

Vegetation and flora of Booti Booti National Park and Yahoo Nature Reserve, lower North Coast of New South Wales.

S.J. Griffith, R. Wilson and K. Maryott-Brown

*Griffith, S.J.¹, Wilson, R.² and Maryott-Brown, K.³ (¹Division of Botany, School of Rural Science and Natural Resources, University of New England, Armidale NSW 2351; ²16 Bourne Gardens, Bourne Street, Cook ACT 2614; ³Paynes Lane, Upper Lansdowne NSW 2430) 2000. Vegetation and flora of Booti Booti National Park and Yahoo Nature Reserve, lower North Coast of New South Wales. *Cunninghamia* 6(3): 645–715. The vegetation of Booti Booti National Park and Yahoo Nature Reserve on the lower North Coast of New South Wales has been classified and mapped from aerial photography at a scale of 1: 25 000. The plant communities so identified are described in terms of their composition and distribution within Booti Booti NP and Yahoo NR. The plant communities are also discussed in terms of their distribution elsewhere in south-eastern Australia, with particular emphasis given to the NSW North Coast where compatible vegetation mapping has been undertaken in many additional areas. Floristic relationships are also examined by numerical analysis of full-floristics and foliage cover data for 48 sites. A comprehensive list of vascular plant taxa is presented, and significant taxa are discussed. Management issues relating to the vegetation of the reserves are outlined.*

Introduction

The study area

Booti Booti National Park (1586 ha) and Yahoo Nature Reserve (48 ha) are situated on the lower North Coast of New South Wales (32°15'S 152°32'E), immediately south of Forster in the Great Lakes local government area (Fig. 1). The reserves fall within the NSW North Coast biogeographic region of Thackway and Cresswell (1995), and the North Coast botanical subdivision of Anderson (1961).

The larger part of Booti Booti NP consists of Quaternary barrier deposits between the Pacific Ocean and Wallis Lake connecting three headland hill complexes. Several small islands in Wallis Lake are also included in Booti Booti NP — Booti Island, Shepherd Island, Coomba Island, Earps Island, Snake Island, Little Snake Island, Black Rocks and Pelican Island. Yahoo NR is a larger island, also in Wallis Lake.

The present paper is based on a vegetation survey which was undertaken by the authors for the NSW National Parks and Wildlife Service, Hunter District (Griffith et al. 1999).

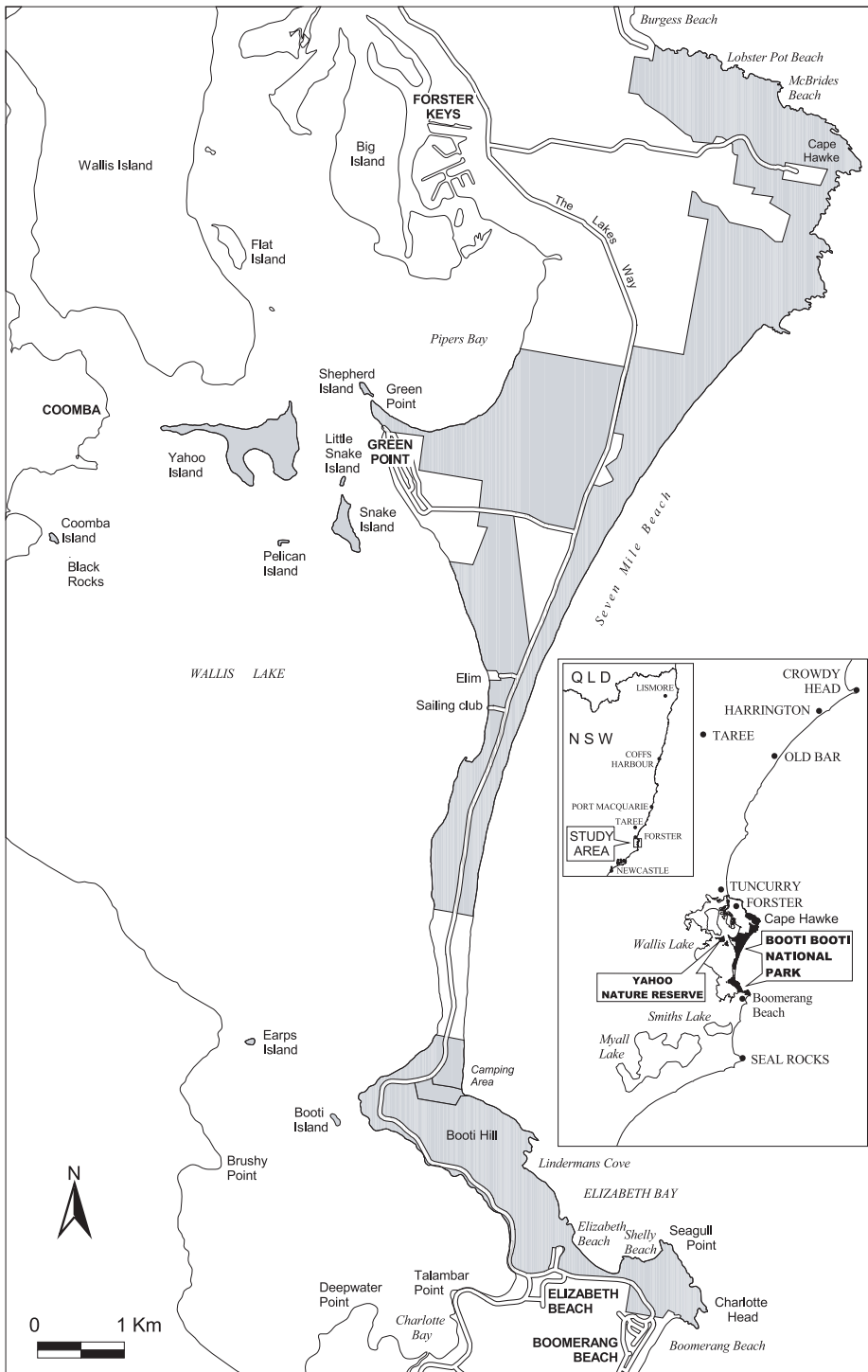


Fig. 1. The location of Booti Booti National Park and Yahoo Nature Reserve (shaded) on the lower North Coast of New South Wales.

Climate

The lower North Coast of NSW experiences a humid subtropical climate (Koeppen typology) which is characterised by mild winters, long hot summers, and precipitation in all seasons. The dominant winter air mass is the polar maritime, and this influences weather patterns for a minimum of 3–6 months (after Oliver 1973, in Linacre and Hobbs 1977). At this time of the year strong, cold winds originate in the south or west. Tropical maritime air dominates in summer for a minimum of three months, and during this time winds often originate in the north or north-east.

The mean annual rainfall for Taree (36 km NNW of Booti Booti NP) is 1178 mm, and an average of 35% of this total falls during the three wettest months of January, February and March. The three driest months of July, August and September receive an average of 17% of the mean annual total. However, annual and seasonal rainfall patterns can vary considerably from year to year, and so result in periods of drought or flood. To illustrate this point, 110 years of record for Harrington (40 km N of Booti Booti NP) yield a variability index for total annual rainfall of 70% (variability index = (90% percentile - 10% percentile)/50% percentile). Similarly, the variability index for monthly rainfall in March (the wettest month on average) is 175%. For monthly rainfall in September (the driest month on average), the variability index is 294% (Bureau of Meteorology 1988; Bureau of Meteorology pers. comm. 1998).

Mean daily maximum temperatures for Taree vary from 28.3 to 28.9°C in the summer months, and from 18.6 to 20.1°C in the winter months. Likewise, mean daily minimum temperatures vary from 16.4 to 18.1°C in summer, and from 5.3 to 7.2°C in winter (Bureau of Meteorology 1988). Frosts are rare in the vicinity of Booti Booti NP and Yahoo NR.

Landforms, geology and soils

Booti Booti NP contains three large hill complexes (landform terms generally follow Speight 1984), and these are dominated by Cape Hawke, Booti Hill and Charlotte Head respectively (Fig. 1). The Cape Hawke complex and the Charlotte Head complex are both composed of sandstone and conglomerate strata of the Conger Formation from the Carboniferous Period. The Booti Hill complex is part of the Wootton Beds, which are also Carboniferous and comprise sandstone, siltstone, claystone, shale, limestone and lavas (NSW Department of Mines 1966). All three hill complexes are interconnected with Quaternary deposits of marine-aeolian and estuarine origin. The Cape Hawke and Charlotte Head complexes were at one time offshore islands, whereas the Booti Hill complex has always been a headland promontory of the mainland (Melville 1984).

The largest hill complex is dominated by Cape Hawke (224 m high). Apart from small beaches such as McBrides and Lobster Pot, the northern and eastern margins of the Cape Hawke complex end in cliffs and rocky outcrops along the ocean. At the south-western extremities, the complex is mantled to an elevation of approximately 50 m with quartzose sands of considerable age (> 140 000 years BP), although these sands have since eroded along gullies (de Castro Lopo 1981, Roy 1982).

During the late Pleistocene the Cape Hawke hill complex was an offshore island some 10 km out to sea and 12 km² in area. Refracted waves subsequently formed a tombolo-like lagoon barrier by joining the Cape Hawke complex (and the smaller island of Green Point) to the protruding headland of Booti Hill (Melville 1984). The former island of Charlotte Head also joined with the mainland in the late Pleistocene as a result of deposition. The main phase of Pleistocene barrier sedimentation commenced approximately 140 000 years BP, and this time corresponds with the Last Interglacial Marine Transgression when sea levels were higher (Roy 1982).

The present-day lagoon barrier which extends south from the Cape Hawke hill complex to the Booti Hill complex is approximately 10 km in length, and varies in width from 400 m to 3.25 km. This lagoon barrier separates Wallis Lake from the Pacific Ocean. The seaward sequence of the lagoon barrier consists of Holocene marine-aeolian deposits which overly or interface with low-lying and partly eroded Pleistocene sands, some of which are humate-cemented. In Wallis Lake, Pleistocene sands extend to a depth of 25 m below the present sea level. The western (lake) side of the lagoon barrier consists of sediments of estuarine origin. These sediments are sandy backbarrier deposits of Pleistocene age, Holocene backbarrier washover and tidal delta sands, and Holocene basin mud and intertidal deposits. Estuarine clays and clayey sands underlie all of the abovementioned sediments, and these estuarine deposits in turn rest on bedrock (Melville 1984, Roy 1982). Much of the present lagoon barrier is less than 10 m in elevation, although sand dunes reach a height of 20–30 m at a few locations. The landform pattern of the lagoon barrier is rolling to level.

The Booti Hill hill complex extends about 3 km in a north-west to south-east direction, and varies in width from 600 m to 1 km. The highest point in this complex is Booti Hill itself (169 m). Hillslopes on the south-western side of the complex form the shore of Wallis Lake, while the north-eastern and eastern slopes often terminate in sea cliffs. Elizabeth Beach occupies a protected situation between the Booti Hill complex and the Charlotte Head complex. Elizabeth Beach consists of Holocene marine-aeolian sands which onlap sandy backbarrier deposits of Pleistocene age and estuarine origin (Roy 1982).

Of the three hill complexes in Booti NP, the one dominated by Charlotte Head is the smallest and lowest (96 m). The Charlotte Head complex terminates in extensive sea cliffs to the east and north-east, and the southern part of the complex is mantled with aeolian sand. To the north-west the complex has an open depression which drains towards Shelly Beach.

Some of the islands in Wallis Lake are composed entirely or partly of bedrock, whereas other islands consist of Quaternary sediments only. Shepherd and Yahoo Islands contain a bedrock knoll (identified as toscanite for Yahoo Island in Floyd 1990) against which estuarine sediments have accumulated. On the other hand, Black Rocks, Booti Island, Earps Island and Coomba Island are entirely bedrock. Snake and Little Snake Islands consist of well vegetated tidal and supratidal sediments, whereas Pelican Island is a sandy tidal flat which is predominantly unvegetated.

The Soil Conservation Service of NSW (1985) has identified several soil groups for the bedrock hill complexes in Booti Booti NP. These groups are red and yellow podzolics, yellow earths and structured clays. Other soils which are known or likely to be present include gleyed podzolics on intermittently waterlogged lower slopes, lithosols on steep slopes and shallow hillcrests, and black headland soils (after Parbery 1947) and soloths on very exposed seaward aspects. The soils associated with older sand masses of the lagoon barrier form a catenary sequence from sand podzols on well-drained sites to humus podzols, peaty podzols and then acid peats in swamps. The younger sands associated with foredunes generally display little profile development other than a surface accumulation of organic matter. Along the margins of Wallis Lake the youngest estuarine deposits often display sediment interbedding, but no true profile development. Older estuarine deposits on the other hand display rudimentary pedological development in the form of a surface accumulation of organic matter. These minimally developed, saline soils are solonchaks.

Landuse and fire history

Approximately half (800 ha) of the present national park was originally designated as Booti Booti State Recreation Area in 1977, and this was administered by the NSW Department of Lands and an SRA Trust. Booti Booti SRA was managed for recreational activities such as fishing, swimming and camping, but with regard for intrinsic conservation values. In 1992 the former state recreation area was dedicated as Booti Booti NP under the administration of the NSW National Parks and Wildlife Service. Additions both before and after dedication as a national park have increased the total area to 1586 ha. Booti Booti NP is still managed for both passive recreation and nature conservation. Yahoo Island (48 ha) was dedicated as a nature reserve in 1983, and visitation has not been actively encouraged.

The entire length of Seven Mile Beach in Booti Booti NP was mined for heavy minerals during the period from 1969 to 1975, and mining also occurred at Elizabeth Beach from 1969 to 1970. The mine paths varied in width from approximately 50–350 m. **Casuarina equisetifolia* subsp. *incana* was established on the mined areas beyond what is considered to be its natural southern distribution limit in the vicinity of Laurieton, approximately 70 km to the north (Harden 1990).

Former clearings are evident on the Cape Hawke hill complex, some of which are attributable to abandoned banana plantations dating from about the time of World War II. A wildfire apparently burnt through rainforest on Cape Hawke approximately 60 years ago (D. Turner NPWS, pers. comm. 1999), and fire scars are still evident on many trees.

The fire history of Booti Booti NP and Yahoo NR is reasonably typical of coastal vegetation on the NSW North Coast in that frequent unprescribed fires result from non-natural or unknown sources. Fire records for the two reserves date from 1984, and since this time most of the vegetation in the reserves has been burnt on at least one occasion. The fire records further indicate that a wide variety of vegetation types have been burnt in the last 15 years, including stands of *Livistona australis* rainforest.

* Exotic or non-indigenous taxa are prefixed with an asterisk.

Fortunately, the extensive rainforests of the Cape Hawke hill complex have remained largely unburnt since 1984. A severe crown fire burnt most of the sand mass vegetation of Booti Booti NP in late January 1997. Yahoo NR last burnt in November 1994, and this fire affected most vegetation types other than dry rainforest on a boulder-strewn knoll.

Previous botanical surveys

Dodkin (1978) and Floyd (1990, undated) investigated the distribution and composition of rainforests in Booti Booti NP and Yahoo NR, while Clough (1979) undertook a more detailed comparative study with rainforests elsewhere on the lower North Coast. Species checklists are available from these earlier works.

The former Booti Booti SRA Trust and the NSW Department of Lands commissioned a more inclusive vegetation study by de Castro Lopo (1980). In this work Booti Booti SRA was divided into six divisions analogous to land systems (e.g. Sand Barriers Division), and 24 subdivisions (e.g. Stabilised Dune Subdivision). A detailed vegetation description and checklist was produced for each subdivision, as well as recommendations for management. In a subsequent publication, de Castro Lopo (1981) presented exploratory analyses of the species checklists compiled for each subdivision, although these analyses were limited by the internal heterogeneity of many of the map units for which the checklists and associated abundance data were collected.

The species checklists produced by Clough (1979), de Castro Lopo (1980), Dodkin (1978) and Floyd (1990, undated) have been incorporated into the present study. Other studies which deal with aspects of the vegetation of the reserves, or the vegetation of other parts of the Wallis Lake area, include the work of Adam et al. (1988, 1989), Brockhoff (1988), Browne and Scott (1985), and Griffith (1987).

Methods

Survey methods

Introduction

The present study is the most recent in a series of 1: 25 000 vegetation maps produced for coastal reserves of northern NSW. This work has been undertaken over a number of years by two of the present authors (S.J. Griffith and R. Wilson) for the NSW National Parks and Wildlife Service. Vegetation maps have been produced for all large coastal reserves of NSW to the north of Booti Booti NP (Broadwater NP, Bundjalung NP, Yuraygir NP, Hat Head NP, Limeburners Creek NR, Lake Innes NR, Crowdy Bay NP), and a number of smaller reserves (Ballina NR, Richmond River NR, Iluka NR, Moonee Beach NR, Arakoon SRA, Kattang NR). Several significant areas of coastal vegetation on freehold or crown land have also been mapped, for example the Newrybar sand plain at Lennox Head, lands at Evans Head north and south of the Evans River, lands to the north of Yuraygir NP in the vicinity of Wooloweyah Lagoon, and Frogalla swamp north of Forster (Fig. 2).

