****Flowers:** Yellow, petals absent, August–October. Buds present for many months before flowers open (Harden 2000a).**Fruit/seed:** Capsule, with long rusty hairs, separating into 3 segments.**Dispersal, establishment & growth:****Fire response:** Probably killed (N. Walsh pers. comm.).**Interaction with other organisms:****Distribution****Status/origin:** Native.**Botanical subregions:** CC SC NT CT ST NWS CWS; Qld, Vic.**Distribution Sydney area:** Bankstown–Dundas, Tablelands.**Select locations:** CC: Dundas, Parramatta, Flemington (1898), Bankstown (1920). CT: Mt Darcy, Mt Caley, Mullions Range, Jenolan Caves, Mt Werong, Bundanoon, Barbers Creek.**Habitat****Habitat:** Rocky slopes, along creeks.**Altitude:** 0–1000 m**Annual rainfall:** 900–1200 mm**Typical local abundance:** Occasional.**Vegetation:****Substrate:** Sandy soil on sandstone, also recorded on basalt.**Exposure:****Conservation****Conservation:** Remaining coastal populations. Plants at Dundas–Parramatta listed as an Endangered Population (Schedule 1) NSW *Threatened Species Conservation Act 1995*. Conservation status of Tablelands population unknown, though no records for Jenolan Caves or Barbers Creek since 1900.***Pomaderris sericea***

RHAMNACEAE

Life history**Growth form:** Low shrub with shining golden-brown hairs on new growth.**Vegetative spread:** No.**Longevity:** 10–25 years (N. Walsh pers. comm.).**Primary juvenile period:****Flowers:** Creamish, no petals. Buds present for many months before flowers open (Harden 2000a).**Fruit/seed:** Hairy capsule, separating into 3 segments.**Dispersal, establishment & growth:****Fire response:** Probably killed (N. Walsh pers. comm.).**Interaction with other organisms:****Distribution****Status/origin:** Native.**Botanical subregions:** CT; Vic.**Distribution Sydney area:** Southern Highlands.**Select locations:** Berrima (1889), Bundanoon Creek.**Habitat****Habitat:** Lower slopes, below cliffs.**Altitude:** 200–600 m**Annual rainfall:** 900–1200 mm**Typical local abundance:** Occasional.**Vegetation:** Tall open-forest e.g. with *Eucalyptus deanei*, *Ceratopetalum apetalum*.**Substrate:** Sandy soil on sandstone.**Exposure:****Conservation****Conservation:** Rare in NSW, collected only from Berrima at the turn of the century (Harden 1990), listed as Endangered (Schedule 1) NSW *Threatened Species Conservation Act 1995* and coded 3VCI on national rare species list (Briggs & Leigh 1996).

Pomaderris subcapitata

RHAMNACEAE

Life history**Growth form:** Shrub to 2 m high, with hairy stems.**Vegetative spread:** No.**Longevity:** 10–25 years (N. Walsh pers. comm.).**Primary juvenile period:****Flowers:** Yellow, with petals. Buds present for many months before flowers open (Harden 2000a).**Fruit/seed:** Hairy capsule with long rusty hairs, separating into 3 segments.**Dispersal, establishment & growth:****Fire response:** Probably killed (N. Walsh pers. comm.).**Interaction with other organisms:**

Distribution**Status/origin:** Native.**Botanical subregions:** NC NT CT ST; Vic.**Distribution Sydney area:** Colong Caves.**Select locations:** CT: Colong Caves.

Habitat**Habitat:** Limestone slopes.**Altitude:** 700 m**Annual rainfall:** 800–900 mm**Typical local abundance:** Occasional.**Vegetation:****Substrate:** Foot of limestone slopes.**Exposure:**

Conservation**Conservation:** Not common in NSW, only Sydney area record is Colong Caves.***Pomaderris vellea***

RHAMNACEAE

Life history**Growth form:** Erect shrub to 2 m high, with hairy stems.**Vegetative spread:** No.**Longevity:** 10–25 years (N. Walsh pers. comm.).**Primary juvenile period:****Flowers:** Yellow, with petals, November. Buds present for many months before flowers open (Harden 2000a).**Fruit/seed:** Hairy capsule, separating into 3 segments.**Dispersal, establishment & growth:****Fire response:** Probably killed (N. Walsh pers. comm.).**Interaction with other organisms:**

Distribution**Status/origin:** Native.**Botanical subregions:** NC CC NT CWS; Qld.**Distribution Sydney area:** Campbelltown.**Select locations:** CC: Kentlyn.

Habitat**Habitat:****Altitude:** 0–100 m**Annual rainfall:** 800 mm**Typical local abundance:** Occasional.**Vegetation:** Dry open-forest.**Substrate:** Sandy soils on sandstone, low nutrients.**Exposure:**

Conservation**Conservation:** Mainly north from Hunter Valley, Campbelltown is disjunct occurrence at southern limit. Considered vulnerable in Western Sydney (James et al. 1999).

Pomaderris velutina

RHAMNACEAE

Life history**Growth form:** Slender shrub to 2 m high, young stems with long rusty hairs.**Vegetative spread:** No.**Longevity:** 10–25 years (N. Walsh pers. comm.).**Primary juvenile period:****Flowers:** Pale yellow, petals absent, November. Buds present for many months before flowers open (Harden 2000a).**Fruit/seed:** Hairy capsule, separating into 3 segments.**Dispersal, establishment & growth:****Fire response:** Probably killed (N. Walsh pers. comm.).**Interaction with other organisms:****Distribution****Status/origin:** Native.**Botanical subregions:** CC ST SWS; Vic., Tas.**Distribution Sydney area:** Burragorang–Nattai area.**Select locations:** CC: Burragorang, Nattai.**Habitat****Habitat:** Slopes.**Altitude:** 0–400 m**Annual rainfall:** 800–900 mm**Typical local abundance:** Frequent.**Vegetation:** Open-forest e.g. with *Allocasuarina torulosa*.**Substrate:** Sandy soil on sandstone, low nutrients.**Exposure:****Conservation****Conservation:** Not common in NSW, Nattai–Burragorang area, populations are disjunct and at northern geographical limit. Conservation status unknown.***Rhamnus alaternus* ***

RHAMNACEAE

Buckthorn

Life history**Growth form:** Tall, evergreen spreading shrub.**Vegetative spread:****Longevity:****Primary juvenile period:****Flowers:** Greenish, early spring.**Fruit/seed:** Roundish, blue-black, succulent, 3–5 mm diam., usually containing 3 nutlets.**Dispersal, establishment & growth:** Diaspore: fruit, probably bird-dispersed.**Fire response:****Interaction with other organisms:****Distribution****Status/origin:** Exotic, native to Europe. Introduced as ornamental.**Botanical subregions:** CC CT CWS.**Distribution Sydney area:****Select locations:** CC: Leumeah (1948), Campbelltown, Nepean River, Cobbitty (1951).

CT: Megalong Creek (1953).

Habitat**Habitat:** Creeks and waste places.**Altitude:** 0–800 m**Annual rainfall:** 700–1000 mm**Typical local abundance:****Vegetation:****Substrate:****Exposure:****Conservation****Conservation:** Cultivated, occasionally naturalised. Not reported along the Nepean River by Benson and Howell (1993).

Acaena agnipila

ROSACEAE

Life history**Growth form:** Hairy perennial herb 20–50 cm high**Vegetative spread:** No.**Longevity:****Primary juvenile period:****Flowers:** October–November. Wind-pollinated and likely to be strongly out-crossing (Symon et al. 2000).**Fruit/seed:** Spiny burr-like head containing an achene, October–November.**Dispersal, establishment & growth:** Diaspore: fruit, dispersed by attachment to fur of animals, clothing etc.**Fire response:****Interaction with other organisms:**

Distribution**Status/origin:** Native.**Botanical subregions:** CC SC NT CT ST NWS CWS SWS; Qld, Vic., Tas., S.A., W.A., *NZ**Distribution Sydney area:** Western Sydney, Bathurst.**Select locations:** CC: Rookwood, Camden. CT: Sunny Corner, Wattle Flat.

Habitat**Habitat:****Altitude:** 0–1000 m **Annual rainfall:** 600–700 mm**Typical local abundance:****Vegetation:** Grassland.**Substrate:** Clay soils on shales, slates.**Exposure:**

Conservation**Conservation:** Rare, conservation status unknown, recorded mostly in cemeteries, Not recorded for Western Sydney in James et al. (1999). Possibly confused with *Acaena ovina*.***Acaena echinata***

ROSACEAE

Life history**Growth form:** Perennial herb 25–40 cm high**Vegetative spread:** No.**Longevity:****Primary juvenile period:****Flowers:** September. Wind-pollinated and likely to be strongly out-crossing (Symon et al. 2000).**Fruit/seed:** Spiny burr-like head containing an achene, September–March.**Dispersal, establishment & growth:** Diaspore: fruit, dispersed by attachment to fur of animals, clothing etc.**Fire response:****Interaction with other organisms:**

Distribution**Status/origin:** Native.**Botanical subregions:** CC SC ST SWS; Qld, Vic., Tas., S.A., W.A.**Distribution Sydney area:** Tablelands and Western Sydney.**Select locations:** CC: Casula, Narellan, Camden, Menangle. CT: Orange, Turondale, Leura.

Habitat**Habitat:****Altitude:** 0–1000 m **Annual rainfall:** 700–900 mm**Typical local abundance:** Occasional.**Vegetation:** Scrub e.g. with *Bursaria spinosa*.**Substrate:** Clay soils on shale, slate.**Exposure:**

Conservation**Conservation:** Conservation status unknown.

Acaena novae-zelandiae

ROSACEAE

Life history

Growth form: Creeping perennial herb, with hairy stems and flowers in globular terminal heads.

Vegetative spread: Spreading by stolons.

Longevity:

Primary juvenile period:

Flowers: November–May, peak November. Wind-pollinated and likely to be strongly out-crossing (Symon et al. 2000).

Fruit/seed: Spiny burr-like head 20–25 mm diam., containing an achene, November–May.

Dispersal, establishment & growth: Diaspore: fruit, dispersed by attachment to fur of animals, clothing etc.

Fire response:

Interaction with other organisms:

Distribution

Status/origin: Native.

Botanical subregions: NC CC SC NT CT ST NWS CWS; Qld, Vic., Tas., S.A., N.Z.

Distribution Sydney area: Mainly Tablelands.

Select locations: CC: Grose Vale, Yerranderie, Cambewarra Range. CT: Nullo Mountain, Mt Canobolas, Cadia, Oberon, Boyd Plateau, Mt Wilson, Katoomba, Barren Grounds, Berrima, Kangaloon.

Habitat

Habitat: Moist places.

Altitude: 300–1200 m

Annual rainfall: 800–1400 mm

Typical local abundance: Frequent–occasional.

Vegetation: Upland swamp e.g. with *Empodisma minus*, *Restio australis*; open-forest e.g. with *Eucalyptus macrorhyncha*, *E. polyanthemos*, *E. goniocalyx*; woodland e.g. with *Eucalyptus pauciflora*, *Leptospermum obovatum*.

Substrate: Clay soils on basalt, alluvium, medium to high nutrients.

Exposure:

Conservation

Conservation: Conservation status unknown, many old collections in proportion to recent collections.

Acaena ovina

ROSACEAE

Life history

Growth form: Perennial hairy herb. Develops hard woody crowns and roots (Whittet 1958).

Vegetative spread: No.

Longevity:

Primary juvenile period:

Flowers: October–November. Wind-pollinated and likely to be strongly out-crossing (Symon et al. 2000).

Fruit/seed: Spiny burr-like head containing an achene, October–November.

Dispersal, establishment & growth: Diaspore: fruit, dispersed by attachment to fur of animals, clothing etc.

Fire response:

Interaction with other organisms: Young leaves sometimes eaten by sheep but stems unpalatable, enabling plants to develop numerous seed heads carrying hooked seeds which damage fleeces (Whittet 1958).

Distribution

Status/origin: Native.

Botanical subregions: NT CT ST CWS SWS; Qld, Vic., Tas., S.A., W.A., *NZ

Distribution Sydney area: Tablelands.

Select locations: CT: Rylsone, Orange, Wyagdon, Oberon, Mt Victoria, Moss Vale.

Habitat**Habitat:** Grassland, roadsides.**Altitude:** 600–1000 m **Annual rainfall:** 800–1000 mm**Typical local abundance:** Frequent–occasional.**Vegetation:** Grassland.**Substrate:** Clay soils on shale, basalt.**Exposure:**

Conservation**Conservation:** Conservation status unknown.***Aphanes arvensis* *****ROSACEAE**

Parsley-piert

Life history**Growth form:** Spreading or erect herb 4–10 cm high.**Vegetative spread:** No.**Longevity:** Less than 1 year.**Primary juvenile period:** Less than 1 year.**Flowers:****Fruit/seed:** Achene enclosed in a cup-like structure about 2 mm long.**Dispersal, establishment & growth:** Often colonising disturbed areas.**Fire response:****Interaction with other organisms:**

Distribution**Status/origin:** Exotic, native to Europe.**Botanical subregions:** NT CT ST NWS; Vic., Tas.**Distribution Sydney area:** Oberon area.**Select locations:** CT: Edith (1966).

Habitat**Habitat:** Stream bank.**Altitude:** 1000–1200 m **Annual rainfall:** 900 mm**Typical local abundance:****Vegetation:****Substrate:** Mud on stream bank.**Exposure:**

Conservation**Conservation:** Minor weed, rarely reported in Sydney area.

Aphanes australiana

ROSACEAE

Life history**Growth form:** Pale green dwarf herb to 10 cm high.**Vegetative spread:** No.**Longevity:** Less than 1 year.**Primary juvenile period:** Less than 1 year.**Flowers:** September–December.**Fruit/seed:** Achene enclosed in a cup-like structure 2 mm long.**Dispersal, establishment & growth:****Fire response:****Interaction with other organisms:****Distribution****Status/origin:** Native.**Botanical subregions:** CT CWS SWS SWP; Vic., Tas.**Distribution Sydney area:** Bathurst (1992).**Select locations:** CT: Bathurst.**Habitat****Habitat:** Often on rocks.**Altitude:** 700–800 m **Annual rainfall:** 600–650 mm**Typical local abundance:** Occasional.**Vegetation:** Ungrazed pasture e.g. with *Eucalyptus melliodora*, *E. blakelyi*; in moss mats in forest.**Substrate:****Exposure:****Conservation****Conservation:** Appears to be rare, conservation status unknown.***Duchesnea indica****

ROSACEAE

Indian Strawberry

Life history**Growth form:** Perennial herb with trifoliate leaves.**Vegetative spread:** Spreads by slender stolons.**Longevity:** Indefinite.**Primary juvenile period:****Flowers:** Yellow, October–April.**Fruit/seed:** Fleshy, red, covered with hard achenes. Mature mainly December–January (L. Parkinson pers. comm.). Fruit edible but insipid.**Dispersal, establishment & growth:** Rooting fragments probably spread by water. Fruit reported from pellets of Currawongs (Buchanan 1989a).**Fire response:** Resprouted after high intensity fire 1/94, secondary juvenile period less than 6 months (at Lane Cove, P. Kubiak pers. comm.).**Interaction with other organisms:****Distribution****Status/origin:** Exotic, native to India and Asia. Introduced as ornamental.**Botanical subregions:** NC CC CT CWS; LHI, Qld.**Distribution Sydney area:** Widespread.**Select locations:** CC: Pennant Hills, Wahroonga (1948), Nortons Basin, Fairfield, Albion Park, Upper Kangaroo Valley. CT: Mt Tomah, Robertson.**Habitat****Habitat:** Moist sites, creeks.**Altitude:** 0–700 m **Annual rainfall:** 900–1400 mm**Typical local abundance:** Frequent.**Vegetation:** Disturbed rainforest e.g. with *Doryphora sassafras*; riverine vegetation e.g. with *Tristaniopsis laurina*, *Backhousia myrtifolia*, *Casuarina cunninghamiana*.**Substrate:** Clay soils on shale, basalt, sandy soil on alluvium, medium to high nutrients, poorly drained.**Exposure:****Conservation****Conservation:** Garden escape, naturalised near urban areas.

Geum urbanum

ROSACEAE

Life history**Growth form:** Perennial herb 50–100 cm high, with stem leaves and basal leaves.**Vegetative spread:****Longevity:****Primary juvenile period:****Flowers:** Yellow, summer.**Fruit/seed:** Head of achenes, each 3–4 mm long with a persistent hooked style elongating to 10 mm long.**Dispersal, establishment & growth:****Fire response:****Interaction with other organisms:****Distribution****Status/origin:** Native.**Botanical subregions:** NC CC SC NT CT ST; Vic., Tas., N & S temp regions.**Distribution Sydney area:** Sporadic.**Select locations:** CC: Jamberoo, CT: Mt Werong.**Habitat****Habitat:** Creekbanks.**Altitude:** 0–1000 m**Annual rainfall:** 900–1400 mm**Typical local abundance:****Vegetation:****Substrate:****Exposure:****Conservation****Conservation:** Rare, only 2 records for Sydney area, Jamberoo (1899) and Mt Werong (1971). Conservation status unknown.***Potentilla recta* ***

ROSACEAE

Life history**Growth form:** Perennial herb 10–70 cm high, with basal and stem leaves.**Vegetative spread:****Longevity:****Primary juvenile period:****Flowers:** Yellow,**Fruit/seed:** Head of achenes on a fleshy fruit.**Dispersal, establishment & growth:****Fire response:****Interaction with other organisms:****Distribution****Status/origin:** Exotic, native to Europe.**Botanical subregions:** NT CT ST CWS SWS; Tas.**Distribution Sydney area:** Tablelands.**Select locations:** CT: Lucknow (1987), Moss Vale (1946).**Habitat****Habitat:** Roadsides.**Altitude:** 700–800 m**Annual rainfall:** 800–900 mm**Typical local abundance:****Vegetation:****Substrate:****Exposure:****Conservation****Conservation:** Minor weed in cooler areas.

***Rosa bracteata* ***

ROSACEAE

Macartney Rose

Life history**Growth form:** Shrub with looping or scrambling prickly, hairy stems.**Vegetative spread:****Longevity:****Primary juvenile period:****Flowers:** White with large hairy bracts,**Fruit/seed:** Large swollen cup ('hip') 20–30 mm long, containing achenes.**Dispersal, establishment & growth:****Fire response:****Interaction with other organisms:****Distribution****Status/origin:** Exotic, native to China. Introduced as ornamental.**Botanical subregions:** NC CC NT SWS; Qld.**Distribution Sydney area:****Select locations:** CC: Cooks River (1912), Kembla Grange (1912).**Habitat****Habitat:****Altitude:** 0–200 m**Annual rainfall:** 1000–1200 mm**Typical local abundance:****Vegetation:****Substrate:****Exposure:****Conservation****Conservation:** Cultivated, represented by a few old records which may be plantings.

Recorded from Kembla Grange (1912, 1936, 1967), suggesting that occurrences may be remnants of old plantings rather than truly naturalised.

***Rosa rubiginosa* ***

ROSACEAE

Sweet Briar

Life history**Growth form:** Erect or scrambling prickly shrub; crushed foliage with sweet apple-like scent.**Vegetative spread:** No (McIntyre et al. 1995).**Longevity:****Primary juvenile period:****Flowers:** Pink, October–January, peak November.**Fruit/seed:** Large red, swollen cup ('hip') 15–20 mm long, containing achenes, November–May.**Dispersal, establishment & growth:** Diaspore: fruit, bird-dispersed (Whittet 1958). Coloniser of previously cleared land.**Fire response:****Interaction with other organisms:****Distribution****Status/origin:** Exotic, native to Europe.**Botanical subregions:** CC SC NT CT ST NWS CWS SWS NWP SWP; Vic., Tas., S.A.**Distribution Sydney area:** Western Sydney, Tablelands.**Select locations:** CC: Putty Rd, Richmond (1913), Leumeah, Liverpool, Campbelltown, Albion Park, Kowmung River. CT: Rylstone, Orange, Kanimbla Valley, Lithgow, Hill Top (1911), Moss Vale.**Habitat****Habitat:** Creekbanks, roadsides, ridges, cleared areas.**Altitude:** 0–1000 m**Annual rainfall:** 800–1000 mm**Typical local abundance:** Frequent–occasional.**Vegetation:** Roadside weed vegetation e.g. with *Tagetes minuta*; cleared land; forest e.g. with *Eucalyptus amplifolia*, *Casuarina glauca*; shrubland e.g. with *Melaleuca styphelioides*, *Olea europea* subsp. *africana*.

Substrate: Clay soils on shales, alluvium, medium nutrients. Recorded on saline sites in western NSW (Semple 1993).

Exposure:

Conservation

Conservation: Widespread, minor weed of roadsides and cleared areas, not invasive of bushland.

***Rubus bellobatus* *** (misidentified as *R. velox*)

ROSACEAE

Kittatinny Blackberry

Life history

Growth form: Large semideciduous scrambling shrub with angular canes and stout, recurved prickles.

Vegetative spread: Arching canes root at tip, spreading outwards.

Longevity:

Primary juvenile period:

Flowers:

Fruit/seed: Red-black aggregate fruit of fleshy drupelets 10–20 mm diam.

Dispersal, establishment & growth: Fleshy edible fruits or seeds dispersed by animals.

Fire response:

Interaction with other organisms:

Distribution

Status/origin: Exotic, native of N America.

Botanical subregions: CC.

Distribution Sydney area: Sporadic.

Select locations: CC: Bilpin (1998), Longneck Lagoon (1992), Lane Cove River (1991), Field of Mars Park.

Habitat

Habitat: Roadsides, riverbanks.

Altitude: 0–700 m

Annual rainfall: 800–1100 mm

Typical local abundance: Frequent.

Vegetation:

Substrate: Loamy soils on shale, medium nutrients.

Exposure:

Conservation

Conservation: Rarely naturalised (Harden 1990), though may spread to form local dense thickets. Rate of seed dispersal and establishment unknown. Weed potential unknown.

Rubus discolor * (*R. procerus*)

ROSACEAE

Blackberry

Life history

Growth form: Scrambling semideciduous shrub to 2 m high, with long prickles, and extensive rooting system.

Vegetative spread: Roots suckering, stems layering with arching canes.

Longevity: Indefinite.

Primary juvenile period:

Flowers: Pinkish, November–December. Probably pollinated by honeybees, native bees, beetles, flies and butterflies (P. Kubiak pers. comm.).

Fruit/seed: Black aggregate fruit of succulent drupelets 10–15 mm long, December–January.

Dispersal, establishment & growth: Fleshy edible fruits or seeds animal-dispersed e.g. foxes, birds.

Fire response: Probably resprouts from base and root suckers.

Interaction with other organisms:

Distribution

Status/origin: Exotic, native to Europe. Widespread weed.

Botanical subregions: CC SC CT ST; Vic., S.A., W.A.