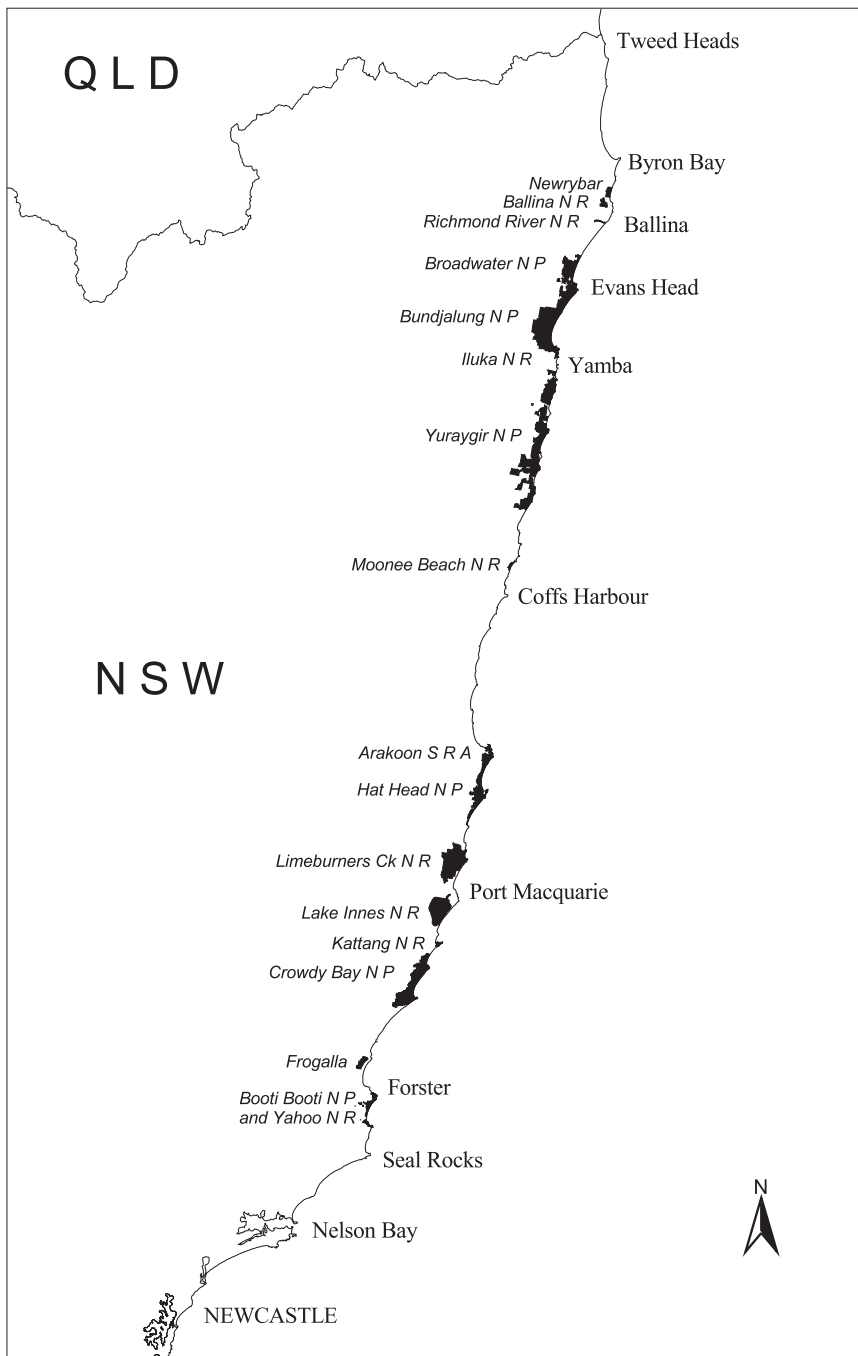


Fig. 2. National parks, nature reserves and other lands on the North Coast of New South Wales for which compatible vegetation mapping is available. These areas of coastal vegetation have been mapped to a scale of 1: 25 000 using the classification and coding system employed in the present study for Booti Booti NP and Yahoo NR.

All of the aforementioned mapping (around 84 000 ha) has been digitised using a minimum polygon size of approximately one hectare, and it is stored in a regional geographical information system (GIS) at the Northern Zone office of the NSW National Parks and Wildlife Service (Coffs Harbour).

Air photo interpretation and mapping

The vegetation of Booti Booti NP and Yahoo NR was mapped by means of air photo interpretation (API). Stereo-paired colour photography flown by the NSW Department of Land and Water Conservation was used, generally at a scale of 1: 25 000 (Bulahdelah series 1991, Runs 6, 7, 8, 9), although an incomplete coverage of 1: 10 000 photography was also used to confirm some vegetation boundaries.

Preliminary stratification of the vegetation into photo types was undertaken by reference to such diagnostic features as colour, texture, crown architecture, aspect and topographic position. A process of preliminary stratification, selective field sampling, and specification and interpretation adjustment was continued until a satisfactory level of confidence in photo type recognition was reached.

Selective field sampling (ground truthing) was undertaken by two people over a period of six days, and during this process observations were made of the structure and composition of each photo type. A species checklist was also compiled for each vegetation type during this fieldwork, although not for rainforests other than that dominated by *Choricarpia leptopetala*. Extensive checklists have already been produced for most rainforest types of the reserves by others (Clough 1979, Dodkin 1978, Floyd 1990, undated).

The boundaries of the photo types, which are generally analogous to plant associations (sensu Beadle 1981), were transcribed to CMA (Central Mapping Authority) 1: 25 000 topographic mapbases, digitised, and then converted to ArcView 3.1 GIS (Environmental Systems Research Institute Inc.) format for final vegetation map production.

Vegetation classification

The structural classification used for mapping and community description follows Walker and Hopkins (1984), and the general range in height and crown cover for each community is expressed using two or more classes (e.g. mid-high to tall, open to closed forest; simple, tall to very tall closed fan palm forest).

Subformation names for vegetation types other than rainforest are adapted from the classification proposed by Beadle and Costin (1952), e.g. 'wet sclerophyll forest'. The subformation categories of Floyd (1990) are used for rainforests, although the distinction between littoral rainforest and subtropical rainforest has been maintained.

The communities are named after dominant indicator species of the tallest (dominant) stratum, and most could be considered associations using the definition of Beadle (1981): 'a community in which the dominant stratum exhibits uniform floristic composition, the community usually exhibiting uniform structure (also)'. In applying Beadle's definition, it is assumed that a particular stand is structurally uniform if it

spans two or less height classes (after Walker & Hopkins 1984), and two or less crown cover classes. In this way, for example, *Melaleuca quinquenervia* tall open woodland/woodland could be considered a separate association to *M. quinquenervia* tall open/closed forest. As observed in the field, subsidiary (10–30% of total crown cover) or minor (< 10% of total crown cover) associates of the tallest stratum are given in each plant community description. Emergents above the tallest stratum are also noted where present (generally < 5% of total crown cover for the tallest stratum). For strata beneath the tallest stratum, short lists of common species are provided.

Five-digit numeric codes are used for mapping purposes to identify individual plant communities, and also other map units such as cleared land. The decision to use numeric codes in preference to, say, alpha-numeric codes was originally made in the early 1980s to facilitate the compilation of data for fire behaviour modelling using PREPLAN software. At that time numeric codes were generally easier to manipulate and compute.

The first four digits of each code identify the formation, subformation and community. As an illustration, map codes 0000–4999 are reserved for formations in which the tallest stratum is dominated by trees, i.e. forest and woodland. Within the forest and woodland formations, map codes 3500–3999 are used for communities in the dry sclerophyll forest and woodland subformations. Dry sclerophyll forest and woodland in which *Eucalyptus pilularis* is the dominant indicator species has been assigned the map code 3504. A fifth digit is used on vegetation maps to signify the crown cover range of the tallest stratum in each polygon: 1 = mid-dense to dense (e.g. 3504₁ for *E. pilularis* open to closed forest); 2 = very sparse to sparse (e.g. 3504₂ for *E. pilularis* open woodland to woodland); 0 = crown cover variable, or else not determined. The '0' code is only used for 'complex' map units and 'miscellaneous' map units.

In some instances it was not possible to map communities discretely at a scale of 1: 25 000. This situation arose where communities were too fragmented and intermixed (e.g. along foredunes and sea cliffs), or else formed seemingly broad ecotones or 'mixed stands' (after Beadle 1981). In many situations where communities closely intermix, micro-relief varies over small distances. For simplicity of mapping, commonly encountered mixed stands which are perceived to comprise two communities have been assigned a distinct map code (e.g. 40991 for mixed swamp sclerophyll forest stands of *Melaleuca quinquenervia* and *Casuarina glauca*). Less common mixed stands are simply mapped using a dual code (e.g. 64021-65031). Fragmented and intermixed vegetation which comprises more than two communities is often found on foredunes, in saltmarshes, and along seacliffs. In such situations appropriately annotated 'complex' map units are employed. These are Foregone Complex (code 90100), Saltmarsh Complex (code 90200) and Headland Complex (code 90300) respectively. 'Miscellaneous' map units are further used to identify artificial, disturbed or predominantly unvegetated areas, for example clearings (code 92030), urban development (code 92090) and open water (code 91040). Occasionally a stand of vegetation grades from one structural formation into another over too small an area to be further subdivided at the mapping scale employed (e.g. where a forest stand grades into tree mallee or shrubland on its more exposed margins). In such cases the stand was mapped according to the predominant growth form.

The vegetation coding system has been consistently applied to vegetation mapping projects in coastal reserves and other lands of northern NSW (Fig. 2), and to date some 180 plant communities have been delineated and mapped. This vegetation classification and mapping system has formed the basis of fire management in many coastal reserves on the NSW North Coast (e.g. NSW National Parks and Wildlife Service 1997, 1998a,b). Sun et al. (1997) provide a generalised comparison of the vegetation classification and mapping system (as 'NSW NPWS Coastal Vegetation Mapping') with systems in use for other parts of NSW and Australia.

Plot-based sampling

Site stratification

A plot-based survey was undertaken in addition to the vegetation mapping, plant community description and species checklist compilation. The stratification of sites for plot-based sampling was initially attempted using environmental variables (geology, slope, aspect, elevation) and a GIS, rather than air photo patterns. Such a procedure has been employed in several other surveys for the NSW National Parks and Wildlife Service (e.g. Bell 1997, Sheringham & Sanders 1993), particularly in vegetation on rugged sandstone landforms in the Sydney region where changes in aspect and elevation are generally pronounced.

Unfortunately, subsequent attempts to assign sample sites using derived environmental category combinations (e.g. high quartz sedimentary bedrock, 0–2° slope, 0–89° aspect and 0–99 m elevation) proved unsatisfactory, primarily due to resolution limitations for the available GIS environmental layers. As an illustration, the GIS geology layer grouped all Pleistocene and Holocene deposits as 'Quaternary sand and alluvium' regardless of origin, degree of weathering, and soil formation environment. Coastal vegetation patterns, particularly on sand plains and around estuaries, are quite complex. In such areas vegetation patterns may change dramatically with only slight changes in elevation (< 0.5 m), and also with variations in groundwater hydrology which are often more closely linked to soil profile characteristics (e.g. depth and degree of induration of the B horizon) than to elevation above sea level.

In view of the perceived complexity of coastal vegetation, and the relative coarseness of the environmental layers which were available at the time of the survey, all attempts to stratify the vegetation using environmental variables were abandoned in favour of sampling a range of photo patterns. Sample sites were assigned by photo pattern following the preparation of a draft vegetation map (Fig. 3).

Data collection

Floristic data were collected for 49 sites in Booti Booti NP and Yahoo NR using quadrats of fixed size (400 m² wherever possible, but occasionally 200 m² or 100 m² in restricted vegetation types). The sampling was undertaken during the periods February to April 1998 and September 1998, and each site was permanently marked with a numbered metal picket. All vascular species present were recorded and assigned to one of six foliage cover (*sensu* Walker & Hopkins 1984) classes: 1 (< 5%

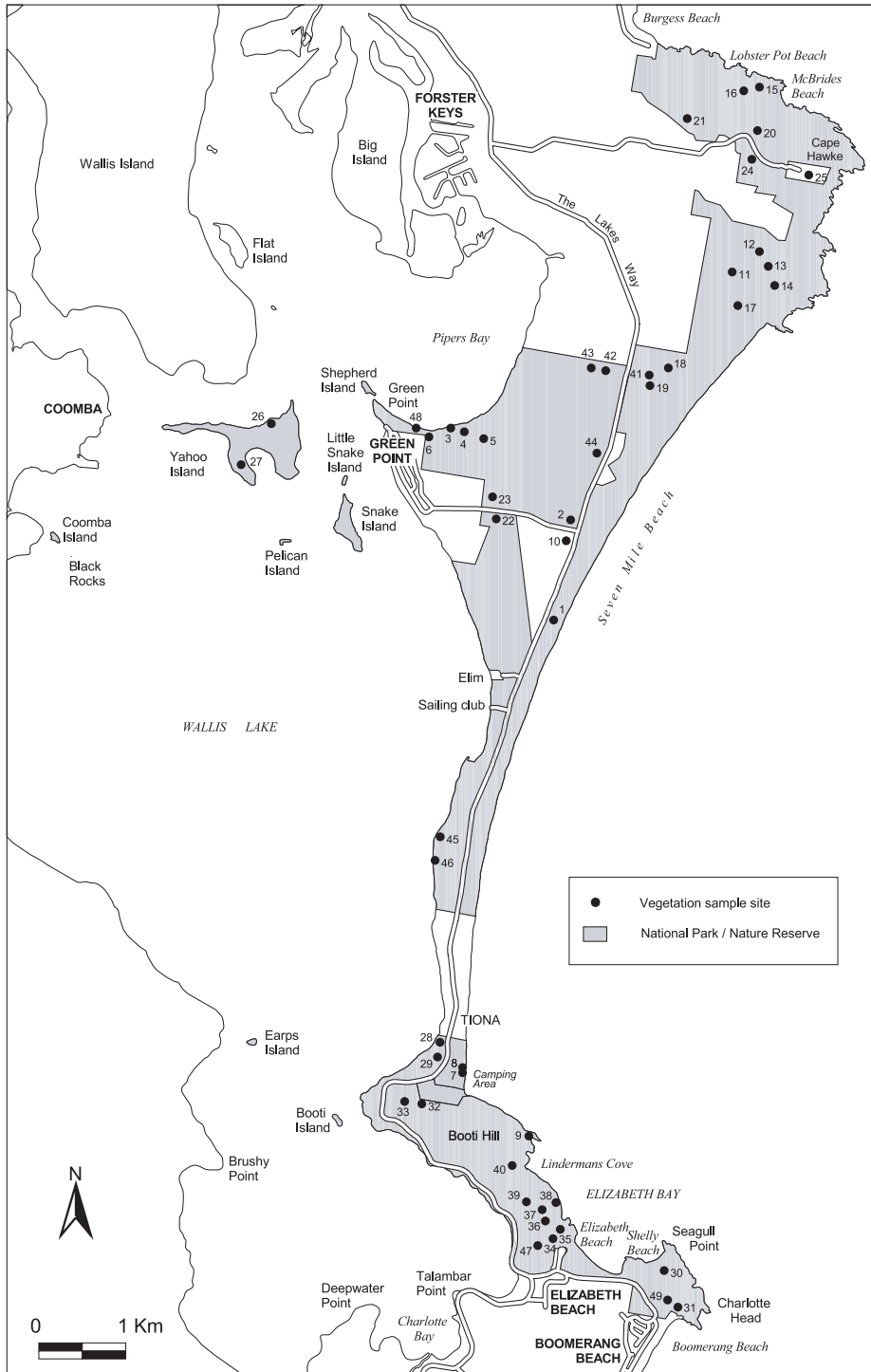


Fig. 3. Location of sites in Booti Booti NP and Yahoo NR at which plot-based sampling was undertaken. Sample sites were stratified on the basis of photo pattern after the preparation of a preliminary vegetation map.

cover and species uncommon); 2 (< 5% and common); 3 (6–20%); 4 (21–50%); 5 (51–75%); and 6 (76–100%). The nomenclature for plant taxa is consistent with current usage at the Royal Botanic Gardens Sydney, and most authorities are provided in Harden (1990–93). Exotic or non-indigenous taxa are prefixed with an asterisk.

The following attributes were also measured or estimated at each site:

- vegetation structure, including the height and foliage cover of each stratum;
- location, aspect, elevation and slope;
- angle to the horizon for the eight principal compass points;
- geology and general soil characteristics;
- topographic position;
- time since the last fire event; and
- forms of disturbance other than fire.

Data are available for all plant communities recognised during the vegetation mapping process, although budgetary constraints restricted the sampling intensity to a single quadrat in all but two communities (two quadrats were placed in each of the latter). The data for each site were recorded on a standard NPWS proforma, and archived with the NPWS, Hunter District.

Numerical analysis

Plant communities perceived from air photo interpretation are primarily distinguished on the basis of structure and, where resolution is adequate, floristic composition of the dominant stratum (and occasionally a second stratum). Plant communities so derived display a degree of floristic homogeneity for the tallest stratum, but this may not be the case for understorey strata. Conversely, it may be possible to distinguish different structural formations on aerial photographs (e.g. shrubland versus heathland), even though there is little obvious difference in floristic composition. All air photo interpretation is also scale dependent, and it is sometimes possible to further subdivide map units with the aid of larger scale photography. The degree of congruence between plant communities derived from air photo interpretation and phytosociological units derived solely from floristics can be examined by the numerical classification of site data.

Forty eight of the 49 sites for which plot-based sampling was undertaken were analysed using the PATN software package (Belbin 1993). One site which sampled young regrowth in a former clearing was excluded from the analysis. The sites were analysed on the basis of full-floristics and foliage cover class scores using the Bray-Curtis dissimilarity measure with the flexible UPGMA (unweighted pair group arithmetic averaging) strategy and a slightly negative (-0.1) beta value.