Distribution Sydney area: Widespread.

Select locations: CC: Hunters Hill, Minto (1963), Mount Annan, Bargo. CT: Newnes Junction, Katoomba (1902), Oberon, Bundanoon.

Habitat

Habitat: Roadsides, disturbed bush, creekbanks, old gardens.

Altitude: 0–1000 m

Annual rainfall: 700–1400 mm

Typical local abundance: Frequent.

Vegetation: Shrubland e.g. with *Olea europea* subsp. *africana*.

Substrate: Clay soils on shale, gravelly alluvium.

Exposure:

Conservation

Conservation: Widespread weed of disturbed sites and creekbanks. The most common blackberry in NSW (Maguire 1993).

Rubus ellipticus *

ROSACEAE

Yellow Raspberry

Life history

Growth form: Erect shrub with arching canes to 2.5 m high, elliptical leaflets, curved prickles to 4 mm long and stiff reddish bristles on canes (Bean 1997).

Vegetative spread:

Longevity:

Primary juvenile period:

Flowers: White, July–October.

Fruit/seed: Yellow, aggregate fruit 9 mm diam., mature July–December.

Dispersal, establishment & growth:

Fire response:

Interaction with other organisms:

Distribution

Status/origin: Exotic, native to India, introduced to Australia in 1891 as *Rubus flavus*.

Botanical subregions: NC CC; Qld.

Distribution Sydney area:

Select locations: CC: Gordon (1997, L.McD.), East Killara (1994), Glenbrook Creek (1991).

Habitat

Habitat: Roadside, creekbed.

Altitude: 0–200 m

Annual rainfall: 900–1400 mm

Typical local abundance: Occasional.

Vegetation: *Eucalyptus pilularis*/*Angophora costata* open-forest in weedy creekbed e.g. with *Tradescantia fluminensis* (L.McD.). Rainforest margins; cleared or disturbed areas which formerly supported rainforest (Bean 1997).

Substrate: Sandy soil on sandstone, alluvium, shale, roadfill.

Exposure: Full sun–light shade.

Conservation

Conservation: Recently reported as localised groups of 1–2 plants. Weed potential unknown but likely to spread locally. Seed dispersal and establishment unknown.

Rubus hillii (*R. moluccanus*)

ROSACEAE

Life history

Growth form: Tall prickly scrambling shrub or climber, canes 2–4 m long.

Vegetative spread:

Longevity:

Primary juvenile period:

Flowers: Pink–red–white, October–May.

Fruit/seed: Red, aggregate fruit of succulent drupelets 12 mm diam. Mean fresh weight 200 mg (Westoby et al. 1990), falling away when ripe, December–January.

Dispersal, establishment & growth: Diaspore: fleshy edible fruits, vertebrate-adapted dispersal (Westoby et al. 1990).

Fire response:

Interaction with other organisms:

Distribution

Status/origin: Native.

Botanical subregions: NC CC CT; Qld, Vic.

Distribution Sydney area: Widespread.

Select locations: CC: Gosford, Woy Woy, Wisemans Ferry, Marramarra Creek, Erskine Creek, Bulli Pass, Macquarie Pass, Cambewarra. CT: Rylstone, Katoomba Falls, Mt Victoria, Kanangra, Robertson, Bundanoon.

Habitat

Habitat: Sheltered gullies, below waterfalls.

Altitude: 0–1000 m **Annual rainfall:** 1000–1400 mm

Typical local abundance: Frequent–occasional.

Vegetation: Rainforest and moist eucalypt forest e.g. with *Angophora costata*, *Eucalyptus punctata*.

Substrate: Shale and volcanic soils, sometimes sandstone gullies, medium nutrients. Soil pH 4.5–5.5 (R. Payne pers. comm.).

Exposure: Sheltered gullies, light shade.

Conservation

Conservation: Conservation status unknown. Reported in Bouddi NP, Brisbane Water NP, Marramarra NP, Muogamarra Nature Reserve, Ku-ring-gai Chase NP, Garigal NP, Sydney Harbour NP.

***Rubus laciniatus* ***

ROSACEAE

Cut-leaf Blackberry

Life history**Growth form:** Stout, much-branched, semideciduous erect or sprawling prickly shrub.**Vegetative spread:****Longevity:****Primary juvenile period:****Flowers:** White to pink.**Fruit/seed:** Black, aggregate fruit of succulent drupelets**Dispersal, establishment & growth:** Fleshy edible fruits or seeds probably animal-dispersed.**Fire response:****Interaction with other organisms:****Distribution****Status/origin:** Exotic, native to Europe.**Botanical subregions:** NC CC CT; Vic., S.A.**Distribution Sydney area:****Select locations:** CC: Wahroonga (1922), Mosman (1916). CT: Mt Wilson (1920).**Habitat****Habitat:****Altitude:** 0–1000 m**Annual rainfall:** 1200–1400 mm**Typical local abundance:****Vegetation:****Substrate:****Exposure:****Conservation****Conservation:** Doubtfully naturalised in NSW (Harden 1990), Sydney records probably from gardens.***Rubus leightonii* ***

ROSACEAE

Blackberry

Life history**Growth form:** Scrambling or trailing semi-deciduous shrub.**Vegetative spread:****Longevity:****Primary juvenile period:****Flowers:** White to bright pink.**Fruit/seed:** Black, aggregate fruit of succulent drupelets 15 mm long, February.**Dispersal, establishment & growth:** Fleshy edible fruits probably dispersed by animals.**Fire response:****Interaction with other organisms:****Distribution****Status/origin:** Exotic, native to Europe.**Botanical subregions:** CC CT.**Distribution Sydney area:** Southern Highlands.**Select locations:** CC: Kiama (1964), Kangaroo Valley. CT: Jenolan Caves, Kowmung River (1972), Kanangra-Boyd NP, Robertson (1918), Mittagong.**Habitat****Habitat:** Riverflats, clearings.**Altitude:** 0–1000 m**Annual rainfall:** 800–1600 mm**Typical local abundance:** Frequent.**Vegetation:** Riparian scrub e.g. with *Leptospermum* sp., *Bursaria spinosa*, *Acacia dealbata*.**Substrate:** Clay soils on basalt, limestone and gravelly alluvium, medium–high nutrients.**Exposure:****Conservation****Conservation:** Not widespread but sometimes locally common (Harden 1990).

Rubus nebulosus (*R. sp. A*, closely related to *R. moorei*)

ROSACEAE

Green-leaved Bramble, Bush Lawyer

Life history

Growth form: Tall evergreen climber with orange papery bark and prickles on leaves and flower stalks. Domatia and hairs along veins on undersides of leaflets (Bean 1997). Closely related to *Rubus moorei* (Harden 1990).

Vegetative spread:

Longevity:

Primary juvenile period:

Flowers: White, August–November.

Fruit/seed: Red fleshy fruit 10 mm diam. , mature November–February.

Dispersal, establishment & growth:

Fire response:

Interaction with other organisms:

Distribution

Status/origin: Native.

Botanical subregions: NC CC SC NT CT; Qld.

Distribution Sydney area:

Select locations: CC: Gosford, Kincumber, Kurrajong Heights, Royal NP, Otford, Mt Kembla, Cambewarra, Minnamurra Falls. CT: Robertson, Burrawang.

Habitat

Habitat: Gullies, gorges.

Altitude: 0–600 m

Annual rainfall: 1200–1600 mm

Typical local abundance: Occasional.

Vegetation: Warm temperate–cool temperate rainforest e.g. with *Doryphora sassafras*, *Ceratopetalum apetalum*, *Eupomatia laurina*; swamp forest e.g. with *Melaleuca biconvexa*.

Substrate: Clay soils on basalt, sandy soils on alluvium, sandstone.

Exposure:

Conservation

Conservation: Conservation status unknown.

Rubus parvifolius

ROSACEAE

Native Raspberry

Life history**Growth form:** Scrambling shrub with stems to 1 m long; hybridizes with *R. hillii*.**Vegetative spread:** Yes.**Longevity:** Indefinite.**Primary juvenile period:****Flowers:** Red or pink, recorded for all months of the year (Bean 1997).**Fruit/seed:** Red, aggregate fruit 10 mm diam., of succulent drupelets, mature November–April.

Fruit weight 285 mg, with c. 14 seeds per fruit (extra data on seed & pulp characteristics in French 1991).

Dispersal, establishment & growth: Diaspore: attractive fleshy edible fruits, vertebrate-adapted dispersal (Westoby et al. 1990).**Fire response:** Probably resprouts.**Interaction with other organisms:** Adult jewel beetles *Alcinous nodosus* observed during early summer on leaves; larvae feed in the stems and later pupate in a hollowed out chamber (Hawkeswood 1987).**Distribution****Status/origin:** Native.**Botanical subregions:** NC CC SC NT CT ST NWS CWS; Qld, Vic., Tas., S.A., E Asia.**Distribution Sydney area:** Widespread.**Select locations:** CC: Wisemans Ferry, Beecroft, Razorback, Campbelltown, Minnamurra, Shellharbour, Barrengarry. CT: Orange, Jenolan Caves, Bundanoon.**Habitat****Habitat:** Levee banks.**Altitude:** 0–800 m**Annual rainfall:** above 700 mm**Typical local abundance:** Frequent.**Vegetation:** Riverflat forest e.g. with *Tristaniopsis laurina*, and dry rainforest.**Substrate:** Sandy alluvial soils and clay soils from shale, basalt, medium–high nutrients.**Exposure:** Mid-shade.**Conservation****Conservation:** Conservation status unknown. Reported in Brisbane Water NP, Marramarra NP, Dalrymple Hay Nature Reserve.**Rubus radula ***

ROSACEAE

Blackberry

Life history**Growth form:** Scrambling semideciduous shrub with arching or trailing stems tips that root when in contact with the ground.**Vegetative spread:** Stems tips root when in contact with the ground.**Longevity:****Primary juvenile period:****Flowers:** White or pinkish, December.**Fruit/seed:** Black aggregate fruit of succulent drupelets**Dispersal, establishment & growth:** Fleshy edible fruits or seeds probably dispersed by animals.**Fire response:****Interaction with other organisms:****Distribution****Status/origin:** Exotic, native to Europe.**Botanical subregions:** CC.**Distribution Sydney area:****Select locations:** CC: Bargo (1953).

	Habitat
Habitat:	
Altitude: 400 m	Annual rainfall: 900 mm
Typical local abundance:	
Vegetation:	
Substrate:	
Exposure:	
	Conservation
Conservation: Not widespread (Harden 1990), only Sydney record is Bargo (1953).	

***Rubus roribaccus* ***

ROSACEAE

North American Dewberry

	Life history
Growth form: Vigorous semideciduous climber with prickles, with low, spreading habit.	
Vegetative spread:	
Longevity:	
Primary juvenile period:	
Flowers: White, September–October.	
Fruit/seed: Purple to black oblong fleshy fruit.	
Dispersal, establishment & growth: Attractive fleshy edible fruits or seeds dispersed by animals.	
Fire response:	
Interaction with other organisms:	
	Distribution
Status/origin: Exotic, native to N America.	
Botanical subregions: CC.	
Distribution Sydney area: Mainly Sydney suburbs.	
Select locations: CC: Yarramalong (1994), Cheltenham (1946), Killara, Lane Cove River, Wentworthville (1957).	
	Habitat
Habitat: Wasteland, disturbed area.	
Altitude: 0–200 m	Annual rainfall: 900–1400 mm
Typical local abundance: Occasional.	
Vegetation: Exotic weeds.	
Substrate: Medium nutrient soils on alluvium, shale.	
Exposure: Full sun.	
	Conservation
Conservation: Not widely naturalised (Harden 1990). Weed potential unknown.	

Rubus rosifolius* var. *commersonii

ROSACEAE

Rose-leaf Bramble

Life history

Growth form: Shrub with trailing glandular-hairy stems to 2 m long and stout curved to almost straight prickles. Distinguished from *R. rosifolius* var. *rosifolius* by the number of petals (Bean 1997).

Vegetative spread:

Longevity:

Primary juvenile period:

Flowers: White, with 9–13 petals, June to December.

Fruit/seed: Egg-shaped red fleshy fruit 20 mm long, edible but insipid, mature July to December.

Dispersal, establishment & growth:

Fire response:

Interaction with other organisms:

Distribution

Status/origin: Native.

Botanical subregions: NC CC; Qld, Java, Mauritius, China, Brazil.

Distribution Sydney area: Sporadic.

Select locations: CC: Point Clare (1897), Yellow Rock (1942).

Habitat

Habitat:

Altitude: 0–300 m **Annual rainfall:** 1200 mm

Typical local abundance:

Vegetation: Rainforest margins; wet eucalypt forest

Substrate:

Exposure:

Conservation

Conservation: Rare, reported from only 2 locations in Sydney area. Last recorded in 1942. Kiama is southern geographical limit (Harden 2000).

Rubus rosifolius* var. *rosifolius

ROSACEAE

Rose-leaf Bramble

Life history

Growth form: Shrub with trailing glandular-hairy stems to 2 m long and stout curved to almost straight prickles. Distinguished from *R. rosifolius* var. *commersonii* by the number of petals (Bean 1997).

Vegetative spread:

Longevity:

Primary juvenile period:

Flowers: White, with 5 petals, June to December.

Fruit/seed: Egg-shaped red fleshy fruit 20 mm long, edible but insipid, mature July to December.

Dispersal, establishment & growth:

Fire response:

Interaction with other organisms:

Distribution

Status/origin: Native.

Botanical subregions: NC CC SC NT CT; Qld, Vic., SE Asia, N.G.

Distribution Sydney area: Widespread on coast and ranges.

Select locations: CC: Audley, Albion Park. CT: Mount Wilson.

Habitat

Habitat: Creeks, often in disturbed areas.

Altitude: 0–1000 m **Annual rainfall:** 1000–1400 mm

Typical local abundance: Frequent.

Vegetation: Rainforest margins; wet eucalypt forest

Substrate: Probably clayey soils, medium nutrients.

Exposure:

Conservation

Conservation: Reported in Royal NP. Conservation status unknown.

***Rubus ulmifolius* ***

ROSACEAE

Blackberry

Life history

Growth form: Semideciduous scrambling shrub with strong hooked prickles. Hybrids are widespread, extensively naturalised and often quite variable; crosses with *R. vestitus* and *R. discolor* are common (Harden 1990).

Vegetative spread: By layering of arching canes.

Longevity:

Primary juvenile period:

Flowers: Pink, December–February.

Fruit/seed: Aggregate black fleshy fruit, often imperfectly formed, February. Sweet and lacking acidity but rather insipid.

Dispersal, establishment & growth: Diaspore: fruit, animal-dispersed.

Fire response:

Interaction with other organisms:

Distribution

Status/origin: Naturalised exotic, native to Europe.

Botanical subregions: CC SC NT CT ST SWP; Vic.

Distribution Sydney area: Tablelands.

Select locations: CC: Albion Park (1949). CT: Orange, Evans Plains (1976), Tuglow Caves, Robertson (1917).

Habitat

Habitat: Riverflats, old pastures.

Altitude: 600–1000 m **Annual rainfall:** 600–1600 mm

Typical local abundance: Frequent.

Vegetation: Riparian scrub e.g. with *Leptospermum* sp., *Acacia dealbata*, *Bursaria spinosa*.

Substrate: Clay soils on shales, gravelly alluvium, medium nutrients.

Exposure:

Conservation

Conservation: Conservation impact unknown.

***Rubus vestitus* ***

ROSACEAE

Blackberry

Life history

Growth form: Semideciduous scrambling shrub with red-brown, angled canes and small prickles.

Vegetative spread: By layering of arching canes.

Longevity:

Primary juvenile period:

Flowers: Deep to pale pink.

Fruit/seed: Aggregate black fleshy fruit 10 mm long

Dispersal, establishment & growth: Diaspore: fruit, animal-dispersed.

Fire response:

Interaction with other organisms:

Distribution

Status/origin: Exotic, native to Europe.

Botanical subregions: CT ST; Vic.

Distribution Sydney area: Mount Tomah.

Select locations: CT: Mount Tomah (1952, 1968), Newnes Junction (1975).

Habitat

Habitat: Remnant forest, roadsides.

Altitude: 1000 m **Annual rainfall:** 1200 mm

Typical local abundance: Frequent.

Vegetation: Moist open-forest e.g. with *Eucalyptus fastigata*, *Acacia melanoxylon*.

Substrate: Clay soils on basalt, high nutrients.

Exposure:

Conservation

Conservation: Apparently locally naturalised and common over quite a large area (on Mount Tomah South, 1968). Situation now unknown.

Asperula conferta

RUBIACEAE

Common Woodruff

Life history**Growth form:** Erect to decumbent perennial herb, with stems to 20 cm long.**Vegetative spread:** Yes (McIntyre et al. 1995), rhizomatous.**Longevity:****Primary juvenile period:****Flowers:** White, October–December.**Fruit/seed:** Black-brown fleshy fruit 3–4 mm long, December–January.**Dispersal, establishment & growth:** No particular mechanism for dispersal (McIntyre et al. 1995).**Fire response:****Interaction with other organisms:** Palatable to rabbits (Leigh et al. 1987).**Distribution****Status/origin:** Native.**Botanical subregions:** NC CC SC NT CT ST NWS CWS SWS NWP SWP NFWP; Qld, Vic., N.T., S.A.**Distribution Sydney area:****Select locations:** CC: St Marys, Marayong, Silverdale, Mount Annan, Camden Park.

CT: Towinhingy, Orange Wyagdon, Limekilns, Bathurst, Moss Vale.

Habitat**Habitat:** Open areas.**Altitude:** 0–1000 m **Annual rainfall:** 600–1000 mm**Typical local abundance:** Frequent.**Vegetation:** Eucalypt open-forest, woodland, grassland e.g. with *Themeda australis*.**Substrate:** Clay soils on shale, basalt, slate, medium nutrients, well-drained.**Exposure:****Conservation****Conservation:** Conserved in Western Sydney (James et al. 1999), conservation elsewhere unknown.***Asperula gunnii***

RUBIACEAE

Mountain Woodruff

Life history**Growth form:** Ascending to decumbent perennial herb, with stems to 20 cm long, conspicuously ridged.**Vegetative spread:****Longevity:****Primary juvenile period:****Flowers:** White, October–March.**Fruit/seed:** Black fleshy fruit 1–2 mm long.**Dispersal, establishment & growth:****Fire response:****Interaction with other organisms:****Distribution****Status/origin:** Native.**Botanical subregions:** NC CT ST; Vic., Tas., S.A.**Distribution Sydney area:** Upper Blue Mountains, Southern Highlands.**Select locations:** CT: Lithgow, Leura, Boyd Plateau, Mt Werong, Wingecarribee Swamp.**Habitat****Habitat:** Damp sites.**Altitude:** 700–1200 m **Annual rainfall:** 1100–1600 mm**Typical local abundance:** Frequent.**Vegetation:** Montane peatland, sedgeland e.g. with *Carex appressa*, *Carex gaudichaudeana*, *Xyris ustulata*.**Substrate:** Peaty soils, low nutrients, poorly-drained.**Exposure:****Conservation****Conservation:** Conservation status unknown.

Asperula scoparia

RUBIACEAE

Prickly Woodruff

Life history

Growth form: Ascending or decumbent perennial herb, with hairy stems to 15 cm long, forming loose mats.

Vegetative spread:

Longevity:

Primary juvenile period:

Flowers: White, with male and female flowers, September–November.

Fruit/seed: Dark brown fleshy fruit 2 mm long.

Dispersal, establishment & growth:

Fire response:

Interaction with other organisms:

Distribution

Status/origin: Native.

Botanical subregions: NT CT ST: Vic., Tas., S.A.

Distribution Sydney area: Western Blue Mountains, Southern Highlands.

Select locations: CT: Orange, Mt Cameron, Mt Wilson, Jenolan SF, Hampton, Kanangra, Bindook, Robertson.

Habitat

Habitat: Open-forest, moist places.

Altitude: 700–1200 m **Annual rainfall:** 1100–1600 mm

Typical local abundance: Frequent–occasional.

Vegetation: Open-forest e.g. with *Eucalyptus sieberi*, *E. oreades*, *E. blaxlandii*, *E. ovata*, *E. radiata*, *E. viminalis*.

Substrate: Clay soil on basalt, shales, medium to high nutrients.

Exposure: Light shade to mid shade.

Conservation

Conservation:

Canthium coprosmoides

RUBIACEAE

Coast Canthium

Life history**Growth form:** Small tree or shrub to 10 m high, often with domatia in leaf axils.**Vegetative spread:****Longevity:****Primary juvenile period:****Flowers:** White, tubular. January–February.**Fruit/seed:** Red fleshy fruit 10 mm diam.**Dispersal, establishment & growth:** Fleshy fruit adapted for vertebrate dispersal (Westoby et al. 1990).**Fire response:** Resprouts from base (L.McD).**Interaction with other organisms:** Larval food plant of bee-hawk moth *Cephonodes kingii* (Common 1990). Poisonous to stock (Hurst 1942).**Distribution****Status/origin:** Native.**Botanical subregions:** NC CC NT; Qld.**Distribution Sydney area:** Coast, north from Gerringong.**Select locations:** CC: Parnell (Yengo NP), Mona Vale, Otford, Bass Point, Minnamurra Falls, Foxground.**Habitat****Habitat:** Gullies, steep ocean foreshores.**Altitude:** 0–400 m **Annual rainfall:** 1000–1600 mm**Typical local abundance:** Frequent–occasional.**Vegetation:** Littoral rainforest e.g. with *Livistona australis*, *Eucalyptus botryoides*; subtropical and warm temperate rainforest e.g. with *Ceratopetalum apetalum*, *Tristaniopsis laurina*, *Doryphora sassafras*, moist eucalypt forest.**Substrate:** Sandy or clay soils on shales, medium nutrients, well-drained. Soil pH 4.5–5.5 (R. Payne pers. comm.).**Exposure:** Sheltered.**Conservation****Conservation:** Foxground is southern geographical limit. Conservation status unknown. Reported in Yengo NP, Wambina NR.**Coprosma hirtella**

RUBIACEAE

Life history**Growth form:** Erect shrub to 2 m high, with rigid branches.**Vegetative spread:****Longevity:****Primary juvenile period:****Flowers:** Male and female flowers in separate clusters.**Fruit/seed:** Orange-red fleshy fruit 8–10 mm wide, October.**Dispersal, establishment & growth:****Fire response:****Interaction with other organisms:** Grazed by stock.**Distribution****Status/origin:** Native.**Botanical subregions:** SC NT CT ST; Vic., Tas.**Distribution Sydney area:** Tablelands.**Select locations:** CT: Nullo Mountain, Mt Coricudgy, Sunny Corner, Browns Gap, Jenolan Caves, Blackheath, Leura, Mt Werong, Wombeyan Caves Road.**Habitat****Habitat:** Rocky hillsides.**Altitude:** 700–1200 m **Annual rainfall:** 900–1400 mm**Typical local abundance:** Frequent–occasional.