Results

Introduction

A total of 758 vascular plant taxa have been recorded for Booti Booti NP and Yahoo NR in the present and earlier surveys (Appendix 1). Exotics account for approximately

14% of the flora (104 taxa), although the total number of introduced taxa could be increased with closer examination of disturbed sites (e.g. road verges, picnic areas, former clearings). Disturbed sites were not systematically sampled in the present survey. Further sampling of native vegetation is also likely to increase the number of records of cryptic taxa such as terrestrial orchids.

Of the 654 native taxa known for the reserves, approximately 83% were recorded during fieldwork for the present survey. A similar percentage of native taxa (approximately 78%) is listed in the earlier study of Booti Booti SRA by de Castro Lopo (1980), which includes rainforest records by Clough (1979).

As derived from air photo interpretation and ground survey, 46 plant communities and other vegetation types have been mapped for Booti Booti NP and Yahoo NR (Table 1). This mapping, at a scale of 1: 25 000, is presented as a separate sheet (located in back pocket). The vegetation map is also stored in a GIS maintained by the NSW National Parks and Wildlife Service, both at the Hunter District office (Raymond Terrace) and the Northern Zone office (Coffs Harbour).

In the following discussion each of the plant communities recognised for Booti Booti NP and Yahoo NR is described in terms of its structure, floristic composition, general habitat characteristics, community relations, extent and distribution. This information was compiled using the results of both the plot-based sampling and the fieldwork for vegetation map production. For rainforest communities other than those dominated by *Choricarpia leptopetala*, the descriptions of floristic composition and structure also incorporate information provided by de Castro Lopo (1980), Dodkin (1978) and Floyd (1990, undated).

The distribution of each plant community elsewhere in northern NSW is discussed, primarily by reference to vegetation mapping for other coastal reserves to the north of Booti Booti NP (Fig. 2). Equivalent vegetation types as recognised in other studies are also given where known.

Table 1. Plant communities of Booti Booti National Park and Yahoo Nature Reserve.

The plant communities are named after dominant indicator species of the tallest (dominant) stratum. Five-digit numeric codes are used for mapping purposes to identify individual plant communities. The first four digits of each code identify the formation, subformation and community. A fifth digit (shown in brackets) is used on the vegetation map to signify the crown cover range of the tallest stratum in each polygon: 1 = mid-dense to dense (e.g. open to closed forest); 2 = very sparse to sparse (e.g. open woodland to woodland). Missing codes apply to plant communities not found in Booti Booti NP or Yahoo NR.

* Exotic taxa are prefixed with an asterisk.

Plant Community	Structure	Map Code
FORMATION: forest and woodland		0000-4999
Subtropical rainforest		0000-0499
<i>Livistona australis</i>	simple, tall to very tall closed fan palm forest	0003(1)
Littoral rainforest		0500-0999
<i>Cupaniopsis anacardioides</i>	simple, notophyll-microphyll, low to tall closed forest	0502(1)

Plant Community	Structure	Map Code
<i>Drypetes deplanchei</i> - <i>Sarcomelicope simplicifolia</i> subsp. <i>simplicifolia</i> - <i>Cassine</i> <i>australis</i> var. <i>australis</i> - <i>Podocarpus elatus</i>	simple, notophyll-microphyll, low to very tall closed forest	0505(1)
Dry rainforest		1000-1499
<i>Ficus</i> spp.- <i>Streblus brunonianus</i> - <i>Dendrocnide</i> spp.- <i>Cassine australis</i> var. <i>australis</i>	simple, notophyll, mid-high to tall closed forest	1003(1)
<i>Choricarpia leptopetala</i>	simple, notophyll, low to tall closed forest	1004(1)
Mangrove forest and woodland		2500-2999
<i>Avicennia marina</i> subsp. <i>australasica</i>	low to mid-high open woodland and woodland	2502(2)
Wet sclerophyll forest		3000-3499
<i>Lophostemon confertus</i>	mid-high to very tall, open to closed forest	3002(1)
<i>Eucalyptus grandis</i>	very tall open to closed forest	3004(1)
<i>Eucalyptus pilularis</i>	very tall open to closed forest	3006(1)
<i>Eucalyptus microcorys</i>	very tall open to closed forest	3007(1)
<i>Eucalyptus tereticornis</i>	mid-high to very tall, open to closed forest	3011(1)
<i>Eucalyptus fergusonii</i> subsp. <i>fergusonii</i>	tall to very tall, open to closed forest	3012(1)
<i>Corymbia maculata</i> - <i>Eucalyptus</i> <i>fergusonii</i> subsp. <i>fergusonii</i> - <i>E. acmenoides</i>	very tall open to closed forest	3013(1)
Dry sclerophyll forest and woodland		3500-3999
<i>Eucalyptus pilularis</i>	tall to very tall, open to closed forest	3504(1)
<i>Eucalyptus microcorys</i>	mid-high to very tall, open to closed forest	3508(1)
<i>Eucalyptus tereticornis</i>	mid-high to tall, open woodland to closed forest	3512(1) 3512(2)
<i>Allocasuarina littoralis</i>	low open to closed forest	3513(1)
<i>Angophora costata</i>	mid-high to very tall, open woodland to closed forest	3522(1) 3522(2)
<i>Eucalyptus pilularis</i> - <i>Angophora</i> <i>costata</i>	tall to very tall, woodland to closed forest	3556(1) 3556(2)
<i>Corymbia maculata</i> - <i>Eucalyptus</i> <i>fergusonii</i> subsp. <i>fergusonii</i> - <i>E. acmenoides</i>	mid-high to tall, open to closed forest	3559(1)
<i>Eucalyptus tereticornis</i> - <i>E. microcorys</i>	mid-high to very tall, open to closed forest	3560(1)
<i>Angophora floribunda</i>	low to mid-high, open to closed forest	3561(1)
<i>Corymbia maculata</i>	tall to very tall, open to closed forest	3562(1)
Swamp sclerophyll forest and woodland		4000-4499
<i>Melaleuca quinquenervia</i>	mid-high to very tall, open woodland to closed forest	4003(1) 4003(2)
<i>Casuarina glauca</i>	mid-high to very tall, open woodland to closed forest	4005(1) 4005(2)
<i>Eucalyptus robusta</i> - <i>Melaleuca</i> <i>quinquenervia</i>	mid-high to very tall, open woodland to closed forest	4098(1) 4098(2)
<i>Melaleuca quinquenervia</i> - <i>Casuarina glauca</i>	mid-high to very tall, open woodland to closed forest	4099(1) 4099(2)
FORMATION: mallee forest and woodland		5000-5199
Dry sclerophyll mallee forest and woodland		5000-5099

Plant Community	Structure	Map Code
<i>Eucalyptus pilularis</i>	very tall to extremely tall, mallee woodland and open mallee woodland	5002(2)
Swamp sclerophyll mallee forest and woodland		5100-5199
<i>Eucalyptus robusta</i>	very tall to extremely tall, mallee woodland and open mallee woodland	5102(2)
FORMATION: shrubland (scrub)		5200-5599
Rain-shrubland		5200-5299
<i>Choricarpia leptopetala</i>	simple, notophyll, tall to very tall closed shrubland	5203(1)
Dry sclerophyll shrubland		5400-5499
<i>Banksia aemula</i>	tall to very tall, open to closed shrubland	5402(1)
<i>Melaleuca armillaris</i>	very tall closed shrubland	5404(1)
<i>Leptospermum laevigatum</i>	tall to very tall closed shrubland	5410(1)
* <i>Chrysanthemoides monilifera</i> subsp. <i>rotundata</i> - <i>Acacia sophorae</i>	mid-high to tall closed shrubland	5411(1)
Swamp sclerophyll shrubland		5500-5599
<i>Melaleuca quinquenervia</i>	tall to very tall, sparse to open shrubland	5506(2)
FORMATION: heathland		5800-6099
Dry heathland		5800-5899
<i>Banksia aemula</i> - <i>Allocasuarina simulans</i>	mid-high to tall closed heathland	5804(1)
Intermediate dry heathland	mid-high to tall closed heathland	5899(1)
Graminoid clay heathland		5900-5999
<i>Banksia spinulosa</i> var. <i>collina</i> - <i>Allocasuarina littoralis</i> - <i>Hakea teretifolia</i> - <i>Ptilothrix deusta</i> - <i>Themeda australis</i>	low to mid-high closed heathland	5905(1)
Wet heathland		6000-6099
<i>Banksia oblongifolia</i> - <i>Leptospermum liversidgei</i> - <i>Sporadanthus interruptus</i> - <i>Sprengelia sprengelioides</i> - <i>Xanthorrhoea fulva</i>	mid-high to tall closed heathland	6002(1)
FORMATION: chenopod shrubland		6100-6199
<i>Sarcocornia quinqueflora</i> subsp. <i>quinqueflora</i> - <i>Sporobolus virginicus</i>	dwarf to low, open to closed chenopod shrubland/tussock grassland	6102(1)
FORMATION: tussock grassland		6200-6299
<i>Spinifex sericeus</i>	low to mid-high, sparse to closed tussock grassland	6202(1) 6202(2)
FORMATION: sod grassland		6300-6399
<i>Themeda australis</i>	low to tall closed sod grassland	6302(1)
FORMATION: sedgeland		6400-6499
<i>Baumea juncea</i>	mid-high to tall closed sedgeland	6402(1)
<i>Leptocarpus tenax</i> - <i>Baloskion pallens</i> - <i>Schoenus brevifolius</i>	tall to very tall closed sedgeland	6403(1)
FORMATION: rushland		6500-6599
<i>Juncus kraussii</i> subsp. <i>australiensis</i>	tall to very tall closed rushland	6502(1)
<i>Phragmites australis</i>	very tall closed rushland	6503(1)

Plant community descriptions

Rainforest

Rainforest vegetation covers approximately 17% of Booti Booti NP and Yahoo NR, where it is found on both Carboniferous strata and unconsolidated Quaternary sediments. Five rainforest communities have been recognised for the reserves, and these represent the dry rainforest and subtropical rainforest subformations distinguished by Floyd (1990), with the latter subformation including littoral rainforest. Approximately one third of the native vascular taxa known for the reserves are found in the rainforests.

Livistona australis subtropical rainforest (map code 00031).

Area: 44 ha in Booti Booti NP and Yahoo NR.

Structure: simple, tall to very tall closed fan palm forest.

Floristic composition: *Livistona australis* dominates the tallest stratum (Fig. 4), although *Casuarina glauca*, *Melaleuca quinquenervia*, *Eucalyptus robusta* and *Lophostemon confertus* may be minor associates (< 10%) or emergent (generally < 5%).

Understorey species include *Calochlaena dubia*, *Christella dentata*, *Entolasia marginata*, *Livistona australis*, *Oplismenus aemulus* and *Viola hederacea*, although the immediate ground surface is often largely unvegetated due to shading and litter accumulation.

Habitat and community relations: Primarily occurs on sandy Quaternary sediments along broad open depressions, although also extends into gullies on sedimentary bedrock. Grades into swamp sclerophyll forest, and also into other rainforest communities.

Equivalent vegetation types: Forms part of an *Archontophoenix-Livistona* suballiance circumscribed for NSW by Floyd (1990), and also falls within the broader 'Palm' forest type (No. 7) of the Forestry Commission of NSW (1989). A related *Livistona australis* 'woodland' has been reported for south-eastern Queensland (Elsol & Dowling 1978, McDonald & Elsol 1984).

Distribution in northern New South Wales: Present in Broadwater NP and Hat Head NP. The broader *Archontophoenix-Livistona* suballiance of Floyd (1990) is found in several North Coast reserves, both near and inland of the coastline.



Fig. 4. Subtropical rainforest (simple, tall to very tall closed fan palm forest) dominated by *Livistona australis* (community 00031), with blackened stems from a fire in the 1994/95 fire season. The immediate ground surface is often largely unvegetated due to shading and litter accumulation.

***Cupaniopsis anacardioides* littoral rainforest (map code 05021).**

Area: 11.5 ha in Booti Booti NP, with additional small areas included in a Foredune Complex map unit.

Structure: simple, notophyll-microphyll, low to tall closed forest.

Floristic composition: *Cupaniopsis anacardioides* is characteristic of the equivalent suballiance circumscribed by Floyd (1990), although other tree species which may be locally subsidiary to co-dominant in Booti Booti NP include *Acmena smithii*, *Alectryon coriaceus*, *Banksia integrifolia* subsp. *integrifolia* (which may be more or less emergent), *Drypetes deplanchei*, *Endiandra sieberi*, *Glochidion ferdinandi* var. *ferdinandi*, *Livistona australis*, *Mischocarpus pyriformis* subsp. *pyriformis*, *Planchonella australis* and *Syzygium oleosum*. Vines include *Cissus antarctica*, *Geitonoplesium cymosum*, *Jasminum volubile* and *Stephania japonica* var. *discolor*.

Habitat and community relations: Found in siliceous sand on sheltered aspects of foredune systems, generally quite close to beach fronts. Replaced by other Foredune Complex communities on more exposed aspects.

Equivalent vegetation types: Named after the equivalent suballiance No. 17 of Floyd (1990), and forms part of the broader forest type No. 24 'Tuckeroo' (Forestry Commission of NSW 1989). A comparable *Acronychia imperforata-Cupaniopsis anacardioides* closed forest is recognised for south-eastern Queensland (McDonald & Elsol 1984).

Distribution in northern New South Wales: The *Cupaniopsis anacardioides* suballiance of Floyd (1990) extends along the North Coast of NSW where it is reserved in Bundjalung NP, Yuraygir NP, Hat Head NP, Crowdy Bay NP, Myall Lakes NP, Brunswick Heads NR, Broken Head NR, Iluka NR, Moonee Beach NR, Bundagen FR, Limeburners Creek NR, Sea Acres NR and Kattang NR. Additional areas outside of the reserve system are protected under SEPP 26-Littoral Rainforest.

***Drypetes deplanchei-Sarcomelicope simplicifolia* subsp. *simplicifolia*-*Cassine australis* var. *australis*-*Podocarpus elatus* littoral rainforest (map code 05051).**

Area: 120 ha in Booti Booti NP where found on Booti Hill and Cape Hawke. Additional minor stands are included in a Headland Complex map unit.

Structure: simple, notophyll-microphyll, low to very tall closed forest.

Floristic composition: *Drypetes deplanchei*, *Sarcomelicope simplicifolia* subsp. *simplicifolia*, *Cassine australis* var. *australis* and *Podocarpus elatus* are characteristic dominants of the equivalent suballiance circumscribed by Floyd (1990), although other species which may be locally subsidiary to co-dominant in Booti Booti NP include *Austromyrtus bidwillii*, *Baloghia inophylla*, *Dysoxylum fraserianum*, *Euroschinus falcata* var. *falcata*, *Heritiera actinophylla* and *Olea paniculata*. Vines include *Arthropteris tenella* and *Cissus antarctica*. *Platyserium bifurcatum* is an abundant epiphyte.

Habitat and community relations: Found on relatively steep, boulder-strewn hillslopes across a range of aspects, although these are predominantly easterly to south-easterly. The sedimentary bedrock is composed of greywacke and tuffaceous sandstone (Floyd 1990). The community is extensive on the southern section of Cape Hawke, but tends to be replaced by *Choricarpia leptopetala* dry rainforest (code 10041) on the northern section where the northerly aspects are perhaps less sheltered and more fire-prone.

Equivalent vegetation types: Named after the equivalent suballiance No. 19 of Floyd (1990), and forms part of the broader forest type No. 25 'Headland Brush Box' (Forestry Commission of NSW 1989).

Distribution in northern New South Wales: Floyd (1990) reports the distribution of the suballiance as extending from Gap Beach (Hat Head NP) to Myall Lakes on the NSW North Coast, with a less representative occurrence also present in Royal NP on the Central Coast.

***Ficus* spp.-*Streblus brunonianus*-*Dendrocnide* spp.-*Cassine australis* var. *australis* dry rainforest (map code 10031).**

Area: Occurs on Yahoo NR, and on Booti and Earps Islands in Booti Booti NP. The total area is 7 ha.

Structure: simple, notophyll, mid-high to tall closed forest.

Floristic composition: *Cassine australis* var. *australis*, *Dendrocnide photinophylla*, *Ficus rubiginosa* and *Streblus brunonianus* are some of the characteristic dominants of the equivalent suballiance circumscribed by Floyd (1990), although other species which may be locally subsidiary to

co-dominant in Booti Booti NP and Yahoo NR include *Austromyrtus bidwillii*, *Clerodendrum tomentosum*, *Drypetes deplanchei*, *Olea paniculata* and *Planchonella australis*. Vine species include *Anredera cordifolia*, *Cissus antartica*, *Ipomoea cairica*, *Jasminum volubile* and *Malaisia scandens*.

Habitat and community relations: Occurs on boulder outcrops of islands in Wallis Lake. The bedrock is sedimentary, or more specifically tuffaceous sandstone for Yahoo Island (Floyd 1990). The community can be fringed by swamp sclerophyll forest, and at one location adjoins *Livistona australis* subtropical rainforest.

Equivalent vegetation types: Named after the equivalent suballiance No. 23 of Floyd (1990), and forms part of the broader forest type No. 22 'Yellow Tulipwood' (Forestry Commission of NSW 1989).

Distribution in northern New South Wales: The *Ficus* spp.-*Streblus brunonianus*-*Dendrocnide* spp.-*Cassine australis* var. *australis* suballiance occurs disjunctly along the North Coast of NSW, and continues further south to Milton (Floyd 1990). Other coastal or island reserves of the North Coast in which the suballiance is present are Myall Lakes NP, John Gould Island NR and Snapper Island NR.

***Choricarpia leptopetala* dry rainforest (map code 10041).**

Area: 99 ha in Booti Booti NP where restricted to Cape Hawke.

Structure: simple, notophyll, low to tall closed forest.