Vegetation: Woodland e.g. with *Eucalyptus viminalis*, *E. pauciflora*.

Substrate: Sandy soil on granite, sandstone, basalt.

Exposure:

Conservation

Conservation: Conservation status unknown, reported from Leura–Mt Victoria area 1896–1914 but not reported since.

Coprosma quadrifida
RUBIACEAE

Prickly Currant Bush

Life history

Growth form: Slender shrub 2–4 m high, with hairy, often spinescent branches.

Vegetative spread:

Longevity:

Primary juvenile period:

Flowers: Separate male and female flowers, white, September–November.

Fruit/seed: Red fleshy fruit 5 mm long (fruit weight 44 mg), with 2 seeds per fruit (extra data on seed & pulp characteristics in French 1991), December–February.

Dispersal, establishment & growth:

Fire response:

Interaction with other organisms: Berries eaten by Yellow-faced Honeyeater *Lichenostomus chrysops* (Barker & Vestjens 1990). Larval food plant of hawk moth *Cizara ardenia* (Common 1990).

Distribution

Status/origin: Native.

Botanical subregions: NC CC SC NT CT ST; Vic., Tas.

Distribution Sydney area:

Select locations: CC: Bulli, Cordeaux Dam, Mt Kembla, Brogers Creek. CT: Mt Coricudgy, Orange, Mt Wilson, Mount Tomah, Mt Victoria, Wombeyan Caves, Bundanoon.

Habitat

Habitat: Stream banks, gullies.

Altitude: 0–1000 m

Annual rainfall: 900–1400 mm

Typical local abundance: Frequent–occasional.

Vegetation: Rainforest e.g. with *Doryphora sassafras*, *Acacia melanoxylon*, *Hedycarya angustifolia*; gully forest e.g. with *Eucalyptus fastigata*; open-forest e.g. with *Eucalyptus dalrympleana*, *E. pauciflora*, *E. dives*; riparian scrub e.g. with *Backhousia myrtifolia*.

Substrate: Clay soils on basalt, Devonian sediments, gravelly alluvium, medium to high nutrients.

Exposure:

Conservation

Conservation: Conservation status unknown.

Coprosma repens *

RUBIACEAE

Looking-glass Bush

Life history**Growth form:** Prostrate shrub to small tree to 8 m high.**Vegetative spread:****Longevity:****Primary juvenile period:****Flowers:** September–early November (Price).**Fruit/seed:** Orange-red fleshy fruit 10 mm long, December–March.**Dispersal, establishment & growth:** Bird and animal-dispersed (Carr et al 1992), possibly seawater-dispersed.**Fire response:****Interaction with other organisms:** Larval food plant of hawk moths *Macroglossum hirundo* subsp. *errans* and *Cizara ardenia* (Common 1990).**Distribution****Status/origin:** Exotic, native to New Zealand, probably introduced as ornamental.**Botanical subregions:** CC SC; Vic., Tas., S.A.**Distribution Sydney area:** Coast south of Broken Bay.**Select locations:** CC: Curl Curl, Harbord Beach (1963), Bass Point, Stanwell Park (1955), Gerringong Beach (1941), Kiama, Stack Island –Minnamurra River (1939).**Habitat****Habitat:** Headlands, cliff faces near the sea.**Altitude:** 0–200 m **Annual rainfall:** 1200–1600 mm**Typical local abundance:** Frequent.**Vegetation:** Scrub, remnant rainforest.**Substrate:** Clay soil on latite, sandstone cliffs, rock crevices.**Exposure:****Conservation****Conservation:** Naturalised along coast south of Broken Bay, invading undisturbed native vegetation. Appears to have established in 1950s–1970s.**Galium aparine** *

RUBIACEAE

Goosegrass, Cleavers

Life history**Growth form:** Scrambling or twining herb, with prickles.**Vegetative spread:** No.**Longevity:** Less than one year.**Primary juvenile period:** Less than one year.**Flowers:** Whitish, November.**Fruit/seed:** Dry fruit 3–5 mm long, breaks into 2 1-seeded segments, November.**Dispersal, establishment & growth:** Diaspore: fruit, probably dispersed by adhesion to clothing (P. Kubiak pers. comm.).**Fire response:****Interaction with other organisms:****Distribution****Status/origin:** Exotic, native to Europe.**Botanical subregions:** NC CC SC CT ST NWS SWS SWP NFWP; Qld, Vic., Tas., N.T., S.A.**Distribution Sydney area:** Mainly Tablelands.**Select locations:** CC: Flemington Saleyard (1968). CT: Jenolan Caves (1967), Junction Reefs (1991), East Kangaloon–Robertson (1987).**Habitat****Habitat:** Disturbed sites, pastures.**Altitude:** 0–800 m **Annual rainfall:** 800–1600 mm**Typical local abundance:** Frequent.**Vegetation:** Disturbed sites e.g. with remnant *Eucalyptus melliodora*, pastures.**Substrate:** Rock rubble and subsoil.**Exposure:****Conservation****Conservation:** Reported naturalised on Tablelands since 1960s. Only record for coast is a single plant at Flemington Saleyard, probably introduced with stock, and now extinct there.

Galium binifolium

RUBIACEAE

Life history**Growth form:** Straggling or clambering annual or biennial herb with stems 20–50 cm long.**Vegetative spread:** No.**Longevity:** Short.**Primary juvenile period:****Flowers:** Cream to yellowish, often with a reddish or purplish tinge, September–January.**Fruit/seed:** Dry fruit 1.5 mm long, breaks into 2, 1-seeded segments, November–May. Seed weight 0.5 mg (Westoby et al. 1990).**Dispersal, establishment & growth:** Diaspore: seed, with no special morphology for dispersal (Westoby et al. 1990).**Fire response:****Interaction with other organisms:****Distribution****Status/origin:** Native.**Botanical subregions:** NC CC SC NT CT NWS CWS; Vic., S.A.**Distribution Sydney area:** Widespread.**Select locations:** CC: Parnell, Drews Creek, Pymble, Bilpin, Ingleburn, Mulgoa, The Oaks, Mount Annan, Albion Park. CT: Newnes, Bindook, Katoomba.**Habitat****Habitat:** Slopes, near creeks, entangled in herbage or trailing over rocks.**Altitude:** 0–1000 m **Annual rainfall:** 700–1400 mm**Typical local abundance:** Rare–occasional.**Vegetation:** Open-forest e.g. with *Eucalyptus saligna*; woodland e.g. with *Eucalyptus sieberi*, *E. blaxlandii*.**Substrate:** Clay soils on Wianamatta Shale, basalt, sandstone, medium nutrients.**Exposure:****Conservation****Conservation:** Vulnerable in Western Sydney (James et al. 1999). Conservation status elsewhere unknown. Reported in Yengo NP, Brisbane Water NP, Ku-ring-gai Chase NP.***Galium ciliare***

RUBIACEAE

Life history**Growth form:** Prostrate, trailing herb with stems 10–30 cm long.**Vegetative spread:** Yes (McIntyre et al. 1995), rhizomatous.**Longevity:****Primary juvenile period:****Flowers:** Yellow to cream, November.**Fruit/seed:** Dry fruit 1 mm long, breaks into 2 1-seeded segments.**Dispersal, establishment & growth:** No particular mechanism for dispersal (McIntyre et al. 1995).**Fire response:****Interaction with other organisms:****Distribution****Status/origin:** Native.**Botanical subregions:** NC NT CT ST; Qld, Vic., Tas.**Distribution Sydney area:** Upper Blue Mountains.**Select locations:** CT: Mt Tomah, Mt Wilson, Jenolan River, Hartley Vale.**Habitat****Habitat:****Altitude:** 700–1000 m **Annual rainfall:** 900–1400 mm**Typical local abundance:** Frequent.**Vegetation:** Grassland and woodland e.g. with *Eucalyptus mannifera*, *E. radiata*, *E. piperita*.**Substrate:** Basaltic soils or Permian sediments, medium to high nutrients.**Exposure:****Conservation****Conservation:** Conservation status unknown.

Galium gaudichaudii

RUBIACEAE

Rough Bedstraw

Life history

Growth form: Straggling to trailing perennial herb with numerous erect stems to 30 cm long.

Vegetative spread: Root system with strong primary root and weak development of nodal roots up to 5 cm from the rootstock.

Longevity:

Primary juvenile period:

Flowers: Cream, purplish in bud, September–November.

Fruit/seed: Dry fruit 1–2 mm long, breaks into 2, 1-seeded segments 1.5 mm long, mature September–November.

Dispersal, establishment & growth: No particular mechanism for dispersal (McIntyre et al. 1995).

Fire response: Possibly resprouts.

Interaction with other organisms: Palatable to rabbits (Leigh et al. 1987).

Distribution

Status/origin: Native.

Botanical subregions: CC NT CT ST NWS CWS SWS NWP SWP; Qld, Vic., Tas., N.T., S.A., W.A.

Distribution Sydney area: Cumberland Plain, Western Blue Mountains.

Select locations: CC: Watagan SF, Vineyard, St Marys, Glenfield, Bringelly. CT: Limekilns, Mt Canobolas, Capertee, Glen Davis, Kowmung, Abercrombie Caves (McGillivray, 1983), Wombeyan Caves.

Habitat

Habitat: Often on steep hillsides, in grassland.

Altitude: 0–1000 m **Annual rainfall:** 700–1200 mm

Typical local abundance: Occasional–rare.

Vegetation: Eucalypt open-forest, woodland with grassy understorey e.g. with *Eucalyptus moluccana*, *E. tereticornis*, *E. rossii*.

Substrate: Usually occurring on relatively dry sites. Gravelly clay or rocky soils from Wianamatta Shale, limestone, sandstone or basalt, medium to high nutrients, well-drained.

Exposure: Sheltered, mid-shade.

Conservation

Conservation: Vulnerable in Western Sydney (James et al. 1999). Conservation status elsewhere unknown.

Galium liratum

RUBIACEAE

Life history

Growth form: Creeping or procumbent herb with several stems 15–30 cm long.

Vegetative spread:

Longevity: Short.

Primary juvenile period:

Flowers: White, August.

Fruit/seed: Dry fruit 1.3 mm long, breaks into 2 1-seeded segments, January–April.

Dispersal, establishment & growth:

Fire response:

Interaction with other organisms:

Distribution

Status/origin: Native.

Botanical subregions: CC SC NT CT ST CWS; Vic.

Distribution Sydney area:

Select locations: CC: Putty Road, Muogamurra NR, Armour Range, Euroka Creek, Glenbrook, Nortons Basin, Douglas Park.

Habitat

Habitat: Moist rocky sites, along creeks.

Altitude: 0–400 m **Annual rainfall:** 900–1000 mm

Typical local abundance:

Vegetation: Eucalypt open-forest or woodland, marshy meadow e.g. with *Pericaria*, *Leptospermum polygalifolium*.

Substrate: Sandstone or granite rocks, slate, low nutrients.

Exposure: Mid shade.

Conservation

Conservation: Conservation status unknown. Reported in Muogamarra Nature Reserve.

Galium migrans**RUBIACEAE****Life history**

Growth form: Prostrate to decumbent perennial herb, with numerous stems 20–40 cm long.

Vegetative spread:

Longevity:

Primary juvenile period:

Flowers: Cream to yellowish or white, October.

Fruit/seed: Dry fruit 1–2 mm long, breaks into 2 1-seeded segments, March.

Dispersal, establishment & growth:

Fire response:

Interaction with other organisms:

Distribution

Status/origin: Native.

Botanical subregions: NC CC SC NT; Qld, Vic., S.A., W.A.

Distribution Sydney area:

Select locations: CC: Nortons Basin, Razorback, Albion Park, Cobbitty. CT: Mt Towingingy, Wyagdon, Winburndale NR, Jenolan Caves, Abercrombie Caves.

Habitat

Habitat: Rocky crevices, near creeks.

Altitude: 0–1000 m **Annual rainfall:** 700–1000 mm

Typical local abundance: Frequent–occasional.

Vegetation: Dry rainforest e.g. with *Streblus brunonianus*, *Notelaea* sp.

Substrate: Rocky crevices on limestone, granite, occasionally sandstone.

Exposure:

Conservation

Conservation: Conservation status unknown. Reported in Winburndale Nature Reserve.

***Galium murale* ***

RUBIACEAE

Small Bedstraw

Life history

Growth form: Small prostrate to ascending herb, with thread-like stems less than 12 cm long.

Vegetative spread:

Longevity: Less than one year.

Primary juvenile period: Less than one year.

Flowers: White to yellowish green, October.

Fruit/seed: Dry fruit 1–1.5 mm long, breaks into 2 1-seeded segments.

Dispersal, establishment & growth:**Fire response:****Interaction with other organisms:****Distribution**

Status/origin: Exotic, native to Europe.

Botanical subregions: CC CT ST NWS CWS SWS NWP NFWP; Vic., N.T., S.A., W.A.

Distribution Sydney area:

Select locations: CC: Albion Park (1948). CT: Bathurst (1965).

Habitat

Habitat: Moist sites, pastures, rocky hillsides.

Altitude: 0–700 m

Annual rainfall: 600–1200 mm

Typical local abundance: Frequent.

Vegetation: Eucalypt open-forest and woodland.

Substrate:**Exposure:****Conservation**

Conservation: Sporadically naturalised, with few Sydney records.

Galium propinquum

RUBIACEAE

Maori Bedstraw

Life history

Growth form: Prostrate to weakly decumbent herb with stems to 30 cm long and well-developed slender rhizomes.

Vegetative spread: Yes (McIntyre et al. 1995), rhizomatous.

Longevity:**Primary juvenile period:**

Flowers: White to cream, October–December.

Fruit/seed: Dry fruit 1 mm long, breaks into 2 1-seeded segments, January–March. Seed weight 0.5 mg (Westoby et al. 1990).

Dispersal, establishment & growth: Diaspore: seed, with tiny hooks presumably for dispersal by attachment to animals (Westoby et al. 1990).

Fire response:**Interaction with other organisms:****Distribution**

Status/origin: Native.

Botanical subregions: NC CC SC NT CT ST SWS; Qld, Vic., N.Z.

Distribution Sydney area:

Select locations: CC: Culoul Range, Wahroonga, Razorback, The Oaks, Springwood, Mt Keira. CT: Mt Tomah, Hartley Vale, Katoomba, Mt Werong, Fitzroy Falls.

Habitat

Habitat: Moist shady sites, hillsides, creekbanks.

Altitude: 0–1000 m

Annual rainfall: 700–1400 mm

Typical local abundance: Frequent–occasional.

Vegetation: Rainforest or moist sclerophyll forest e.g. with *Syncarpia glomulifera*, *Eucalyptus pilularis*, *Backhousia myrtifolia*, *Acmena smithii*, *Eucalyptus obliqua*.

Substrate: Clay soil on basalt, shale, alluvium, medium to high nutrients.

Exposure:**Conservation**

Conservation: Conservation status unknown. Reported in Brisbane Water NP, Muogamarra Nature Reserve.

Galium tricornutum* **RUBIACEAE****Life history****Growth form:** Scrambling herb, with stoutish stems to 1 m long.**Vegetative spread:** No.**Longevity:** Less than one year.**Primary juvenile period:** Less than one year.**Flowers:** Whitish.**Fruit/seed:** Dry fruit 3–5 mm wide, breaks into 2, 1-seeded segments.**Dispersal, establishment & growth:****Fire response:****Interaction with other organisms:****Distribution****Status/origin:** Exotic, native to Europe and Asia.**Botanical subregions:** NC CC CT CWS; Qld, Vic., S.A., W.A.**Distribution Sydney area:****Select locations:****Habitat****Habitat:****Altitude:****Annual rainfall:****Typical local abundance:****Vegetation:****Substrate:****Exposure:****Conservation****Conservation:** Reported as a weed of cultivated land and rubbish tips in NSW but no records of this being naturalised in Sydney area.

Morinda jasminoides

RUBIACEAE

Life history

Growth form: Woody climber or scrambling shrub, with opposite leaves and often, pit-like pouches (domatia) in vein axils.

Vegetative spread: No.

Longevity:

Primary juvenile period:

Flowers: Cream, orange, white–purplish, October–December, peak November.

Fruit/seed: Orange, multiple fleshy fruit 6–15 mm diam., mean fresh weight 300 mg, February–June.

Dispersal, establishment & growth: Diaspore: orange fleshy fruit, vertebrate-adapted dispersal (Westoby et al. 1990). Fruit reported from Currawong pellets (Buchanan 1989a). Fruit eaten by Grey-headed Flying Fox *Pteropus poliocephalus* (Eby 1995).

Fire response: Resprouted after high intensity fire (1/1994) at Lane Cove, fruiting in less than 2 years (P. Kubiak pers. comm.).

Interaction with other organisms: Fruit eaten by Grey-headed Flying Fox *Pteropus poliocephalus* (Eby 1995). Larval food plant of hawk moths *Macroglossum hirundo* subsp. *errans* and *Cizara ardenia* (Common 1990). Pollen gathered by honeybee (P. Kubiak pers. comm.).

Distribution

Status/origin: Native.

Botanical subregions: NC CC SC NT CT; Qld, Vic.

Distribution Sydney area: Widespread, Coast and lower mountains.

Select locations: CC: Mangrove Creek, Sackville, Barrenjoey, Ryde, Kogarah, Campbelltown, Audley, Mt Kembla, Shellharbour, Glenbrook. CT: Robertson.

Habitat

Habitat: Creek banks, gullies.

Altitude: 0–800 m

Annual rainfall: 800–1400 mm

Typical local abundance: Occasional.

Vegetation: Moist rainforest e.g. with *Doryphora sassafras*, *Ceratopetum apetalum*, *Acmena smithii*; dry rainforest e.g. with *Streblus brunonianus*; riparian scrub e.g. with *Acmena smithii*, *Rapanea variabilis*; moist eucalypt forest e.g. with *Eucalyptus pipularis*.

Substrate: Clay soils on basalt, volcanic necks, shales, alluvium, medium to high nutrients.

Exposure: Sheltered sites, light shade–mid-shade.

Conservation

Conservation: Probably adequately conserved. Reported in Bouddi NP, Brisbane Water NP, Muogamarra Nature Reserve, Ku-ring-gai Chase NP, Garigal NP, Sydney Harbour NP.

Opercularia aspera

RUBIACEAE

Coarse Stinkweed

Life history

Growth form: Prostrate to erect subshrub to 2 m high, with foetid odour when crushed or picked.

Vegetative spread: No.

Longevity:

Primary juvenile period:

Flowers: September–October.

Fruit/seed: Compound capsule 5–10 mm diameter, releasing seeds at maturity (most of the year). Seed weight 0.5 mg (Westoby et al. 1990).

Dispersal, establishment & growth: Diaspore: seed, ant-adapted food body for dispersal (Westoby et al. 1990). Plants to 2 m high on better soils, less than 0.5 m on sandstone soils. Coloniser.

Fire response: Resprouted after high intensity fire (1/1994) at Lane Cove and Narrabeen, with some plants fruiting in less than 33 weeks (P. Kubiak pers. comm.).

Interaction with other organisms: A few plants eaten by rabbits (P. Kubiak pers. comm.).

Distribution

Status/origin: Native.

Botanical subregions: NC CC SC NT CT ST NWS CWS; Qld, Vic.

Distribution Sydney area: Widespread.

Select locations: CC: Howes Valley, Colo River, Gunderman, Hornsby, Farm Cove (1902), Kurnell, Doonside, Elderslie, Thirlmere, O'Hares Creek, Berry. CT: Mt Coricudgy.

Habitat

Habitat: Sandy creekbanks and gullies.

Altitude: 0–800 m **Annual rainfall:** above 700 mm

Typical local abundance: Frequent–occasional.

Vegetation: Open-forest and riparian scrub e.g. with *Tristaniopsis laurina*, *Kunzea ambigua*.

Substrate: Mainly sandy soil or loose sandstone, low nutrients.

Exposure: Sheltered; deep–mid shade.

Conservation

Conservation: Conservation status unknown.

Opercularia diphylla

RUBIACEAE

Life history

Growth form: Small weak procumbent herb, with short rootstock.

Vegetative spread:

Longevity:

Primary juvenile period:

Flowers: August–February.

Fruit/seed: Compound capsule 3–8 mm diam., November–May.

Dispersal, establishment & growth: Soil-stored seedbank (Fox 1988).

Fire response: Probably resprouts (Herbarium specimen).

Interaction with other organisms:

Distribution

Status/origin: Native.

Botanical subregions: NC CC SC CT NWS CWS; Qld.

Distribution Sydney area: Mainly Western Sydney.

Select locations: CC: Drews Creek, Maralya, Llandilo, Duck River, Liverpool, Macquarie Fields, Silverdale, Oakdale, Thirlmere Lakes, Appin, Mt Keira, Kowmung Valley. CT: Mittagong.

Habitat

Habitat:

Altitude: 0–700 m **Annual rainfall:** 700–1000 mm

Typical local abundance: Rare–occasional.

Vegetation: Woodland e.g. with *Eucalyptus tereticornis*, *E. crebra*, *E. fibrosa*; open-forest e.g. with *Eucalyptus mannifera*.

Substrate: Clay soils on Wianamatta Shale, Tertiary alluvium, quartzite, medium nutrients.

Exposure:

Conservation

Conservation: Conservation status unknown. Reported in Yengo NP.

Opercularia hispida

RUBIACEAE

Hairy Stinkweed

Life history**Growth form:** Prostrate to erect herb, with numerous stems arising from a central taproot.**Vegetative spread:** No (McIntyre et al. 1995).**Longevity:****Primary juvenile period:****Flowers:** September–February.**Fruit/seed:** Compound capsule 4–10 mm diam., seeds wrinkled, September–May.**Dispersal, establishment & growth:** No particular morphology for dispersal (McIntyre et al. 1995).**Fire response:****Interaction with other organisms:****Distribution****Status/origin:** Native.**Botanical subregions:** NC CC SC NT CT ST NWS CWS SWS; Qld, Vic.**Distribution Sydney area:****Select locations:** CC: Culoul Range, Glen Davis, Wisemans Ferry, Brooklyn, Turramurra, Ingleburn, Douglas Park, Tuglow Caves. CT: Hartley Vale, Jenolan Caves, Hill Top, Bundanoon.**Habitat****Habitat:** Among rocks, creekbeds, valleys.**Altitude:** 0–1000 m **Annual rainfall:** 600–1200 mm**Typical local abundance:** Frequent–occasional.**Vegetation:** Moist eucalypt forest, woodland e.g. with *Eucalyptus dives*, *E. viminalis*, *E. rubida*.**Substrate:** Sandy soils on sandstone, alluvium, quartzite, slate, medium nutrients.**Exposure:****Conservation****Conservation:** Vulnerable in Western Sydney (James et al. 1999). Conservation status elsewhere unknown. Reported in Muogamarra Nature Reserve, Ku-ring-gai Chase NP.***Opercularia varia***

RUBIACEAE

Variable Stinkweed

Life history**Growth form:** Spreading subshrub to 30 cm high, with numerous branches from one short main stem; leaves pungent-smelling.**Vegetative spread:****Longevity:** 5–20 years (D. Keith pers. comm.).**Primary juvenile period:** 2 years (Keith 1996).**Flowers:** October.**Fruit/seed:** Compound capsule 2–5 mm diam., September–January.**Dispersal, establishment & growth:** Recruitment mainly after fire (D. Keith pers. comm.).**Fire response:** Killed (Keith 1996). Some plants probably resprouted after high intensity fire (1/1994) at Lane Cove (P. Kubiak pers. comm.).**Interaction with other organisms:** Often heavily cropped by rabbits (P. Kubiak pers. comm.).**Distribution****Status/origin:** Native.**Botanical subregions:** NC CC SC CT ST SWS; Vic., Tas., S.A.**Distribution Sydney area:****Select locations:** CC: Dural, Hornsby, Narrabeen, Cumberland SE, Maquarie Fields, Maroubra Bay. CT: Mt Wilson, Armour Range, Hill Top, Robertson, Mittagong.