Floristic composition: *Choricarpia leptopetala* dominates the tallest stratum, although *Drypetes deplanchei* and *Lophostemon confertus* may be minor to subsidiary associates (up to 30%), with *L. confertus* becoming more or less emergent at some locations. Understorey and vine species include *Gahnia melanocarpa*, *Notelaea longifolia* forma *intermedia*, *Rapanea variabilis* and *Smilax australis*, although the immediate ground surface may be largely unvegetated due to shading and the presence of extensive rock outcrops.

Habitat and community relations: Extensive on boulder-strewn hillslopes and hillcrests in the northern section of Cape Hawke, particularly on north to north-easterly aspects. At these locations the geology is sedimentary. The community is reduced to the shrubland equivalent (code 52031) on more exposed aspects, and is replaced by *Drypetes deplanchei*-*Sarcomelicope simplicifolia*

subsp. *simplicifolia*-*Cassine australis* var. *australis*-*Podocarpus elatus* rainforest (code 05051) along gullies or southerly aspects which are presumably more sheltered and less fire-prone.

Equivalent vegetation types: Named after the *Choricarpia leptopetala* suballiance circumscribed by Floyd (1990), and falls within the broader 'Myrtle' forest type (No. 23) of the Forestry Commission of NSW (1989).

Distribution in northern New South Wales: The *Choricarpia leptopetala* suballiance of Floyd (1990) extends disjunctly along the North Coast of NSW, with limited areas also present on the Central Coast. The suballiance is not known for coastal reserves to the north of Booti Booti NP.

Mangrove woodland

Mangrove vegetation is of very limited extent in Booti Booti NP and Yahoo NR where it occupies approximately 0.15% of the total area. A single community is present, and this is dominated by *Avicennia marina* subsp. *australasica*.

***Avicennia marina* subsp. *australasica* mangrove woodland (map code 25022).**

Area: 2.5 ha in Booti Booti NP and Yahoo NR, with stands in the latter reserve too small to map at a scale of 1: 25 000.

Structure: low to mid-high open woodland and woodland.

Floristic composition: *Avicennia marina* subsp. *australasica* dominates. *Aegiceras corniculatum* is an uncommon understorey shrub. The immediate ground surface is either unvegetated apart from pneumatophores, or else supports lower saltmarsh species such as *Sporobolus virginicus*.

Habitat and community relations: Found on interbedded Quaternary sediments of intertidal flats in the Wallis Lake estuary. Often grades landward into *Sarcocornia quinqueflora* subsp. *quinqueflora*-*Sporobolus virginicus* chenopod shrubland/tussock grassland where inundation by high tides does not occur on a daily basis.

Distribution in northern New South Wales: Occurs in Bundjalung NP, Yuraygir NP, Hat Head NP, Crowdy Bay NP, Ballina NR, Richmond River NR and Limeburners Creek NR. Additional areas outside of the reserve system are designated as Coastal Wetland under SEPP 14.

Equivalent vegetation types: *Avicennia marina* subsp. *australasica* mangrove forest and woodland is widespread along the NSW coast (Beadle 1981, Adam et al. 1988, West et al. 1984), and extends into Queensland (Batianoff & Elsol 1989, Dowling & McDonald 1982, Durrington 1977). The community forms part of forest type No. 33, 'Mangrove' (Forestry Commission of NSW 1989).

Wet sclerophyll forest

Seven wet sclerophyll forest communities have been recognised for Booti Booti NP. As for rainforest, wet sclerophyll forest is found on both Carboniferous strata and unconsolidated Quaternary sediments. Floristically, the wet sclerophyll forests and rainforests of the reserves have much in common. To illustrate this point, approximately half of the native vascular taxa known for the rainforests are also found in wet sclerophyll forests, primarily in understorey strata.

Lophostemon confertus wet sclerophyll forest (map code 30021).

Area: 5.5 ha in Booti Booti NP where restricted to Booti Hill and Charlotte Head.

Structure: mid-high to very tall, open to closed forest.

Floristic composition: *Lophostemon confertus* dominates the tallest stratum, although *Eucalyptus microcorys* may be a minor associate (< 10%). Understorey and vine species include *Cryptocarya rigida*, *Doodia aspera*, *Lastreopsis decomposita*, *Livistona australis* and *Smilax australis*.

Habitat and community relations: Occurs on south-east to south-west facing hillslopes where the bedrock is sedimentary. Associates with rainforest and *Eucalyptus grandis* wet sclerophyll forest. Replaced by *Eucalyptus pilularis* dry sclerophyll forest on aspects which are likely to be more fire-prone.

Distribution in northern New South Wales: Present in Broadwater NP, Bundjalung NP, Yuraygir NP, Hat Head NP, Iluka NR and Lake Innes NR, although generally as small stands.

Equivalent vegetation types: *Lophostemon confertus* reaches its southern distribution limit in the Hunter River valley on the lower North Coast of NSW (Harden 1991). The community falls within the somewhat broader forest type No. 53 ('Brush Box'), which extends along the coast and escarpment of north-eastern NSW (Forestry Commission of NSW

1989). The community also occurs in south-eastern Queensland (Durrington 1977, Elsol 1991, McDonald & Whiteman 1979, Young & McDonald 1989).

Eucalyptus grandis wet sclerophyll forest (map code 30041).

Area: 8 ha in Booti Booti NP on or near Booti Hill.

Structure: very tall open to closed forest.

Floristic composition: *Eucalyptus grandis* dominates the tallest stratum, although *Corymbia intermedia*, *Eucalyptus microcorys*, *E. pilularis*, *Livistona australis*, *Lophostemon confertus* and *Melaleuca quinquenervia* may be present as minor associates (< 10%) or occasionally subsidiary (up to 30%). Understorey species include *Acacia binervata*, *Baloghia inophylla*, *Cupaniopsis anacardioides*, *Gahnia clarkei*, *Lantana camara* and *Livistona australis*.

Habitat and community relations: Generally occurs along sheltered hillslopes and gullies where the bedrock is sedimentary, although also extends onto sandy Quaternary sediments near the base of Booti Hill. Associates with *Lophostemon confertus* and *Eucalyptus microcorys* wet sclerophyll forests, and at one location also adjoins littoral rainforest. Commonly replaced by *Eucalyptus pilularis* dry sclerophyll forest on less sheltered aspects.

Distribution in northern New South Wales: Present in Broadwater NP, Bundjalung NP, Crowdy Bay NP, Moonee Beach NR, Limeburners Creek NR and Lake Innes NR, although generally as very limited stands.

Equivalent vegetation types: *Eucalyptus grandis* reaches its southern distribution limit in the Newcastle area on the lower North Coast (Chippendale 1988, Harden 1991). The community extends north from here along the NSW coast (Beadle 1981, Forestry Commission of NSW 1989, as forest type No. 48 'Flooded Gum'), and is also found in south-eastern Queensland (Elsol & Dowling 1978, McDonald & Whiteman 1979).

Eucalyptus pilularis wet sclerophyll forest (map code 30061).

Area: 7 ha on Booti Hill in Booti Booti NP.

Structure: very tall open to closed forest.

Floristic composition: The tallest stratum is floristically variable, although *Eucalyptus pilularis* accounts for 50% or more of total crown cover.

Subsidiary or co-dominant species include *Eucalyptus grandis*, *E. microcorys*, *E. propinqua* and *Lophostemon confertus*. Understorey species include *Citriobatus pauciflorus*, *Cryptocarya microneura*, *C. rigida*, *Doodia aspera* and *Lophostemon confertus*. Vine species include *Cissus hypoglauca* and *Smilax australis*.

Habitat and community relations: Occurs along south to south-west facing hillslopes and gullies where the bedrock is sedimentary. Grades into *Eucalyptus pilularis* dry sclerophyll forest on less sheltered aspects, with boundaries between the two communities no doubt maintained by fire.

Distribution in northern New South Wales:

Found in Bundjalung NP, Yuraygir NP, Hat Head NP, Dooragan NP, Crowdy Bay NP and Lake Innes NR. Also present in many state forests, and some conservation reserves away from the seaboard.

Equivalent vegetation types: *Eucalyptus pilularis* extends north from the Eden district (Harden 1991), although the community is more extensive further north in coastal NSW (Beadle 1981, Forestry Commission of NSW 1989, as forest type No. 36 'Moist Blackbutt'). *Eucalyptus pilularis* wet sclerophyll forest also occurs in south-eastern Queensland (Elsol 1991, McDonald & Elsol 1984, McDonald & Whiteman 1979).

***Eucalyptus microcorys* wet sclerophyll forest (map code 30071).**

Area: 5.5 ha in Booti Booti NP where restricted to Booti Hill and Elizabeth Beach.

Structure: very tall open to closed forest.

Floristic composition: *Eucalyptus microcorys* dominates the tallest stratum, although *Lophostemon confertus* may be a minor associate (< 10%) or subsidiary (up to 30%). Understorey species include *Cryptocarya rigida*, *Diospyros pentamera*, *Doodia aspera*, *Gahnia melanocarpa* and *Livistona australis*.

Habitat and community relations: The main stands occupy south to south-west facing hillslopes where the bedrock is sedimentary. At a single location with little or no aspect the community is found on sandy Quaternary sediments. On less sheltered aspects the community is replaced by *Eucalyptus pilularis* dry sclerophyll forest. At one location the community adjoins rainforest.

Distribution in northern New South Wales:

Eucalyptus microcorys has a coastal distribution which extends north from the upper Central Coast of NSW into south-eastern Queensland (Chippendale 1988, Harden 1991). The only other coastal reserve on the North Coast of NSW in which the community appears to be present is Lake Innes NR. The equivalent forest type No. 45, 'Tallowwood' is considered to have a restricted distribution in state forests on the North Coast (Forestry Commission of NSW 1989).

Equivalent vegetation types: The Forestry Commission of NSW (1989) recognises a 'Tallowwood' forest type (No. 45).

***Eucalyptus tereticornis* wet sclerophyll forest (map code 30111).**

Area: 7 ha in Booti Booti NP where restricted to the northern section of Cape Hawke.

Structure: mid-high to very tall, open to closed forest.

Floristic composition: *Eucalyptus tereticornis* dominates. Understorey and vine species include *Cassine australis* var. *australis*, *Choricarpia leptopetala*, *Drypetes deplanchei*, *Gahnia aspera*, *Jasminum volubile* and *Notelaea longifolia* forma *intermedia*.

Habitat and community relations: Occurs on north and north-east facing hillslopes where the bedrock is sedimentary. Replaced by rainforest on increasingly sheltered aspects, and by Headland Complex vegetation on aspects which are more exposed to onshore winds.

Distribution in northern New South Wales: Not known from other coastal reserves in northern NSW, although the dry sclerophyll equivalent (code 35121) is present in Bundjalung NP, Yuraygir NP, Hat Head NP, Limeburners Creek NR and Lake Innes NR.

Equivalent vegetation types: *Eucalyptus tereticornis* forest and woodland extends along the NSW coast and onto the Central Western Slopes (Benson 1989, Forestry Commission of NSW 1989, as forest type No. 92 'Forest Red Gum'), although these occurrences would generally lack a mesophytic understorey. Similar forests and woodlands also occur in south-eastern Queensland (Durrington 1977, Elsol 1991, Elsol & Dowling 1978, Young & McDonald 1989).

***Eucalyptus fergusonii* subsp. *fergusonii* wet sclerophyll forest (map code 30121).**

Area: 4 ha in Booti Booti NP where restricted to the southern end of Cape Hawke.

Structure: tall to very tall, open to closed forest.

Floristic composition: *Eucalyptus fergusonii* subsp. *fergusonii* dominates the tallest stratum, although *E. acmenoides* may be a minor associate (< 10%) or subsidiary (up to 30%). Understorey species include *Diospyros australis*, *Gahnia melanocarpa*, **Lantana camara*, *Lomandra longifolia*, *Macrozamia communis* and *Notelaea longifolia* forma *intermedia*.

Habitat and community relations: Occurs on south and south-east facing hillslopes where the bedrock is sedimentary.

Distribution in northern New South Wales: No other occurrences of the community are known. *Eucalyptus fergusonii* subsp. *fergusonii* has a very sporadic distribution which was previously thought to extend from Morisset to Bulahdelah (Harden 1991).

Equivalent vegetation types: Possibly forms part of forest type No. 84, 'Ironbark' (Forestry Commission of NSW 1989).

***Corymbia maculata*-*Eucalyptus fergusonii* subsp. *fergusonii*-*Eucalyptus acmenoides* wet sclerophyll forest (map code 30131).**

Area: 3 ha in Booti Booti NP where restricted to the southern end of Cape Hawke.

Structure: very tall open to closed forest.

Floristic composition: *Corymbia maculata*, *Eucalyptus fergusonii* subsp. *fergusonii* and *Eucalyptus acmenoides* dominate. Understorey species include *Doodia aspera*, *Livistona australis*, *Lomandra longifolia*, *Notelaea longifolia* forma *intermedia*, *Poa labillardieri* and *Pittosporum undulatum*.

Habitat and community relations: Occurs on a south facing hillslope where the bedrock is sedimentary. Grades into *Corymbia maculata*-*Eucalyptus fergusonii* subsp. *fergusonii*-*E. acmenoides* dry sclerophyll forest on less sheltered aspects, with boundaries between the two communities no doubt maintained by fire. Replaced by rainforest on increasingly sheltered aspects.

Distribution in northern New South Wales: No other occurrences of the community are known.

Eucalyptus fergusonii subsp. *fergusonii* has a very sporadic distribution which was previously thought to extend from Morisset to Bulahdelah (Harden 1991).

Equivalent vegetation types: Possibly forms part of forest type No. 74, 'Spotted Gum-Ironbark/Grey Gum' (Forestry Commission of NSW 1989).

Dry sclerophyll forest and woodland

Ten dry sclerophyll forest and woodland communities are recognised for the reserves, and these are found on both sedimentary bedrock and unconsolidated Quaternary sediments. The dry sclerophyll forest and woodland communities share many tallest stratum species in common with the wet sclerophyll forests (e.g. *Corymbia maculata*, *Eucalyptus pilularis*, *E. microcorys*, *E. tereticornis*). Understorey species which are common to the range of dry sclerophyll forests and woodlands include *Imperata cylindrica* var. *major*, *Lomandra longifolia* and *Themeda australis*.

***Eucalyptus pilularis* dry sclerophyll forest (map code 35041).**

Area: 87 ha in Booti Booti NP where restricted to Booti Hill and Charlotte Head.

Structure: tall to very tall, open to closed forest.

Floristic composition: The tallest stratum is floristically variable, although *Eucalyptus pilularis* accounts for 50% or more of total crown cover (Fig. 5). Subsidiary or co-dominant species include *Angophora costata*, *Corymbia intermedia*, *C. maculata*, *Eucalyptus carnea*, *E. microcorys*, *E. propinqua*, *E. resinifera* subsp. *hemilampra* and *E. tereticornis*. Understorey species include *Acacia longifolia*, *Allocasuarina torulosa*, *Imperata cylindrica* var. *major*, *Poa labillardieri* and *Themeda australis*.

Habitat and community relations: Largely restricted to south-westerly aspects on hillslopes where the bedrock is sedimentary. Grades into wet sclerophyll forests of *Eucalyptus grandis*, *E. microcorys* and *E. pilularis* on more sheltered aspects. Often replaced by dry sclerophyll forest dominated by *Eucalyptus microcorys* and/or *E. tereticornis* on seaward aspects.

Distribution in northern New South Wales: Occurs in Broadwater NP, Bundjalung NP, Yuraygir NP, Hat Head NP, Dooragan NP, Crowdy Bay NP, Limeburners Creek NR and Lake Innes NR.



Fig. 5. Dry sclerophyll forest (tall to very tall, open to closed forest) dominated by *Eucalyptus pilularis* (community 35041). Understorey species include *Acacia longifolia*, *Allocasuarina torulosa*, *Imperata cylindrica* var. *major*, *Poa labillardieri* and *Themeda australis*.

Equivalent vegetation types: *Eucalyptus pilularis* extends north from the Eden district on the South Coast of NSW (Harden 1991), and the community is widespread throughout coastal NSW (Beadle 1981, Forestry Commission of NSW 1989, as forest type No. 37 'Dry Blackbutt'). The community also occurs in south-eastern Queensland (Elsol 1991, McDonald & Whiteman 1979).

***Eucalyptus microcorys* dry sclerophyll forest (map code 35081).**

Area: 15.5 ha in Booti Booti NP where restricted to Booti Hill.

Structure: mid-high to very tall, open to closed forest.

Floristic composition: *Eucalyptus microcorys* dominates the tallest stratum, although *Angophora floribunda*, *Eucalyptus carnea*, *E. pilularis*, *E. resinifera* subsp. *hemilampra* and *E. tereticornis* are minor

associates (< 10%). Understorey species include *Acacia maidenii*, *Imperata cylindrica* var. *major*, *Poa labillardieri* and *Themeda australis*.

Habitat and community relations: Occurs on hillslopes across a range of aspects where the bedrock is sedimentary. Often grades into *Eucalyptus tereticornis* dry sclerophyll forest or *E. tereticornis*-*E. microcorys* dry sclerophyll forest (see comment under community 35601). Replaced by *Eucalyptus pilularis* dry sclerophyll forest on aspects facing away from the sea.

Distribution in northern New South Wales: Present in Bundjalung NP, Crowdy Bay NP and Lake Innes NR. The equivalent forest type No. 45, 'Tallowwood' is considered to have a restricted distribution in state forests on the North Coast (Forestry Commission of NSW 1989).

Equivalent vegetation types: *Eucalyptus microcorys* has a coastal distribution which extends north from the upper Central Coast of NSW into south-eastern Queensland (Chippendale 1988, Harden 1991). The equivalent forest type No. 45 is typically a wet sclerophyll forest (Forestry Commission of NSW 1989).

***Eucalyptus tereticornis* dry sclerophyll forest and woodland (map codes 35121, 35122).**

Area: 16 ha in Booti Booti NP where largely restricted to Booti Hill and Charlotte Head.

Structure: mid-high to tall, open woodland to closed forest.

Floristic composition: *Eucalyptus tereticornis* dominates the tallest stratum, although *Casuarina glauca*, *Eucalyptus microcorys*, *E. pilularis* and *E. propinqua* may be present as minor associates (< 10%). Understorey species include *Acacia maidenii*, *Imperata cylindrica* var. *major*, *Lomandra longifolia* and *Themeda australis*.

Habitat and community relations: Generally occurs on north to north-easterly aspects of hillslopes where the bedrock is sedimentary, although at one location found on a flat formed from Quaternary sediments. Often grades into *Eucalyptus microcorys* or *E. tereticornis*-*E. microcorys* dry sclerophyll forest (see comment under community 35601). Replaced by *Eucalyptus pilularis* dry sclerophyll forest on aspects facing away from the sea.

Distribution in northern New South Wales: Present in Bundjalung NP, Yuraygir NP, Hat Head NP, Limeburners Creek NR and Lake Innes NR, although typically as limited stands.

Equivalent vegetation types: Extends along the coast of NSW, and onto the Central Western Slopes (Benson 1989, Forestry Commission of NSW 1989, as forest type No. 92 'Forest Red Gum'). Also occurs in south-eastern Queensland (Durrington 1977, Elsol 1991, Elsol & Dowling 1978, Young & McDonald 1989).

***Allocasuarina littoralis* dry sclerophyll forest (map code 35131).**

Area: Occupies 2.5 ha on Booti Hill and Charlotte Head in Booti Booti NP, with additional small areas included in a Headland Complex map unit.

Structure: low open to closed forest.

Floristic composition: *Allocasuarina littoralis* dominates the tallest stratum, although *Angophora floribunda* and *Eucalyptus tereticornis* may be minor associates (< 10%). Understorey species include **Chrysanthemoides monillifera* subsp. *rotundata*, *Entolasia marginata* and *Lomandra longifolia*.

Habitat and community relations: Occupies north-easterly to easterly hillslopes and low hillslopes close to the sea where the bedrock is sedimentary. Often grades into dry sclerophyll forest of *Eucalyptus pilularis*, *E. microcorys* or *E. tereticornis* on less exposed aspects.

Distribution in northern New South Wales: Present in Yuraygir NP, Hat Head NP, Crowdy Bay NP, Richmond River NR, Limeburners Creek NR, Lake Innes NR and Kattang NR.

Equivalent vegetation types: Has a scattered distribution along the North Coast of NSW, and extends to the Central Coast (Benson & Howell 1990). Benson (1989) also reports a community dominated by *Allocasuarina littoralis* for the Northern Tablelands of NSW, and an equivalent *A. littoralis* 'scrub' (Batianoff & Elsol 1989) or 'thicket' (Durrington 1977) occurs in south-eastern Queensland. *Allocasuarina littoralis* 'scrub' is also known for coastal situations in Victoria (Lunt 1998).

***Angophora costata* dry sclerophyll forest and woodland (map codes 35221, 35222).**

Area: 7 ha in Booti Booti NP where found on Charlotte Head and the southern end of Cape Hawke.

Structure: mid-high to very tall, open woodland to closed forest.

Floristic composition: *Angophora costata* dominates the tallest stratum, although *Eucalyptus pilularis* may be a minor associate (< 10%). Understorey species include **Lantana camara*, *Macrozamia communis*, *Pteridium esculentum* and *Xanthorrhoea macronema*.

Habitat and community relations: Occurs in podzolised sand which mantles the sedimentary bedrock of lower hillslopes. Grades into *Eucalyptus pilularis*-*Angophora costata* dry sclerophyll forest (code 35561), and also adjoins rainforest.

Distribution in northern New South Wales: *Angophora costata* is endemic to NSW where it has a predominantly coastal distribution south from the Evans River (Bale 1992, Harden 1991), although

with some major range disjunctions on coastal sand masses (e.g. between the Hastings and Macleay Rivers). To the north of Booti Booti NP, the community occurs in Yuraygir NP and Crowdy Bay NP.

Equivalent vegetation types: Reported for the Myall Lakes area on the lower North Coast of NSW (Myerscough & Carolin 1986), and also for the Central Coast (Benson 1986). The Forestry Commission of NSW (1989) has a 'Smoothbarked Apple' forest type (No. 105) for stands dominated by *Angophora costata* or *A. leiocarpa* (the latter species was formerly included in *A. costata* s. lat.).

***Eucalyptus pilularis*-*Angophora costata* dry sclerophyll forest and woodland (map codes 35561, 35562).**

Area: 68.5 ha in Booti Booti NP where found on sand masses.

Structure: tall to very tall, woodland to closed forest.

Floristic composition: The tallest stratum is floristically variable, although *Eucalyptus pilularis* accounts for 50% or more of total crown cover. *Angophora costata* is either a minor associate (< 10%), or subsidiary to co-dominant. Understorey species include *Banksia serrata* (which may be more or less continuous in height with the tallest stratum), *Gonocarpus teucrioides*, *Persoonia levis*, *P. linearis*, *Pteridium esculentum*, *Themeda australis* and *Xanthorrhoea macronema*.

Habitat and community relations: Found on well-drained podzolised sands which usually occur as dunes or beach ridges, but occasionally as a mantle over hillslopes where the underlying bedrock is sedimentary. Replaced by swamp sclerophyll forest as soil drainage deteriorates, and by *Eucalyptus pilularis* dry sclerophyll forest (community 35041) on bedrock hills and low hills where a sand mantle is lacking. Adjoins rainforest at some locations.

Distribution in northern New South Wales: Not known for coastal reserves to the north of Booti Booti NP, although a related *Eucalyptus pilularis*-*Angophora costata*/*E. gummifera*/*E. planchoniana* community (code 35061) is found on sand masses in Bundjalung NP, Yuraygir NP and Crowdy Bay NP. To the south of Booti Booti NP, the community occurs in Myall Lakes NP (Myerscough & Carolin 1986).

Equivalent vegetation types: Falls within the broader forest type No. 41, which is commonly referred to as 'Sandhill Blackbutt' (Forestry

Commission of NSW 1989). *Eucalyptus pilularis* is ubiquitous in this forest type, with one or two of *Corymbia gummifera*, *C. intermedia*, *Angophora floribunda* and *A. costata* present as associates in varying combinations. Forms part of a *Eucalyptus pilularis*-*Angophora costata* suballiance circumscribed by Beadle (1981).

***Corymbia maculata*-*Eucalyptus fergusonii* subsp. *fergusonii*-*Eucalyptus acmenoides* dry sclerophyll forest (map code 35591).**

Area: 25 ha in Booti Booti NP where restricted to the southern end of Cape Hawke.

Structure: mid-high to tall, open to closed forest.

Floristic composition: *Corymbia maculata*, *Eucalyptus fergusonii* subsp. *fergusonii* and *Eucalyptus acmenoides* dominate. Understorey species include *Lomandra longifolia*, *Poa labillardieri* and *Themeda australis*.

Habitat and community relations: Occurs on sedimentary bedrock of hillslopes and hillcrests with a predominantly north to north-westerly aspect. Grades into *Corymbia maculata*-*Eucalyptus fergusonii* subsp. *fergusonii*-*E. acmenoides* wet sclerophyll forest on more sheltered aspects, with boundaries between the two communities no doubt maintained by fire.

Distribution in northern New South Wales: No other occurrences of the community are known. *Eucalyptus fergusonii* subsp. *fergusonii* has a very sporadic distribution which was previously thought to extend from Morisset to Bulahdelah (Harden 1991).

Equivalent vegetation types: Possibly forms part of forest type No. 74, 'Spotted Gum-Ironbark/Grey Gum' (Forestry Commission of NSW 1989).

***Eucalyptus tereticornis*-*Eucalyptus microcorys* dry sclerophyll forest (map code 35601).**

Area: 29 ha in Booti Booti NP where restricted to Booti Hill.

Structure: mid-high to very tall, open to closed forest.

Floristic composition: *Eucalyptus tereticornis* and *E. microcorys* dominate the tallest stratum, although *Angophora floribunda*, *Corymbia intermedia* and *E. grandis* may be a minor associates (< 10%) or subsidiary (up to 30%). Understorey species include *Acacia maidenii*, *Imperata cylindrica* var. *major*, *Lomandra longifolia*, *Poa labillardieri* and *Themeda australis*.

Habitat and community relations: Occurs on northerly, north-westerly and south-westerly aspects of hillslopes where the bedrock is sedimentary. The community might be considered transitional between dry sclerophyll forest dominated by *Eucalyptus microcorys* (code 35081), and that dominated by *Eucalyptus tereticornis* (code 35121). All three communities occur in close proximity to each other.

Distribution in northern New South Wales: Other occurrences of the community are not known.

Equivalent vegetation types: Not known, although comments made for dry sclerophyll forest in which *Eucalyptus microcorys* (code 35081) or *Eucalyptus tereticornis* (code 35121) is dominant have some relevance.

***Angophora floribunda* dry sclerophyll forest (map code 35611).**

Area: Only present as small stands on Booti Hill in Booti Booti NP, and here all occurrences are included in a Headland Complex map unit.

Structure: low to mid-high, open to closed forest.

Floristic composition: *Angophora floribunda* dominates the tallest stratum, although *Eucalyptus microcorys* may be a minor associate (< 10%). Understorey species include *Breynia oblongifolia*, *Imperata cylindrica* var. *major*, *Lantana camara* and *Pratia purpurascens*.

Habitat and community relations: Occurs on relatively exposed hillslopes close to sea cliffs where the bedrock is sedimentary. Closely associates with other headland vegetation. Replaced by dry sclerophyll forests of *Eucalyptus microcorys*, *E. pilularis* and *E. tereticornis* on less exposed aspects.

Distribution in northern New South Wales: *Angophora floribunda* reaches the northern limit of its coastal distribution in the Hastings River valley (Leach 1986). The community is not known to be reserved elsewhere on the lower North Coast, although a related community (code 35251) in which *Angophora floribunda* associates with *Corymbia intermedia* and *Banksia serrata* is present as limited stands on Quaternary sand in Limeburners Creek NR, Lake Innes NR, Kattang NR and Crowdy Bay NP.

Equivalent vegetation types: Forms part of the broader 'Rough-barked Apples' forest type No. 129

(Forestry Commission of NSW 1989). Forest and woodland in which *Angophora floribunda* dominates has been reported for sedimentary bedrock in Ku-ring-gai Chase National Park on the Central Coast of NSW (Le Brocq & Buckley 1994).

***Corymbia maculata* dry sclerophyll forest (map code 35621).**

Area: 8.5 ha in Booti Booti NP where restricted to Booti Hill.

Structure: tall to very tall, open to closed forest.

Floristic composition: *Corymbia maculata* dominates the tallest stratum, although *C. intermedia* may be a minor associate (< 10%). Understorey species include *Chrysanthemoides monilifera* subsp. *rotundata*, *Commelina cyanea*, *Imperata cylindrica* var. *major*, *Poa labillardieri* and *Themeda australis*.

Habitat and community relations: Largely restricted to hillcrests and higher hillslopes, in shallow, stoney soil derived from sedimentary rock. Replaced by *Eucalyptus pilularis* dry sclerophyll forest on sheltered south-westerly hillslopes, and by *E. tereticornis* and *E. microcorys* dry sclerophyll forests on hillslopes with a more northerly aspect. Adjoins rainforest at one location.

Distribution in northern New South Wales: *Corymbia maculata* has a mainly coastal distribution which extends south from the Manning River valley on the mid North Coast (Hill & Johnson 1995), and the community is found in a number of state forests across this distribution (Forestry Commission of NSW 1989).

Equivalent vegetation types: Falls within the *Corymbia maculata* s. lat. alliance of Beadle (1981), and the 'Spotted Gum' (*C. variegata*/*C. maculata*/*C. henryi*) forest type (No. 70) of the Forestry Commission of NSW (1989), both of which are described as widespread in coastal NSW.

Swamp sclerophyll forest and woodland

The swamp sclerophyll forest and woodland communities of Booti Booti NP and Yahoo NR are best developed on Quaternary sediments in areas with impeded drainage. Three species, *Casuarina glauca*, *Eucalyptus robusta* and *Melaleuca quinquenervia* characterise the tallest stratum, and the understorey supports various helophytes.

Swamp sclerophyll forest and woodland occupies approximately 15% of the reserves, and supports about 11% of the total number of native vascular taxa.

***Melaleuca quinquenervia* swamp sclerophyll forest and woodland (map codes 40031, 40032).**

Area: 156 ha in Booti Booti NP where the largest stands are found in the vicinity of Green Point.

Structure: mid-high to very tall, open woodland to closed forest.

Floristic composition: *Melaleuca quinquenervia* dominates the tallest stratum, although *Casuarina glauca* and *Eucalyptus robusta* may be present as minor associates (< 10%). Understorey species include *Baloskion tetraphyllum* subsp. *meiostachyum* and *Blechnum indicum*.

Habitat and community relations: Generally occupies broad swamps near sea level where the peaty soils overlie sandy Quaternary sediments. Occasionally extends onto seepage areas associated with low hillslopes and gullies over sedimentary bedrock. Commonly grades into swamp sclerophyll forest and woodland of *Eucalyptus robusta* or *Casuarina glauca* (see vegetation types 40981/2 and 40991/2). Also adjoins a range of other vegetation types including sedgeland, heathland and shrubland.

Distribution in northern New South Wales: Present in all major coastal reserves of northern NSW which sample vegetation on Quaternary sediments. Many additional areas outside the reserve system are designated as Coastal Wetland under SEPP 14.

Equivalent vegetation types: *Melaleuca quinquenervia* has a coastal distribution in NSW north from Botany Bay on the Central Coast (Harden 1991). The community is particularly widespread on the North Coast, although extensive areas have been cleared for agriculture and urban development (Forestry Commission of NSW (1989), as part of forest type No. 31 'Paperbark', Goodrick 1970, Pressey & Griffith 1992). The community is also found in south-eastern Queensland (Batianoff & Elsol 1989, Dowling & McDonald 1976, Durrington 1977, Elsol & Dowling 1978).

***Casuarina glauca* swamp sclerophyll forest and woodland (map codes 40051, 40052).**

Area: 46.5 ha in Booti Booti NP and Yahoo NR, with additional small areas included in a Headland Complex map unit.

Structure: mid-high to very tall, open woodland to closed forest.

Floristic composition: *Casuarina glauca* dominates the tallest stratum, although *Melaleuca quinquenervia* may be present as a minor associate (< 10%). Understorey and vine species include *Baumea juncea*, *Ipomoea cairica* and *Juncus kraussii* subsp. *australiensis*, although the immediate ground surface is often largely unvegetated due to shading and litter accumulation.

Habitat and community relations: Grows in muddy estuarine sediments of flats associated with the Wallis Lake estuary. Limited areas also occur on exposed aspects of coastal hills and headlands. Often forms a landward fringe to saltmarsh vegetation or, in the absence of the latter, lines the shores of Wallis Lake and its islands. Grades into *Melaleuca quinquenervia* swamp sclerophyll forest and woodland under less saline conditions.

Distribution in northern New South Wales: Found in Bundjalung NP, Yuraygir NP, Hat Head NP, Crowdy Bay NP, Ballina NR, Richmond River NR, Moonee Beach NR, Limeburners Creek NR, Lake Innes NR, Kattang NR and Khappinghat NR. Additional areas outside of the reserve system are designated as Coastal Wetland under SEPP 14.

Equivalent vegetation types: Extends along coastal NSW, although floodplain occurrences have been extensively cleared (Adam et al. 1985, Forestry Commission of NSW (1989), as forest type No. 32 'Swamp Oak', Goodrick 1970). Also present in south-eastern Queensland (Batianoff & Elsol 1989, Dowling & McDonald 1976, Elsol & Dowling 1978, McDonald & Whiteman 1979).

***Eucalyptus robusta*-*Melaleuca quinquenervia* swamp sclerophyll forest and woodland (map codes 40981, 40982).**

Area: 28.5 ha in Booti Booti NP.

Structure: mid-high to very tall, open woodland to closed forest.

Floristic composition: *Eucalyptus robusta* and *Melaleuca quinquenervia* dominate the tallest

stratum (Fig. 6). Understorey species include *Baloskion tetraphyllum* subsp. *meiostachyum*, *Blechnum indicum* and *Gahnia clarkei*.

Habitat and community relations: Occupies broad swamps near sea level where the peaty soils are formed over sandy Quaternary sediments. Often grades into *Melaleuca quinquenervia* swamp forest and woodland, or *Eucalyptus robusta* swamp mallee woodland. Also adjoins *Livistona australis* rainforest.

Equivalent vegetation types: This vegetation type category is used for stands of swamp sclerophyll forest and woodland in which the shift in dominance from *Eucalyptus robusta* to *Melaleuca quinquenervia* occurs over areas which are too small to separate at the mapping scale employed. Such shifts in dominance may be a response to subtle changes in microtopography or drainage, although in some

situations *Eucalyptus robusta* and *Melaleuca quinquenervia* seemingly co-occur. This mixing of the two species has also been noted for the Myall Lakes area (Myerscough & Carolin 1986). The vegetation type could be considered a composite of forest type No. 30 'Swamp Mahogany' and forest type No. 31 'Paperbark' (Forestry Commission of NSW 1989).