Habitat**Habitat:****Altitude:** 0–1000 m **Annual rainfall:** 800–1600 mm**Typical local abundance:** Occasional.**Vegetation:** Open-forest e.g. with *Eucalyptus sieberi*, *Corymbia gummifera*, *Eucalyptus piperita*, *Angophora costata*; wet heath e.g. with *Baeckea linifolia*, *Leptospermum juniperinum*.**Substrate:** Sandy soil on sandstone, low nutrients.**Exposure:****Conservation****Conservation:** Conservation status unknown. Reported in Brisbane Water NP, Muogamarra Nature Reserve, Ku-ring-gai Chase NP, Garigal NP, Lane Cove NP, Sydney Harbour NP.***Pomax umbellata*****RUBIACEAE****Life history****Growth form:** Small perennial sub-herb to 40 cm high.**Vegetative spread:** No.**Longevity:** short - medium.**Primary juvenile period:** Less than 1 year (P. Kubiak pers. comm.).**Flowers:** Reddish, September–December, peak September.**Fruit/seed:** Compound capsule, dehiscent. Seeds 2–3 mm long, mean weight 1.14 mg (J. Howell pers. comm.), mature October–December.**Dispersal, establishment & growth:** Diaspore: seed, ejected ballistically when ripe capsules touched (J. Howell pers. comm.). Soil-stored seedbank (Fox 1988). Coloniser.**Fire response:** Killed by fire (Fox 1988).**Interaction with other organisms:** Considered to be a potential producer of hydrocyanic acid (Hurst 1942).**Distribution****Status/origin:** Native.**Botanical subregions:** NC CC SC NT CT ST NWS CWS NWP SWP NFWP SFWP; Qld, Vic., N.T., S.A., W.A.**Distribution Sydney area:** Widespread.**Select locations:** CC: Toukley, Woy Woy, Wisemans Ferry, Hornsby, Lane Cove, Macquarie Fields, Yerranderie, Kowmung River. CT: Rylstone, Coricudgy, Katoomba, Jenolan Caves.**Habitat****Habitat:** Ridges, cliff tops.**Altitude:** 0–1000 m **Annual rainfall:** 700–1400 mm**Typical local abundance:** Frequent.**Vegetation:** Dry open-forest and woodland e.g. with *Eucalyptus sclerophylla*, *Angophora bakeri*, *Corymbia eximia*, *Angophora costata*, *Corymbia gummifera*.**Substrate:** Sandy soil on sandstone, low nutrients, well-drained.**Exposure:** Full sun.**Conservation****Conservation:** Probably adequately conserved. Reported in Bouddi NP, Brisbane Water NP, Muogamarra Nature Reserve, Ku-ring-gai Chase NP, Garigal NP, Lane Cove NP, Sydney Harbour NP.

Psychotria loniceroides

RUBIACEAE

Hairy Psychotria

Life history

Growth form: Shrub or small tree to 5 m high, with white or rusty hairs on young growth, leaves and inflorescence; sometimes with pouches (domatia) in leaf axils.

Vegetative spread:

Longevity:

Primary juvenile period:

Flowers: White, February–April.

Fruit/seed: Whitish to yellowish egg-shaped fleshy fruit 6–8 mm long, fresh weight 100–200 mg (Westoby et al. 1990), ribbed and furrowed lengthwise, May–July.

Dispersal, establishment & growth: Diaspore: fleshy fruit, vertebrate-adapted for dispersal (Westoby et al. 1990).

Fire response:

Interaction with other organisms: Larval food plant of Hawkmoth *Macroglossum hirundo* subsp. *errans* (Common 1990).

Distribution

Status/origin: Native.

Botanical subregions: NC CC SC NT CT; Qld.

Distribution Sydney area: Coast.

Select locations: CC: Wyong, Gosford, Newport, Pymble, Kurrajong Heights, Mountain Lagoon, Hurstville, Waterfall, Mt Kembla, Minnumurra Falls, Cambewarra Range. CT: Moss Vale.

Habitat

Habitat: Tall open-forest and rainforest (R. Payne pers. comm.).

Altitude: 0–600 m

Annual rainfall: 900–1600 mm

Typical local abundance: Frequent.

Vegetation: Rainforest and moist eucalypt forest e.g. with *Eucalyptus saligna*, *Syncarpia glomulifera*.

Substrate: Clay soil on basalt, volcanics, Wianamatta Shale, Narrabeen Sandstones. Soil pH 4.5–5.5 (R. Payne pers. comm.).

Exposure:

Conservation

Conservation: Conservation status unknown. Reported in Bouddi NP, Wambina NR, Dalrymple Hay NR.

***Richardia brasiliensis* ***

RUBIACEAE

White Eye, Mexican Clover

Life history

Growth form: Prostrate to ascending herb, with hairy stems to 40 cm long, possibly rhizomatous.

Vegetative spread:

Longevity: Less than 1 year.

Primary juvenile period: Less than 1 year.

Flowers: White, tubular, in a head, January.

Fruit/seed: Dehiscent fruit of 3 segments, 2–3 mm long.

Dispersal, establishment & growth:

Fire response:

Interaction with other organisms: Food plant of butterfly larvae *Hypolimnas bolina nerina* (Common & Waterhouse 1981).

Distribution

Status/origin: Exotic, native to S America.

Botanical subregions: NC CC; Qld.

Distribution Sydney area: Lower Hawkesbury River area.

Select locations: CC: Woy Woy (1969), Ourimbah (1965), Cheltenham (1948), Wisemans Ferry (1958), MacDonald (1967), Central Colo (1987).

Habitat**Habitat:** Roadsides, riverbanks.**Altitude:** 0–200 m **Annual rainfall:** 900–1200 mm**Typical local abundance:** Occasional.**Vegetation:****Substrate:** Sandy soil on alluvium, medium nutrients.**Exposure:**

Conservation**Conservation:** Recently naturalised, 1940s–1950s, in Lower Hawkesbury River area, possibly spread in soil. Weed potential unknown.

Richardia humistrata* **RUBIACEAE**

Life history**Growth form:** Prostrate perennial herb, with stems to 15 cm long.**Vegetative spread:** Roots at nodes, often forms dense mats.**Longevity:****Primary juvenile period:****Flowers:** White, tubular, in a head.**Fruit/seed:** Dehiscent fruit of 4 segments, 2 mm long, March–May.**Dispersal, establishment & growth:****Fire response:****Interaction with other organisms:**

Distribution**Status/origin:** Exotic, native to S America.**Botanical subregions:** NC CC.**Distribution Sydney area:****Select locations:** CC: Wollombi (1986), Wyee (1993).

Habitat**Habitat:** Disturbed sites.**Altitude:** 0–100 m **Annual rainfall:** 1000–1100 mm**Typical local abundance:** Frequent.**Vegetation:****Substrate:** Sandy loam on sandstone.**Exposure:**

Conservation**Conservation:** Recently reported naturalised. Weed potential unknown, though its ability to spread vegetatively may allow it to be spread quickly.

***Richardia stellaris* ***

RUBIACEAE

Life history**Growth form:** Prostrate perennial herb, with stems to 15 cm long.**Vegetative spread:** No (McIntyre et al. 1995).**Longevity:****Primary juvenile period:****Flowers:** White, in a head, October–April.**Fruit/seed:** Dehiscent fruit of 4 segments, 2 mm long, October–February.**Dispersal, establishment & growth:** No particular morphology for dispersal (McIntyre et al. 1995).**Fire response:** Possibly resprouted after high intensity fire (1/1994) at Lane Cove, with some plants fruiting in 6 months (P. Kubiak pers. comm.)**Interaction with other organisms:****Distribution****Status/origin:** Exotic, native to S America.**Botanical subregions:** NC CC SC NT CT CWS; Qld.**Distribution Sydney area:** Widespread at lower elevations.**Select locations:** CC: Wisemans Ferry, Cheltenham, Mosman Bay (1844), Silverwater, Kogarah (1900), Ingleburn (1900), Mt Annan, The Oaks, Shellharbour, Lower Portland, Wisemans Ferry (1908), Warrimoo.**Habitat****Habitat:** Roadsides.**Altitude:** 0–700 m**Annual rainfall:** 800–1400 mm**Typical local abundance:** Frequent.**Vegetation:** Grassy areas, remnant woodland e.g. with *Bursaria spinosa*.**Substrate:** Sandy soil near beaches, clay soil on shale, volcanics.**Exposure:****Conservation****Conservation:** Probably naturalised since late 19th century, minor weed of grassy areas.***Sherardia arvensis* ***

RUBIACEAE

Field Madder

Life history**Growth form:** Ascending to procumbent herb, with weak stems to 30 cm long.**Vegetative spread:** No.**Longevity:** Less than one year.**Primary juvenile period:** Less than one year.**Flowers:** Pink to lilac, September–December.**Fruit/seed:** Dry 2-lobed fruit 2–5 mm long.**Dispersal, establishment & growth:****Fire response:****Interaction with other organisms:****Distribution****Status/origin:** Native to Europe and W Asia.**Botanical subregions:** CC SC NT CT ST NWS CWS SWS; Vic., Tas., N.T., S.A.**Distribution Sydney area:** Mainly Illawarra and Southern Highlands.**Select locations:** CC: Westmead, Prospect (1912), Ingleburn, Casula, St Marys, Camden, Kiama (1899), Kangaroo Valley, Berry. CT: Abercrombie Caves, Bowral.**Habitat****Habitat:** Grassland, lawns, creekbanks.**Altitude:** 0–700 m**Annual rainfall:** 800–1400 mm**Typical local abundance:** Occasional.**Vegetation:** Grassland.**Substrate:** Clay soils on shale, alluvium, limestone, medium nutrients.**Exposure:** Full sun.**Conservation****Conservation:** Weed of gardens and disturbed areas.

Synaptantha tillaeacea

RUBIACEAE

Life history

Growth form: Prostrate, succulent herb, with stems to 15 cm long, leaves opposite.

Vegetative spread:

Longevity:

Primary juvenile period:

Flowers: Whitish, July–October.

Fruit/seed: Capsule 1–2 mm wide, with 8–16 seeds.

Dispersal, establishment & growth:

Fire response:

Interaction with other organisms:

Distribution

Status/origin: Native.

Botanical subregions: CT NWS CWS NWP NFWP SFWP; Qld, N.T., S.A., W.A.