Distribution in northern New South Wales:

Occurs in Broadwater NP, Bundjalung NP, Yuraygir NP, Hat Head NP, Myall Lakes NP (Myerscough & Carolin 1986), Moonee Beach NR, Limeburners Creek NR and Lake Innes NR. Also found on areas of crown or freehold land (e.g. Evans Head, the Newrybar sand plain near Lennox Head, Frogalla Swamp north of Tuncurry).

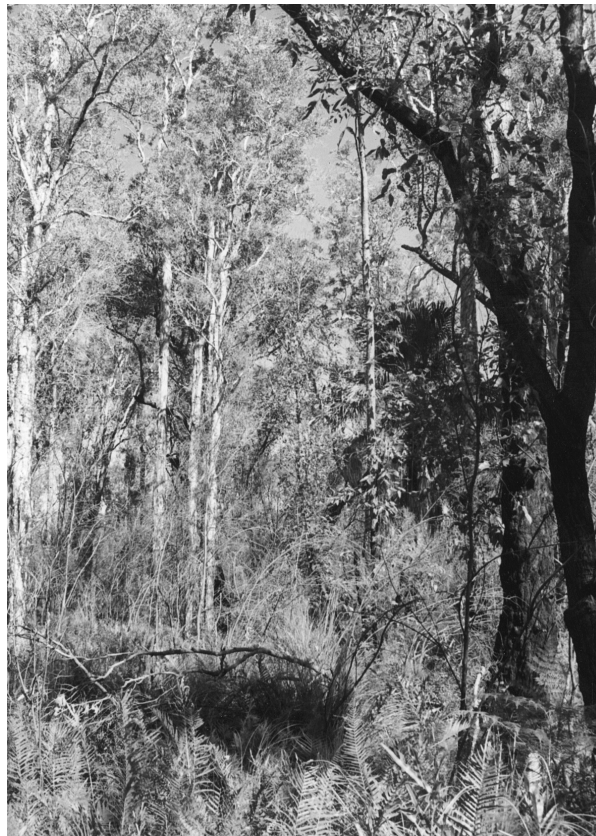


Fig. 6. Swamp sclerophyll forest (tall open forest) dominated by *Melaleuca quinquenervia* and *Eucalyptus robusta* (map code 40981), recovering from a crown fire in late January 1997. *Blechnum indicum* is conspicuous in the ground stratum.

***Melaleuca quinquenervia*-*Casuarina glauca*
swamp sclerophyll forest and woodland
(map codes 40991, 40992).**

Area: 18 ha in Booti Booti NP and Yahoo NR.

Structure: mid-high to very tall, open woodland to closed forest.

Floristic composition: *Melaleuca quinquenervia* and *Casuarina glauca* dominate the tallest stratum. Understorey species include *Baumea juncea*, *Eriochloa procera*, *Hemarthria uncinata*, *Lobelia alata* and *Zoysia macrantha*.

Habitat and community relations: Occurs on flats associated with the Wallis Lake estuary where the soils are derived from Quaternary sediments. Limited areas also occur on hillslopes close to the sea where the bedrock is sedimentary. Often associates with other swamp forest and woodland communities, as well as *Livistona australis* rainforest.

Equivalent vegetation types: This vegetation type category is used for stands of swamp sclerophyll forest and woodland in which the shift in dominance from *Melaleuca quinquenervia* to *Casuarina glauca* occurs over areas which are too small to separate at the mapping scale employed. Such shifts in dominance may be a response to subtle changes in microtopography or hydrology, although in some situations *Melaleuca quinquenervia* and *Casuarina glauca* seemingly co-occur. This mixing of the two species has also been noted for the Myall Lakes area (Myerscough & Carolin 1986). The vegetation type could be considered a composite of forest type No. 31 'Paperbark' and forest type No. 32 'Swamp Oak' (Forestry Commission of NSW 1989).

Distribution in northern New South Wales: Present in Bundjalung NP, Yuraygir NP, Hat Head NP, Myall Lakes NP (Myerscough & Carolin 1986), Ballina NR, Moonee Beach NR, Limeburners Creek NR, Lake Innes NR and Kattang NR. Also present at numerous locations outside the reserve system, and many of these occurrences are designated as Coastal Wetland under SEPP 14.

Mallee woodland

Limited stands of mallee woodland are found in Booti Booti NP where two communities have been recognised. One community dominated by *Eucalyptus robusta* is found in poorly drained

depressions. *Eucalyptus pilularis* dominates the second community, and this is found in a well-drained situation.

***Eucalyptus pilularis* dry sclerophyll mallee
woodland (map code 50022).**

Area: 4 ha along The Lakes Way in Booti Booti NP.

Structure: very tall to extremely tall, mallee woodland and open mallee woodland.

Floristic composition: *Eucalyptus pilularis* dominates the tallest stratum, although *Angophora costata* may be a minor associate (< 10%). Understorey species include *Banksia aemula*, *Coleocarya gracilis*, *Hypolaena fastigiata* and *Lomandra glauca*.

Habitat and community relations: Found in a well-drained sand podzol, on the lower slope of a dune where partly sheltered from onshore winds. Replaced by *Banksia aemula*-*Allocasuarina simulans* dry heathland on more exposed aspects.

Distribution in northern New South Wales:

Appears to have a scattered distribution on sand masses of the NSW North Coast, with other occurrences in Broadwater NP, Bundjalung NP, Yuraygir NP, Crowdy Bay NP and Lake Innes NR.

Equivalent vegetation types: None known, although in some respects the community could be considered a structural variant of *Eucalyptus pilularis*-*Angophora costata* dry sclerophyll forest and woodland (codes 35561/2).

***Eucalyptus robusta* swamp sclerophyll mallee
woodland (map code 51022).**

Area: 30.5 ha in Booti Booti NP.

Structure: very tall to extremely tall, mallee woodland and open mallee woodland.

Floristic composition: *Eucalyptus robusta* dominates. Understorey species include *Balioskion tetraphyllum* subsp. *meiostachyum*, *Dianella caerulea*, *Imperata cylindrica* var. *major* and *Leptospermum polygalifolium*.

Habitat and community relations: Found in peaty soils along open depressions associated with beach ridges and dunes. Often grades upslope into *Banksia aemula* dry sclerophyll shrubland or *B. aemula*-*Allocasuarina simulans* dry heathland.

Distribution in northern New South Wales:

Limited areas occur in Broadwater NP, Crowdy Bay NP, Moonee Beach NR and Lake Innes NR. Small stands also occur on areas of crown or freehold land (e.g. Evans Head, and the Newrybar sand plain near Lennox Head).

Equivalent vegetation types: Although the range of *Eucalyptus robusta* extends along much of the NSW coast (Harden 1991), this mallee community appears to have a very scattered distribution (e.g. Murray 1989, Pressey & Griffith 1992).

Shrubland

Shrubland vegetation is typically greater than 2 m in height, and supports a tallest stratum dominated by woody plants which are multistemmed at or near the base. Occasionally shrublands are less than 2 m high (cf. heathland) where dominated by species which are better classified as shrubs rather than heath shrubs using the criteria of Walker and Hopkins (1984). Shrublands are found in a range of habitats throughout Booti Booti NP, and the following six communities have been recognised for rain-shrubland, dry sclerophyll shrubland and swamp sclerophyll shrubland subformations.

***Choricarpia leptopetala* rain-shrubland (map code 52031).**

Area: 3 ha in Booti Booti NP where restricted to the northern section of Cape Hawke.

Structure: simple, notophyll, tall to very tall closed shrubland.

Floristic composition: *Choricarpia leptopetala* is more or less mono-dominant. Understorey species include *Gahnia aspera* and *Gymnostachys anceps*, although the immediate ground surface is largely unvegetated due to shading and the presence of extensive rock outcrops.

Habitat and community relations: Occupies east and north-east facing hillslopes where exposed to onshore winds. The substrate is sedimentary rock, and this outcrops extensively as boulders. Grades into the forest equivalent, *Choricarpia leptopetala* dry rainforest, on less exposed aspects.

Equivalent vegetation types: A structural variant of the *Choricarpia leptopetala* dry rainforest suballiance circumscribed by Floyd (1990), which

extends to the Central Coast of NSW. The suballiance forms part of forest type No. 23, 'Myrtle' (Forestry Commission of NSW 1989).

Distribution in northern New South Wales: The *Choricarpia leptopetala* suballiance of Floyd (1990) extends disjunctly along the North Coast of NSW, although it is not present in other coastal reserves to the north of Booti Booti NP.

***Banksia aemula* dry sclerophyll shrubland (map code 54021).**

Area: 72 ha in Booti Booti NP.

Structure: tall to very tall, open to closed shrubland.

Floristic composition: *Banksia aemula* is the characteristic dominant of the tallest stratum. *Boronia pinnata*, *Leptospermum polygalifolium*, *L. trinervium*, *Melaleuca nodosa*, *Pteridium esculentum* and other species form a somewhat continuous understorey, certain of which (e.g. *L. polygalifolium*, *L. trinervium*) may merge and associate with *B. aemula* in the absence of fire for long periods. At some locations *Eucalyptus robusta* is present as a scattered tree mallee emergent (< 5%).

Habitat and community relations: Grows in sand podzol soils of beach ridges and dunes. Replaced by *Banksia aemula*-*Allocasuarina simulans* dry heathland on more exposed aspects. Often replaced downslope by wet heathland, swamp sclerophyll forest, or *Eucalyptus robusta* swamp sclerophyll mallee woodland.

Distribution in northern New South Wales: Occurs in Broadwater NP, Bundjalung NP, Yuraygir NP, Hat Head NP, Crowdy Bay NP, Moonee Beach NR and Limeburners Creek NR. Also present on areas of freehold or crown land (e.g. the Newrybar sand plain near Lennox Head).

Equivalent vegetation types: Widespread on the North Coast of NSW, and extends to the Central Coast (Benson & Howell 1990). Also occurs in south-eastern Queensland (Batianoff & Elsol 1989, Dowling & McDonald 1976, Durrington 1977).

***Melaleuca armillaris* dry sclerophyll shrubland (map code 54041).**

Area: 6.5 ha on headlands in Booti Booti NP, with additional small areas included in a Headland Complex map unit.

Structure: very tall closed shrubland.

Floristic composition: *Melaleuca armillaris* is more or less mono-dominant in the tallest stratum. Understorey species include **Chrysanthemoides monilifera* subsp. *rotundata*, *Gahnia aspera* and *Oplismenus imbecillis*, although the immediate ground surface may be largely unvegetated due to heavy shading and the presence of extensive rock outcrops.

Habitat and community relations: Found on relatively steep, south to south-east facing aspects of hillslopes close to the sea. The bedrock is sedimentary, and this outcrops extensively. Associates with several other Headland Complex communities.

Distribution in northern New South Wales: Although *Melaleuca armillaris* has a range which extends into Queensland (Harden 1991), it is not known from coastal headlands of NSW any further north than the Forster area.

Equivalent vegetation types: To the south of Booti Booti NP, the community has been reported for Seal Rocks (Clough 1979). It is also likely to occur elsewhere on the lower North Coast of NSW, as in Myall Lakes NP (Myerscough & Carolin 1986, as part of a 'headland thicket' map unit) and Tomaree NP (Benson 1981, as part of a 'closed-scrub' map unit).

***Leptospermum laevigatum* dry sclerophyll shrubland (map code 54101).**

Area: 26 ha in Booti Booti NP, with additional areas included in Foredune Complex and Headland Complex map units.

Structure: tall to very tall closed shrubland.

Floristic composition: *Leptospermum laevigatum* is more or less mono-dominant in the tallest stratum. Understorey species include **Chrysanthemoides monilifera* subsp. *rotundata*, *Dianella caerulea*, *Lepidosperma concavum* and *Lomandra longifolia*, although the immediate ground surface may be largely unvegetated due to heavy shading.

Habitat and community relations: Grows in well drained siliceous sand of foredunes close to the sea, with limited occurrences also extending onto exposed aspects of bedrock headlands. Associates with a number of other Foredune Complex and Headland Complex communities, although generally replaced by **Chrysanthemoides monilifera* subsp. *rotundata*-*Acacia sophorae* shrubland on more exposed aspects along beach fronts.

Distribution in northern New South Wales: Shrubland or forest stands of *Leptospermum laevigatum* occur in Hat Head NP, Crowdy Bay NP, Limeburners Creek NR and Kattang NR. *Leptospermum laevigatum* reaches its natural northern limit of distribution in the Nambucca Heads area (Harden 1991), although it has been planted further north following sand mining.

Equivalent vegetation types: *Leptospermum laevigatum* is a characteristic species of foredune shrublands (and low forests) along parts of southern Australia, including the Central and South Coasts of NSW (Beadle 1981, Bennett 1994).

****Chrysanthemoides monilifera* subsp. *rotundata*-*Acacia sophorae* dry sclerophyll shrubland (map code 54111).**

Area: Occurs in Booti Booti NP where only mapped as part of a Foredune Complex map unit.

Structure: mid-high to tall closed shrubland.

Floristic composition: **Chrysanthemoides monilifera* subsp. *rotundata* dominates the community, with *Acacia sophorae* present as a subsidiary to minor species (from 30% to < 10%). The immediate ground surface is largely unvegetated due to shading.

Habitat and community relations: Grows in well-drained siliceous sand of Holocene foredunes just above the general zone of influence of high seas. Replaced by *Spinifex sericeus* tussock grassland at lower elevations approaching mean high water level. Often replaced landward by *Leptospermum laevigatum* dry sclerophyll shrubland.

Distribution in northern New South Wales: This community, or the variant *Acacia sophorae* shrubland (code 54081), occurs in all coastal reserves of northern NSW where foredune vegetation is represented.

Equivalent vegetation types: A variant of *Acacia sophorae* shrubland, and only differs in the degree of displacement of *A. sophorae* by the exotic shrub **Chrysanthemoides monilifera* subsp. *rotundata*. *Acacia sophorae* is widespread as a shrubland dominant along the NSW coast (Beadle 1981). *Acacia sophorae* shrubland is also found in south-eastern Queensland (W. McDonald, Queensland Herbarium pers. comm.), although *A. sophorae* reaches its northern distribution limit at Point Arkwright near Coolum (Batianoff & Elsol 1989).

Melaleuca quinquenervia swamp sclerophyll shrubland (map code 55062).

Area: 2.5 ha in Booti Booti NP near the shore of Wallis Lake.

Structure: tall to very tall, sparse to open shrubland.

Floristic composition: *Melaleuca quinquenervia* dominates. Understorey species include *Baumea articulata*, *B. juncea*, *Fimbristylis ferruginea*, *Juncus kraussii* subsp. *australiensis* and *Schoenoplectus littoralis*.

Habitat and community relations: Grows in small swamps near the shore of Wallis Lake where the soil consists of peat over Quaternary sediments. Grades into swamp sclerophyll forest, presumably where drainage improves.

Distribution in northern New South Wales:

Occurs in Broadwater NP, Bundjalung NP, Yuraygir NP, Hat Head NP and Kattang NR, and also present on areas of freehold or crown land (e.g. the Newrybar sand plain near Lennox Head). Most occurrences are of limited extent.

Equivalent vegetation types: Appears to have a limited distribution in NSW, although heathlands in which *Melaleuca quinquenervia* is dominant or co-dominant are recognised for south-eastern Queensland (Batianoff & Elsol 1989, Dowling & McDonald 1976, Durrington 1977).

Heathland

Heathland vegetation is less than 2 m in height, and supports a range of woody species, particularly from the families Proteaceae, Myrtaceae, Epacridaceae, Fabaceae and Rutaceae. Heath shrubs often, but not always, have ericoid leaves. Heathland vegetation is widespread in Booti Booti NP but absent from Yahoo NR. Most of the heathlands in Booti Booti NP are found on podzolised Quaternary sands, although a small area of graminoid clay heathland on Charlotte Head is growing in shallow soil derived from sedimentary rock. Approximately 23% of the total number of native vascular taxa recorded for the reserves are found in heathland.

***Banksia aemula*-*Allocasuarina simulans* dry heathland (map code 58041).**

Area: 89 ha along The Lakes Way in Booti Booti NP.

Structure: mid-high to tall closed heathland.

Floristic composition: *Banksia aemula* and *Allocasuarina simulans* are the characteristic dominants, although other species which may be subsidiary or co-dominant include *Acacia ulicifolia*, *Isopogon anemonifolius*, *Monotoca scoparia* and *Ricinocarpus pinifolius* (Fig. 7).

Habitat and community relations: Grows in sand podzol soils of dunes, on aspects exposed to prevailing onshore winds. Replaced by *Banksia aemula* dry sclerophyll shrubland on more sheltered aspects, and by wet heathland or sedgeland where soil drainage deteriorates.

Distribution in northern New South Wales:

Allocasuarina simulans is endemic to the Forster-Nabiac area (Harden 1990), and the community is only known for Booti Booti NP.

Equivalent vegetation types: None known, although a related *Banksia aemula*-*Allocasuarina littoralis* dry heathland community (code 58031) occurs on the NSW North Coast (e.g. in Broadwater NP, Yuraygir NP, Hat Head NP, Crowdy Bay NP and Kattang NR), as well as in south-eastern Queensland (Batianoff & Elsol 1989). For the Central Coast of NSW, McRae (1990) reports *Allocasuarina distyla* as common in *Banksia aemula* heathland of Bouddi Peninsula. *Allocasuarina simulans* was formerly included in *A. distyla* (*Casuarina distyla*) s. lat.

Intermediate dry heathland (map code 58991).

Area: 26.5 ha in Booti Booti NP.

Structure: mid-high to tall closed heathland.

Floristic composition: Intermediate dry heathland supports a mixture of both dry heathland (58041) and wet heathland (60021) species, for example *Banksia aemula*, *B. oblongifolia*, *Dillwynia floribunda* var. *floribunda*, *Hypolaena fastigiata*, *Leptospermum polygalifolium*, *Sporadanthus interruptus*, *Lomandra glauca* and *Melaleuca nodosa*.

Habitat and community relations: Occurs on podzolised sands of deflated dunes where a shallow watertable is present following periods of high rainfall. Intermediate dry heathland is a feature of very deflated sand masses on the NSW North Coast which display little or no slope and aspect. Where the topography becomes more pronounced, intermediate dry heathland is replaced by dry heathland upslope on dunes and beach ridges, and by wet heathland downslope in swales.



Fig. 7. *Banksia aemula*-*Allocasuarina simulans* dry heathland (mid-high to tall closed heathland; community 58041) recovering from a severe fire in late January 1997.

Distribution in northern New South Wales:

Present in Crowdy Bay NP, Moonee Beach NR and Lake Innes NR. Also found on some areas of freehold or crown land (e.g. the Newrybar sand plain near Lennox Head).

Equivalent vegetation types: For the Myall Lakes area on the lower North Coast of NSW, Myerscough and Carolin (1986) found the boundaries between dry heathland and wet heathland to be somewhat obscure also. Furthermore, for the far North Coast and south-eastern Queensland there are reports of *Banksia aemula* shrubland supporting a ground stratum of 'wet heathland' species in low-lying areas rather than the more typical suite of 'dry heathland' species (Batianoff & Elsol 1989, Griffith 1983).

Banksia spinulosa var. *collina*-*Allocasuarina littoralis*-*Hakea teretifolia*-*Ptilothrix deusta*-*Themeda australis* **graminoid clay heathland** (map code 59051).

Area: 2 ha in Booti Booti NP where restricted to the southern section of Charlotte Head.

Structure: low to mid-high closed heathland.

Floristic composition: *Banksia spinulosa* var.

collina, *Allocasuarina littoralis*, *Hakea teretifolia*, *Ptilothrix deusta* and *Themeda australis* are the characteristic dominants. Other subsidiary to co-dominant species include *Epacris pulchella* and *Gonocarpus tetragynus*. Grasses and sedges form a large component of the above-ground biomass, hence the use of the term 'graminoid'.

Habitat and community relations: Restricted to a steep, south-facing hillslope close to the ocean where exposed to high levels of salt accretion. The stony soil is formed over sedimentary rock. Replaced by forest and woodland on northerly aspects, and also on lower slopes where sand mantles the bedrock. Also adjoins stands of *Melaleuca armillaris* shrubland.

Distribution in northern New South Wales: Not known to occur elsewhere, although closely related communities are discussed below.

Equivalent vegetation types: Forms part of the *Allocasuarina littoralis*-*Banksia oblongifolia* (syn. *Casuarina littoralis*-*Banksia asplenifolia*) 'headland heath' alliance of Beadle (1981). Similar graminoid clay heathland communities are found on headlands

and exposed coastal hills elsewhere on the North Coast of NSW. These include a *Banksia oblongifolia-Allocasuarina littoralis-Hakea teretifolia-Aristida warburgii-Ptilothrix deusta* community (code 59031) on rhyolite in Crowdy Bay NP, a *B. oblongifolia-A. littoralis-H. teretifolia-A. warburgii-Themedea australis* community (code 59041) on adamellite in Hat Head NP and Arakoon SRA, and a *B. oblongifolia-A. littoralis-A. warburgii-P. deusta* community (code 59021) on sedimentary rock in Yuraygir NP. Related communities in which *Allocasuarina littoralis* is replaced by *A. distyla* also occur on the lower North Coast (Benson 1981) and Central Coast (McRae 1990). Similar heathland vegetation is found on trachyte and rhyolite in south-eastern Queensland (Batianoff & Elsol 1989), for example on Mount Cooloom (S.J.G. pers.observ. 1999).

***Banksia oblongifolia-Leptospermum liversidgei-Sporadanthus interruptus-Sprengelia sprengelioides-Xanthorrhoea fulva* wet heathland (map code 60021).**

Area: 34.5 ha in Booti Booti NP.

Structure: mid-high to tall closed heathland.

Floristic composition: Floristically variable, although three or more of *Banksia oblongifolia*, *Leptospermum liversidgei*, *Sporadanthus interruptus*, *Sprengelia sprengelioides* and *Xanthorrhoea fulva* usually co-dominate. Other subsidiary or co-dominant species are *Callistemon citrinus*, *Dillwynia floribunda* var. *floribunda*, *Lepidosperma neesii*, *Lepyrodia scariosa* and *Melaleuca nodosa*. The incidence of fire may explain some of the variation in floristic composition, as certain species are obligate seeders (e.g. *Sprengelia sprengelioides*, *Dillwynia floribunda* var. *floribunda*). Under a suitable fire regime, the serotinous obligate seeder *Banksia ericifolia* var. *macrantha* may overtop lower heath shrub species to form a closed shrubland.

Habitat and community relations: Grows in humus podzol and peaty podzol soils of dune swales where humic groundwater remains close to the ground surface for extended periods. Often replaced by *Banksia aemula-Allocasuarina simulans* dry heathland or *Banksia aemula* dry sclerophyll shrubland upslope as soil drainage improves. Replaced by sedgeland downslope where standing water accumulates.

Distribution in northern New South Wales:

Found in Broadwater NP, Bundjalung NP, Yuraygir NP, Hat Head NP, Crowdy Bay NP, Myall Lakes NP (Myerscough & Carolin 1986), Moonee Beach NR, Limeburners Creek NR, Lake Innes NR and Khappinghat NR. Also present on some areas of freehold or crown land (e.g. Evans Head, and the Newrybar sand plain near Lennox Head).

Equivalent vegetation types: Widespread over much of the NSW North Coast, extending south to the Myall Lakes area (Myerscough & Carolin 1986). Equivalent communities are also recognised for south-eastern Queensland (Batianoff & Elsol 1989, Clifford & Specht 1979, Durrington 1977, Elsol & Dowling 1978). *Leptospermum liversidgei* reaches its southern distribution limit on the lower North Coast at Port Stephens (McNair 1992), as does *Sporadanthus interruptus* (Harden 1993). The remaining three species after which the community is named extend further south (Harden 1991, 1992).

Chenopod shrubland, tussock grassland and sod grassland

Chenopod shrubland, tussock grassland and sod grassland communities are found in what could be considered extreme habitats along estuaries, sea cliffs and beaches. The following three communities have been recognised for Booti Booti NP, and one is also found in Yahoo NR.

***Sarcocornia quinqueflora* subsp. *quinqueflora*-*Sporobolus virginicus* chenopod shrubland/tussock grassland (map code 61021).**

Area: 19.5 ha in Booti Booti NP and Yahoo NR, with additional small areas included in a Saltmarsh Complex map unit. Occurrences of the community in Yahoo NR are too small to map discretely at a scale of 1: 25 000.

Structure: dwarf to low, open to closed chenopod shrubland/tussock grassland.

Floristic composition: *Sarcocornia quinqueflora* subsp. *quinqueflora* (a chenopod shrub) and *Sporobolus virginicus* (a tussock grass) can co-exist in mixed stands, or alternatively zonation may occur over short distances (with boundaries gradational, and generally unmappable at the scale employed). Occasionally one or other of the two species is mono-dominant over larger areas. *Casuarina glauca* may be present as a scattered emergent (< 5%).

Habitat and community relations: Found on interbedded Quaternary sediments of tidal flats associated with the Wallis Lake estuary (Fig. 8). Often replaced by *Juncus kraussii* subsp. *kraussii* rushland upslope, and may be replaced by *Avicennia marina* subsp. *australasica* mangrove woodland downslope closer to mean high tide level.

Distribution in northern New South Wales: Present in Bundjalung NP, Yuraygir NP, Hat Head NP, Crowdy Bay NP, Moonee Beach NR, Limeburners Creek NR and Lake Innes NR. Additional areas outside of the reserve system are designated as Coastal Wetland under SEPP 14.

Equivalent vegetation types: This variable community, which could be further subdivided on the basis of relative dominance by the characteristic species (Adam et al. 1988), or else treated as a community complex (Zedler et al. 1995), extends along the NSW coast and into southern Queensland (Adam et al. 1988, Beadle 1981, Dowling & McDonald 1976, Elsol & Dowling 1978).

***Spinifex sericeus* tussock grassland (map codes 62021, 62022).**

Area: Occurs in Booti Booti NP where only mapped as part of a Fore-dune Complex map unit.

Structure: low to mid-high, sparse to closed tussock grassland.

Floristic composition: *Spinifex sericeus* dominates, although species which may be subsidiary to minor associates (30% to < 10%) include **Cakile maritima*, *Carpobrotus glaucescens*, **Chrysanthemoides monilifera* subsp. *rotundata*, **Conyza bilbaoana*, *Scaevola calendulacea* and *Zoysia macrantha*.

Habitat and community relations: Grows in relatively unstable sands of foredunes just above high water level. Often replaced by **Chrysanthemoides monilifera* subsp. *rotundata*-*Acacia sophorae* shrubland at slightly higher elevations.

Distribution in northern New South Wales: Occurs in all reserves of northern NSW which sample fore-dune vegetation.



Fig. 8. *Sarcocornia quinqueflora* subsp. *quinqueflora*-*Sporobolus virginicus* dwarf to low, open to closed chenopod shrubland/tussock grassland (community 61021) on tidal flats associated with the Wallis Lake estuary.

Equivalent vegetation types: Widespread along the NSW coast (Benson 1989), and also extends into south-eastern Queensland (Batianoff & Elsol 1989, Durrington 1977).

***Themeda australis* sod grassland (map code 63021).**

Area: Occurs in Booti Booti NP where only mapped as part of a Headland Complex map unit.

Structure: low to tall closed sod grassland.

Floristic composition: *Themeda australis* is the characteristic dominant, although closely intertwined heath shrubs, sedges and rushes such as *Abildgaardia ovata*, *Lomandra longifolia* and *Pimelea linifolia* may be subsidiary or minor associates (generally < 10%). Species such as *Banksia integrifolia* subsp. *integrifolia*, *Casuarina glauca*, *Isolepis nodosa* and *Westringia fruticosa* may be present as scattered emergents (< 5%).

Habitat and community relations: Occupies very exposed seaward slopes of headlands, in black headland soils (after Parbery 1947) formed from sedimentary rock under high levels of cyclic salt accession. Replaced by a range of other headland forest and shrubland communities on less exposed aspects.

Distribution in northern New South Wales: Found in Bundjalung NP, Yuraygir NP, Hat Head NP, Crowdy Bay NP, Moonee Beach NR, Limeburners Creek NR and Kattang NR. Also present on a number of headlands outside the reserve system (e.g. Evans Head).

Equivalent vegetation types: Widespread on the North Coast of NSW (Griffith 1992, Quint 1982), and extends further south (Adam et al. 1989, Beadle 1981, Benson 1986, Benson & Howell 1990, McRae 1990). Also occurs in south-eastern Queensland (Batianoff & Elsol 1989).

Sedgeland and rushland

The sedgelands of Booti Booti NP and Yahoo NR are dominated by species from the families Cyperaceae and Restionaceae, whereas the rushlands are dominated by either *Juncus kraussii* subsp. *australiensis* or *Phragmites australis*. Two sedgeland communities and two rushland communities are recognised for the reserves. Collectively these communities support approximately 6% of the native vascular taxa known for the reserves.

***Baumea juncea* sedgeland (map code 64021).**

Area: 24 ha in Booti Booti NP and Yahoo NR, with additional small areas included in a Saltmarsh Complex map unit.

Structure: mid-high to tall closed sedgeland.

Floristic composition: *Baumea juncea* dominates. *Sporobolus virginicus* may be present as a shorter but continuous species beneath *B. juncea*. At some locations *Melaleuca quinquenervia* is present as a scattered emergent (< 5%).

Habitat and community relations: Found in solonchak soils of supratidal flats associated with the Wallis Lake estuary. Grades into *Juncus kraussii* subsp. *kraussii* rushland or *Sarcocornia quinqueflora* subsp. *quinqueflora*-*Sporobolus virginicus* chenopod shrubland/tussock grassland downslope closer to mean high tide level. Often grades landward into swamp forest or woodland dominated by *Casuarina glauca* and/or *Melaleuca quinquenervia*.

Distribution in northern New South Wales: Present in Broadwater NP, Bundjalung NP, Yuraygir NP, Hat Head NP, Crowdy Bay NP, Moonee Beach NR, Limeburners Creek NR and Lake Innes NR. Additional areas outside of the reserve system are designated as Coastal Wetland under SEPP 14.

Equivalent vegetation types: Extends along the Central Coast of NSW (Adam et al. 1988, Kratochvil et al. 1973), and also occurs in Victoria (Head 1988) and south-eastern Queensland (Beadle 1981).

***Leptocarpus tenax*-*Baloskion pallens*-*Schoenus brevifolius* sedgeland (map code 64031).**

Area: 36.5 ha in Booti Booti NP, predominantly in the vicinity of Green Point.

Structure: tall to very tall closed sedgeland.

Floristic composition: A floristically variable community. *Leptocarpus tenax*, *Baloskion pallens* and *Schoenus brevifolius* are characteristic dominants, although one (occasionally two) of these may be replaced by such species as *Baumea arthropphylla* and *B. teretifolia*. Certain heath shrubs (e.g. *Callistemon pachyphyllus*, *Melaleuca thymifolia*) can also make a significant contribution to crown cover.

Habitat and community relations: Found in acid peat soils of dunal swamps where standing water is

present for extended periods. Replaced by wet heathland and dry heathland upslope as soil drainage improves.

Distribution in northern New South Wales:

Present in Bundjalung NP, Yuraygir NP, Hat Head NP, Crowdy Bay NP, Limeburners Creek NR and Lake Innes NR. Additional areas outside of the reserve system are designated as Coastal Wetland under SEPP 14.

Equivalent vegetation types: The community shares many species in common with a somewhat broader *Empodisma minus* (syn. *Calorophus minor*)-*Leptocarpus tenax* alliance described for south-eastern Queensland and NSW by Beadle (1981). *Leptocarpus tenax*, *Baloskion pallens*, *Schoenus brevifolius* and *Baumea teretifolia* are characteristic of a sedgeland community delineated for Tomaree NP on the lower North Coast of NSW by Bell (1997). A related sedgeland of *Leptocarpus tenax*, *Schoenus brevifolius* and other species has been described for the Gosford-Lake Macquarie area on the Central Coast of NSW (Benson 1986). Similar communities also occur in south-eastern Queensland (Batianoff & Elsol 1989, Dowling & McDonald 1976, Elsol & Dowling 1978).

***Juncus kraussii* subsp. *australiensis* rushland (map code 65021).**

Area: 2.5 ha in Booti Booti NP and Yahoo NR, with additional small areas included in a Saltmarsh Complex map unit.

Structure: tall to very tall closed rushland.

Floristic composition: *Juncus kraussii* subsp. *australiensis* dominates. *Sporobolus virginicus* may be present as a shorter but continuous species beneath *J. kraussii* subsp. *australiensis*. *Casuarina glauca* is sometimes present as a scattered emergent (< 5%).

Habitat and community relations: Found on interbedded Quaternary sediments of supratidal flats associated with the Wallis Lake estuary. Often grades into *Baumea juncea* sedgeland upslope, and into *Sarcocornia quinqueflora* subsp. *quinqueflora*-*Sporobolus virginicus* chenopod shrubland/tussock grassland downslope closer to mean high tide level.

Distribution in northern New South Wales:

Found in Broadwater NP, Bundjalung NP, Yuraygir NP, Hat Head NP, Crowdy Bay NP, Moonee Beach NR,

Limeburners Creek NR and Lake Innes NR. Additional areas outside of the reserve system are designated as Coastal Wetland under SEPP 14.

Equivalent vegetation types: Widespread on the North Coast of NSW, and extends to the Central and South Coasts (Adam et al. 1988, Beadle 1981, Benson 1986, Goodrick 1970, Kratochvil et al. 1973). Also present in south-eastern Queensland (Batianoff & Elsol 1989, Durrington 1977).

***Phragmites australis* rushland (map code 65031).**

Area: 2 ha in Booti Booti NP and Yahoo NR, with additional small areas included in a Saltmarsh Complex map unit.

Structure: very tall closed rushland.

Floristic composition: *Phragmites australis* dominates. *Baumea juncea*, *Fimbristylis ferruginea* and *Juncus kraussii* subsp. *australiensis* may be present as shorter but continuous species beneath *Phragmites australis*. *Casuarina glauca* can be present as a scattered emergent (< 5%).

Habitat and community relations: Found in solonchak soils of supratidal flats associated with the Wallis Lake estuary. Often grades into *Baumea juncea* sedgeland, and also adjoins swamp sclerophyll forest and woodland.

Distribution in northern New South Wales:

Present elsewhere on the mid North Coast in Hat Head NP, Limeburners Creek NR, Lake Innes NR and Khappinghat NR, although generally as very limited stands. Also reported for Myall Lakes NP on the lower North Coast (Myerscough & Carolin 1986). Additional areas outside of the reserve system are designated as Coastal Wetland under SEPP 14.

Equivalent vegetation types: *Phragmites australis* rushland is found on a number of coastal floodplains in northern NSW (Pressey 1981, 1987a,b; Pressey & Griffith 1987), and estuarine occurrences of the community are also reported for NSW by others (e.g. Adam et al. 1988, Brockhoff 1988). A *Phragmites australis* suballiance is recognised by Beadle (1981) for the coast of eastern and south-eastern Australia, and also for some inland rivers and lakes.