Distribution Sydney area: Blue Mountains.

Select locations: CT: Mt Victoria (1882) only record.

Habitat

Habitat:

Altitude:

Annual rainfall:

Typical local abundance:

Vegetation:

Substrate:

Exposure:

Conservation

Conservation: Mainly found in northwest New South Wales, with only one record for Central Tablelands at Mount Victoria (1882). Possibly now extinct in the Sydney area.

Index to Ecology of Sydney Plant Species 7b

Scientific names are in bold type and synonyms are in italics. Family names are in upper case. Common names are in roman type. Exotic species are indicated by an asterisk following the botanical name.

A

Acaena

- agnipila** 1165
- echinata** 1165
- novae-zelandiae** 1166
- ovina** 1166

Alphitonia

- excelsa** 1142

Aphanes

- arvensis** * 1167
- australiana** 1168

Asperula

- conferta** 1180
- gunnii** 1180
- scoparia** 1181

Australian Anchor Plant 1147

B

Banksia

- aemula** 1028
- conferta* var. *penicillata* 1029
- cunninghamii** subsp. **cunninghamii** 1030
- ericifolia** var. **ericifolia** 1030
- integrifolia**
 - subsp. **integrifolia** 1032
 - subsp. **monticola** 1033
 - var. *compar* 1033
- marginata** 1034
- oblongifolia** 1035
- paludosa** 1036
- penicillata** 1029
- robur** 1037
- serrata** 1038
- spinulosa**
 - var. *collina* 1039
 - var. **spinulosa** 1040

Batrachium

- trichophyllum** * 1130

Bedstraw

- Maori 1188
- Rough 1186
- Small 1188

Blackberry 1172, 174, 176, 179

- Cut-leaf 1174
- Kittatinny 1171

Bramble

- Green-leaved 1175
- Rose-leaf 1178

Buckthorn 1164

Bush

- Looking-glass 1184
- Prickly Currant 1183

Bush Lawyer 1175

Buttercup

- Celery 1139
- Common 1134
- Creeping 1138
- Sharp 1135

C

Canthium

- Coast 1182
- coprosmoides** 1182

Cleavers 1184

Clematis

- aristata** 1130
- glycinoides** var. **glycinoides** 1131
- microphylla** var. **microphylla** 1132
- Small-leaved 1132

Coast Banksia 1032, 1033

Conesticks 1124

Conospermum

- ellipticum** 1041
- ericifolium** 1042
- longifolium**
 - subsp. **angustifolium** 1042
 - subsp. **longifolium** 1043
 - subsp. **mediale** 1044
- taxifolium** 1044
- tenuifolium** 1045

Coprosma

- hirtella** 1182
- quadrifida** 1183
- repens** * 1184

Crinkle Bush 1095

Cryptandra

- amara**
 - var. **amara** 1143
 - var. **floribunda** 1143
 - var. **longiflora** 1144
- buxifolia** 1144

- ericoides** 1145
- propinqua** 1145
- species A 1146
- spinescens** 1146

Cut-leaved Mignonette 1140

D

Discaria

- pubescens** 1147

Drumsticks 1089

Duchesnea

- indica** * 1168

E**Emmenosperma****aliphitonioides** 1148**F**

Field Madder 1196

G**Galium****aparine** * 1184**binifolium** 1185**ciliare** 1185**gaudichaudii** 1186**liratum** 1186**migrans** 1187**murale** * 1188**propinquum** 1188**tricornutum** * 1189

Geebung

Broad-leaved 1107

Narrow-leaved 1108

Pine-leaved 1120

Geum**urbanum** 1169

Goosegrass 1184

Grevillea**acanthifolia** subsp. **acanthifolia** 1046**arenaria**subsp. **arenaria** 1046subsp. **canescens** 1047**aspleniifolia** 1048**baueri** subsp. **baueri** 1048**buxifolia**subsp. **buxifolia** 1049subsp. **ecorniculata** 1050subsp. **phyllicoides** 1070subsp. **sphacelata** 1077**caleyi** 1050**capitellata** 1051*capitellata* 1066

Carrington Falls 1072

diffusasubsp. **constablei** 1052subsp. **diffusa** 1052subsp. **diffusa** 'Robust Form' 1051subsp. **evansiana** 1055subsp. **filipendula** 1053**divaricata** 1054**evansiana** 1055**floribunda** subsp. **floribunda** 1055**humilis** subsp. **humilis** 1056**imberbis** 1056**johnsonii** 1057**juniperina**subsp. **juniperina** 1058subsp. **sulphurea** 1058subsp. **trinervis** 1059**kedumbensis** 1060**lanigera** 1060**laurifolia** 1061**linearifolia** 1062*linearifolia*

'Hawkesbury Sandstone form' 1062

'Kanangra/Braidwood form' 1056

'Narrower-leaved Sydney form' 1068

'Northern form' 1056

'Southern Sandstone form' 1069

longifolia 1063**molyneuxii** 1064**mucronulata** 1064**obtusiflora**subsp. **fecunda** 1065subsp. **kedumbensis** 1060subsp. **obtusiflora** 1066**oldei** 1066**oleoides** 1067**parviflora**subsp. **parviflora** 1068subsp. **supplicans** 1068**patulifolia** 1069**phyllicoides** 1070**ramosissima** subsp. **ramosissima** 1070**raybrownii** 1071*riparia* 1073**rivularis** 1072**rosmarinifolia**subsp. **rosmarinifolia** 1072var. **divaricata** 1054**sericea**subsp. **riparia** 1073subsp. **sericea** 1074*sericea* 1064

Seven Dwarfs 1055

shiressii 1075**speciosa** 1076**sphacelata** 1077*stricta* 1074*trinervis* 1058, 1066**triternata** 1078*triternata* 1071**H****Hakea****bakeriana** 1078**constablei** 1079**dactyloides** 1080*dactyloides* 1082**dohertyi** 1081**gibbosa** 1082**laevipes** subsp. **laevipes** 1082**microcarpa** 1083**pachyphylla** 1084**propinqua** 1084*propinqua* 1084**salicifolia**subsp. **angustifolia** 1085subsp. **salicifolia** 1086

sericea 1087
 Small-fruited 1083
 sp. *B* 1081
 subsp. *hirsuta* 1088
 subsp. *teretifolia* 1088
teretifolia 1088

Headache Vine 1131

Helicia

glabriflora 1088

I

Indian Strawberry 1168

Isopogon

anemonifolius 1089

anethifolius 1090

dawsonii 1090

fletcheri 1091

prostratus 1092

L

Lambertia

formosa 1092

Lesser Spearwort 1133

Lomatia

ilicifolia 1093

myricoides 1094

River 1094

silatifolia 1095

M

Macartney Rose 1170

Mexican Clover 1194

Morinda

jasminoides 1190

Mountain Devil 1092

N

North American Dewberry 1177

O

Opercularia

aspera 1190

diphylla 1191

hispida 1192

varia 1192

P

Parsley-piert 1167

Persoonia

acerosa 1096

acuminata 1096

bargoensis 1097

chamaepeuce 1098

chamaepitys 1098

fucifolia 1124

glaucescens 1099

hindii 1100

hirsuta

subsp. **evoluta** 1100

subsp. **hirsuta** 1101

isophylla 1102

lanceolata 1103

subsp. *B* 1099

laurina

subsp. *A* 1104

subsp. *B* 1104

subsp. *C* 1105

subsp. **intermedia** 1104

subsp. **laurina** 1104

subsp. **leiogyna** 1105

laxa 1106

levis 1107

linearis 1108

marginata 1108

microphylla 1109

mollis

subsp. **caleyi** 1110

subsp. **ledifolia** 1110

subsp. **leptophylla** 1111

subsp. **livens** 1112

subsp. **maxima** 1113

subsp. **mollis** 1114

subsp. **nectens** 1114

subsp. **revoluta** 1115

myrtilloides

subsp. **cunninghamii** 1116

subsp. **myrtilloides** 1116

nutans 1117

subsp. *A* 1117

subsp. *B* 1106

subsp. *C* in part 1096

nutans 1097

oblongata 1118

oxycoccoides 1119

pinifolia 1120

recedens 1121

rigida 1122

sp. aff. *pinifolia* 1102

Petrophile

canescens 1123

pedunculata 1123

pulchella 1124

sessilis 1124

Pomaderris

adnata 1148

andromedifolia

subsp. **andromedifolia** 1149

subsp. **confusa** 1150

angustifolia 1150

apetala 1151

aspera 1151

betulina subsp. **betulina** 1151

brunnea 1152

cotoneaster 1152

discolor 1153

elliptica var. **elliptica** 1154

- eriocephala** 1154
ferruginea 1155
 Hazel 1151
intermedia 1156
lanigera 1156
ledifolia 1157
ligustrina subsp. **ligustrina** 1158
mediora 1158
multiflora 1154
pauciflora 1159
phyllicifolia
 subsp. **ericoides** 1160
 subsp. **phyllicifolia** 1160
precaria 1161
prunifolia var. **prunifolia** 1162
sericea 1162
sieberiana 1156
 sp. A 1150
subcapitata 1163
vellea 1163
velutina 1164
Pomax
 umbellata 1193
Potentilla
 recta * 1169
 PROTEACEAE 1028–1129
Psychotria
 Hairy 1194
 loniceroides 1194
R
 RANUNCULACEAE 1130–1139
Ranunculus
 amphitrichus 1132
 collinus 1133
 flammula * 1133
 inundatus 1134
 lappaceus 1134
 muricatus * 1135
 papulentus 1135
 pimpinellifolius 1136
 plebeius 1136
 pumilio
 var. **politus** 1137
 var. **pumilio** 1137
 repens * 1138
 rivularis 1132
 sceleratus * 1139
 sessiliflorus var. **sessiliflorus** 1139
 trichophyllus 1130
 Raspberry
 Native 1176
 Yellow 1172
 Red Ash 1142
Reseda
 lutea * 1140
 luteola * 1141
 RESEDACEAE 1140–1141
 RHAMNACEAE 1142–1164
Rhamnus
 alaternus * 1164
Richardia
 brasiliensis * 1194
 humistrata * 1195
 stellaris * 1196
Rosa
 bracteata * 1170
 rubiginosa * 1170
 ROSACEAE 1165–1179
 RUBIACEAE 1180–1197
Rubus
 bellobatus * 1171
 discolor * 1172
 ellipticus * 1172
 hillii 1173
 laciniatus * 1174
 leightonii * 1174
 moluccanus 1173
 moorei 1175
 nebulosus 1175
 parvifolius 1176
 procerus 1172
 radula * 1176
 roribaccus * 1177
 rosifolius
 var. **commersonii** 1178
 var. **rosifolius** 1178
 sp. A 1175
 ulmifolius * 1179
 velox 1171
 vestitus * 1179
S
 Scrub Beefwood 1125
Sherardia
 arvensis * 1196
 Spider Flower
 Grey 1049, 1077
 Red 1076
Stenocarpus
 salignus 1125
 Stinkweed
 Coarse 1190
 Hairy 1192
 Variable 1192
 Sweet Briar 1170
Symphionema
 montanum 1126
 paludosum 1126
Synaptantha
 tillaeacea 1197
T
Telopea
 mongaensis 1127
 speciosissima 1128
 Traveller's Joy 1130

W

- Waratah 1128
 - Braidwood 1127
 - Monga 1127
- Weld 1141
- White Eye 1194
- Woodruff
 - Common 1180
 - Mountain 1180
 - Prickly 1181

X

- Xylomelum**
 - pyriforme** 1129