Vegetation complexes

Complex map units have been used to delineate groups of plant communities where the individual

communities are too small or intermixed to map separately at a scale of 1: 25 000. The following three complex map units have been applied to foredune, saltmarsh and headland vegetation in Booti Booti NP.

Foredune Complex (map code 90100).

The main constituent communities of the Foredune Complex are *Leptospermum laevigatum* dry sclerophyll shrubland (code 54101), **Chrysanthemoides monilifera* subsp. *rotundata*-*Acacia sophorae* dry sclerophyll shrubland (code 54111) and *Spinifex sericeus* tussock grassland (codes 62021/2), although limited areas of *Cupaniopsis anacardioides* littoral rainforest (code 05021) and *Melaleuca quinquenervia* swamp sclerophyll forest (code 40031) are also likely.

Other species may also dominate in the Foredune Complex over small areas, for example *Banksia integrifolia* subsp. *integrifolia*, *Carex pumila*, *Lomandra longifolia*, *Scaevola calendulacea* and *Zoysia macrantha*. **Chrysanthemoides monilifera* subsp. *rotundata* is prevalent in the complex, and **Casuarina equisetifolia* subsp. *incana* has been planted at some locations. Much of the complex is regeneration following sand mining.

Saltmarsh Complex (map code 90200).

The main constituent communities of the Saltmarsh Complex are *Sarcocornia quinqueflora* subsp. *quinqueflora*-*Sporobolus virginicus* chenopod shrubland/tussock grassland (code 61021), *Baumea juncea* sedgeland (code 64021) and *Juncus kraussii* subsp. *australiensis* rushland (code 65021), with small areas of *Avicennia marina* subsp. *australasica* mangrove woodland (code 25022), *Phragmites australis* rushland (code 65031) and unvegetated mudflat also likely.

Other species may dominate in the Saltmarsh Complex over minor localised areas, for example *Paspalum vaginatum* or *Schoenoplectus litoralis*.

Headland Complex (map code 90300).

The main constituent communities of the Headland Complex are *Allocasuarina littoralis* dry sclerophyll forest (code 35131), *Angophora floribunda* dry sclerophyll forest (code 35611), *Casuarina glauca* swamp sclerophyll forest (code 40051), *Melaleuca armillaris* dry sclerophyll shrubland (code 54041) and *Themeda australis* sod grassland (code 63021).

Other communities which are likely to be present in the complex as limited stands are *Livistona australis* subtropical rainforest (code 00031), *Cupaniopsis anacardioides* littoral rainforest (code 05021), *Drypetes deplanchei*-*Sarcomelicope simplicifolia* subsp. *simplicifolia*-*Cassine australis* var. *australis*-*Podocarpus elatus* littoral rainforest (code 05051), *Choricarpia leptopetala* dry rainforest (code 10041), *Melaleuca quinquenervia* swamp sclerophyll forest (code 40031), *Choricarpia leptopetala* rain-shrubland (code 52031) and *Leptospermum laevigatum* dry sclerophyll shrubland (code 54101). On very exposed aspects, forest communities may grade into shrublands.

Other species can dominate in the Headland Complex over small localised areas, for example *Banksia integrifolia* subsp. *integrifolia* or *Westringia fruticosa*. **Chrysanthemoides monilifera* subsp. *rotundata* is prevalent in the complex, and exotic grasses such as **Pennisetum clandestinum* occur as localised infestations.

Miscellaneous map units

Miscellaneous map units are used to identify artificial, disturbed or predominantly unvegetated areas, for example clearings (code 92030), urban development (code 92090) and open water (code 91040). Yahoo NR is in a relatively natural state, although approximately 7% of Booti Booti NP is in a cleared or otherwise disturbed condition (road easements and regenerated mine paths excluded), particularly on the Cape Hawke hill complex.

Numerical analysis

The numerical analysis using PATN (Belbin 1993) produced a hierarchical, agglomerative polythetic classification of the 48 plot-based sites. The results are presented as a dendrogram (Fig. 9).

In the interpretation of hierarchical classifications such as the one produced here, any decision as to the selection of the most meaningful number of final floristic groups is still subjective and largely rests on the current level of ecological understanding (see Kent & Coker 1992). This dilemma is further compounded by a lack of sample site replication, as is the case in the present study other than for *Drypetes deplanchei-Sarcomelicope simplicifolia* subsp. *simplicifolia*-*Cassine australis* var. *australis*-*Podocarpus elatus* littoral rainforest (Sites 13 and 25) and *Choricarpia leptopetala* dry rainforest (Sites 20 and 24).

If, for arguments sake, the number of floristic groups were to be constrained at the level for which the replicate rainforest sites combine (dissimilarity coefficient of approximately 0.55 on Fig. 9), a number of other sites also merge. These groups of merging sites include:

- Sites 32, 34 and 36: *Eucalyptus tereticornis* dry sclerophyll forest/woodland (DSF/W), *E. microcorys* DSF and *E. tereticornis*-*E. microcorys* DSF, all of which have obvious tallest stratum affinities, and many understorey species in common;
- Sites 11 and 14: *Corymbia maculata*-*Eucalyptus fergusonii* subsp. *fergusonii*-*E. acmenoides* wet sclerophyll forest (WSF) and *E. fergusonii* subsp. *fergusonii* WSF, which have tallest stratum affinities, and many understorey species in common;
- Sites 37, 39 and 40: *Eucalyptus pilularis* WSF, *E. microcorys* WSF and *Lophostemon confertus* WSF, all of which share many common understorey species, with the tallest stratum species also interchanging as subsidiary or minor associates rather than dominants (e.g. *E. microcorys* as a subsidiary or minor tallest stratum species in *E. pilularis* WSF and *L. confertus* WSF);
- Sites 19 and 41: *Banksia oblongifolia*-*Leptospermum liversidgei*-*Sporadanthus interruptus*-*Sprengelia sprengelioides*-*Xanthorrhoea fulva* wet heathland and intermediate dry heathland, which are topographically contiguous, and have many species in common;
- Sites 10 and 18: *Banksia aemula*-*Allocasuarina simulans* dry heathland and *Eucalyptus pilularis* dry sclerophyll mallee woodland, with the latter having an understorey of typical 'dry heathland' species;
- Sites 23 and 43: *Melaleuca quinquenervia* swamp sclerophyll forest/woodland (SSF/W) and *Eucalyptus robusta*-*M. quinquenervia* SSF/W, which have tallest stratum affinities, and many understorey species in common;
- Sites 3 and 4: *Juncus kraussii* subsp. *australiensis* rushland and *Sarcocornia quinqueflora* subsp. *quinqueflora*-*Sporobolus virginicus* chenopod shrubland/tussock grassland, which are often topographically contiguous, with *S. virginicus* extending beneath *J. kraussii* subsp. *australiensis*;

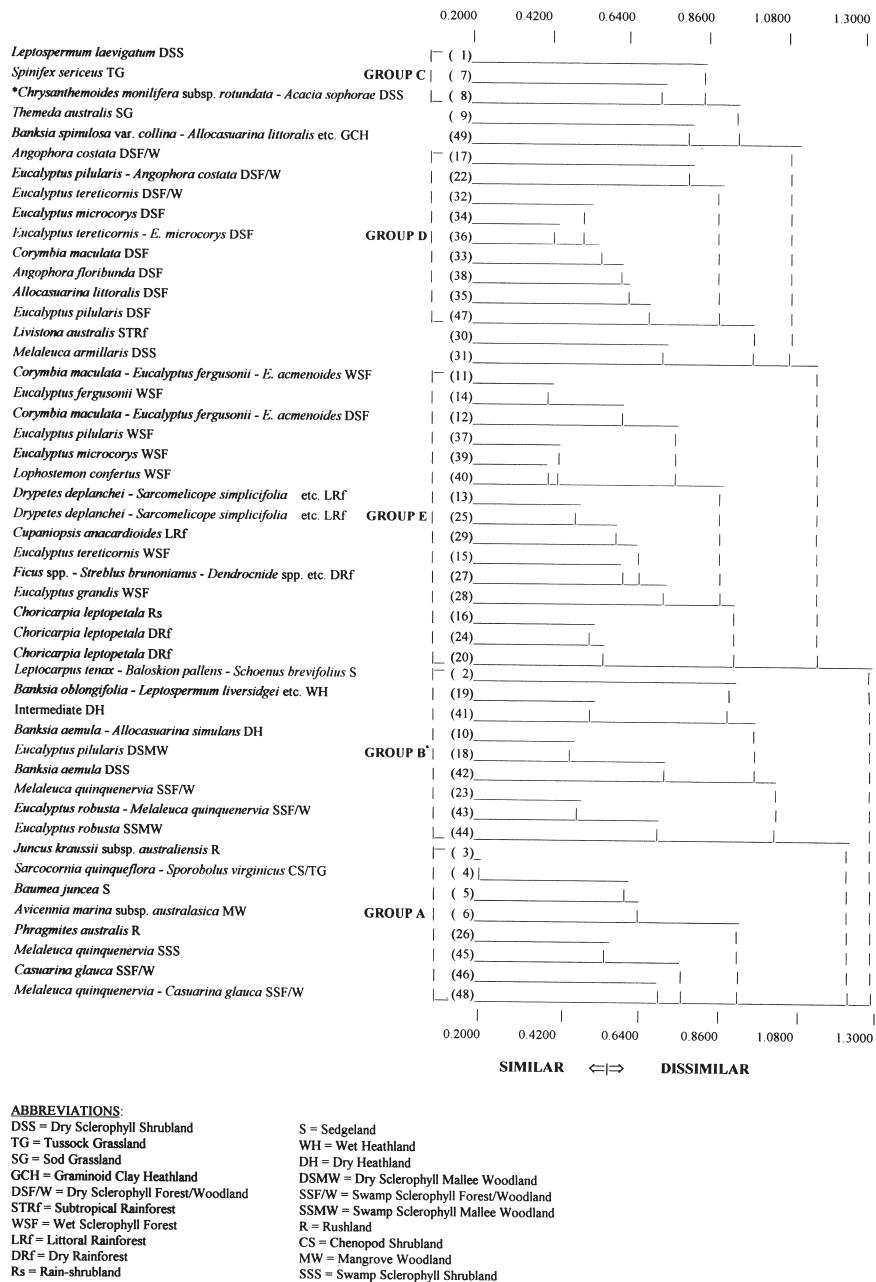


Fig. 9. Dendrogram showing the relationships between 48 sites in Booti Booti NP and Yahoo NR on the basis of full-floristics and foliage cover class scores using the Bray-Curtis dissimilarity measure.

- Sites 26 and 45: *Phragmites australis* rushland and *Melaleuca quinquenervia* swamp sclerophyll shrubland, which occupy similar habitats and share several species in common.

Based on the above illustration, it would be possible to amalgamate some of the plant communities delineated by means of air photo interpretation. For example, *Eucalyptus tereticornis* DSF/W, *E. microcorys* DSF and *E. tereticornis*-*E. microcorys* DSF could all be amalgamated into a single map unit. However, it would be unwise to do so given the limited extent of the data set used for analysis, especially where other workers have recognised a difference between, for example *Juncus kraussii* subsp. *australiensis* rushland and *Sarcocornia quinqueflora* subsp. *quinqueflora*-*Sporobolus virginicus* chenopod shrubland/tussock grassland (Adam et al. 1988, Beadle 1981), or *Eucalyptus pilularis* WSF and *Lophostemon confertus* WSF (Elsol 1991, Forestry Commission of NSW 1989, McDonald & Whiteman 1979), or forests and woodlands of *Eucalyptus tereticornis* and *E. microcorys* (Forestry Commission of NSW 1989). More utilitarian reasons relating to reserve management are also likely to exist for not amalgamating some of the communities derived from air photo interpretation, for example maintaining the distinction between *Melaleuca quinquenervia* SSF/W and *Eucalyptus robusta*-*M. quinquenervia* SSF/W for the purpose of linking the movement of koalas with the distribution of *Eucalyptus robusta*, a favoured food tree.

Issues of vegetation classification aside, the hierarchical analysis provides some insight into the ecological relationships of the various plant communities defined by air photo interpretation. Some of these relationships are discussed below.

The group of sites comprising Site 3 through to Site 48 (denoted Group A on Fig. 9) are all associated with the Wallis Lake estuary, either as saltmarsh and mangrove vegetation or as fringing swamp forests, swamp woodlands and swamp shrubland.

The group of sites comprising Site 2 through to Site 44 (denoted Group B) are all associated with the older sand mass areas of Booti Booti NP. These sites remain floristically distinct from the foredune communities of Sites 1, 7 and 8 (denoted Group C).

Banksia spinulosa var. *collina*-*Allocasuarina littoralis*-*Hakea teretifolia*-*Ptilothrix deusta*-*Themeda australis* graminoid clay heathland (Site 49) appears to be floristically more similar to *Themeda australis* sod grassland (Site 9) than it is to other heathland communities associated with the old sand masses (Group B). These graminoid clay heathland and sod grassland communities are restricted to exposed aspects of headlands where the soils have formed from sedimentary bedrock.

Despite an obvious overlap in floristic composition for the tallest stratum, the dry sclerophyll forest and woodland communities from Site 17 through to Site 47 (denoted Group D) are more alike with each other than they are with the wet sclerophyll forest (and rainforest) communities in Group E. The one exception is *Corymbia maculata*-*Eucalyptus fergusonii* subsp. *fergusonii*-*E. acmenoides* DSF (Site 12), which links with the wet sclerophyll forest equivalent (Site 11), and another wet sclerophyll community in which *E. fergusonii* subsp. *fergusonii* dominates in the absence of *Corymbia maculata* (Site 14). This outcome presumably reflects the exclusive fidelity of *E. fergusonii* subsp. *fergusonii* to the communities represented by sites 11, 12 and 14. This species has a very

restricted distribution in the reserves where it is confined to Cape Hawke, and it was not recorded in any other communities.

During the field survey for vegetation map preparation, it became apparent that three of the rainforest communities recognised for the reserves using the suballiance typology of Floyd (1990) share many species in common. These three floristically related suballiances are *Cupaniopsis anacardioides* littoral rainforest (Site 29), *Drypetes deplanchei*-*Sarcomelicope simplicifolia* subsp. *simplicifolia*-*Cassine australis* var. *australis*-*Podocarpus elatus* littoral rainforest (Sites 13 and 25), and *Ficus* spp.-*Streblus brunonianus*-*Dendrocnide* spp.-*Cassine australis* var. *australis* dry rainforest (Site 27). The present hierarchical analysis, superficial though it is, would suggest that the aforementioned rainforest suballiances are floristically similar, yet collectively distinct from *Livistona australis* subtropical rainforest (Site 30) and *Choricarpia leptopetala* dry rainforest (Sites 20 and 24).

Significant plant species

Forty four (6.7%) of the 654 native vascular plant taxa recorded for Booti Booti NP and Yahoo NR in the present and earlier surveys are considered to be of conservation significance (Table 2). Five of the taxa, *Allocasuarina defungens*, *A. simulans*, *Chamaesyce psammogeton*, *Cynanchum elegans* and *Senna acclinis*, are listed under the NSW *Threatened Species Conservation (TSC) Act 1995*. A sixth taxon, *Eucalyptus fergusonii* subsp. *fergusonii*, is listed on the Rare or Threatened Australian Plants (ROTAP) schedule (after Briggs & Leigh 1996). The remaining 38 taxa either approach or reach their distribution limit in the reserves, or are in some way restricted.

A further five taxa of Booti Booti NP, although widespread on coastal sand masses in northern NSW nonetheless reach their southern distribution limit in the Port Stephens area of the lower North Coast, approximately 60 km to the SSW. These taxa are: *Aotus lanigera* (Bell 1997), which was previously thought to extend northwards from Taree (Harden 1991); *Leptospermum liversidgei* (McNair 1992), previously known as far south as Myall Lakes (Harden 1991); *Sporadanthus interruptus* (Harden 1993); *Leucopogon lanceolatus* var. *gracilis* (Harden 1992); and *Leucopogon leptospermoides* (Harden 1992).

Management issues

Fire

Fire management in Booti Booti NP and Yahoo NR will largely be a matter of fire exclusion in the short term, in view of the extent and severity of fires in the last 5–10 years. For the longer term there is a relative paucity of habitat-specific information about the fire behaviour of individual plant species in the reserves other than general post-fire regeneration responses (e.g. Griffith & Williams 1997). Little is also known about the impact of season of burn, the extent to which post-fire weather patterns influence recruitment, and the significance of fire heterogeneity and micro-site variation. Nonetheless, in the absence of further research it is possible to apply

generalised fire interval classes to the different plant communities of the reserves using guidelines developed by the NSW National Parks and Wildlife Service (refer NSW National Parks and Wildlife Service 1997, 1998a,b). Mitigating factors which relate to the generalised fire interval classes are discussed at length in Griffith et al. (1999). These mitigating factors include post-fire weed encroachment, the proximity of 'fire-tolerant' vegetation to 'fire-sensitive' vegetation, the likely impact of peat fires, the severity of a recent unplanned crown fire, anecdotal evidence for already depleted seed pools in certain obligate seed regenerator species, the fire behaviour of significant plant species, and likely shifts in floristic composition where fire is excluded.

Exotic species

Several particularly aggressive weeds are present in Booti Booti NP and Yahoo NR, and some of these pose a serious threat to the long-term viability of native vegetation. **Chrysanthemoides monilifera* subsp. *rotundata* (Bitou Bush) is present as extensive infestations along foredunes and sea cliffs where it is actively displacing native vegetation. **Lantana camara* (Lantana) is also widespread, particularly in former clearings on the Cape Hawke hill complex and along gullies and moist hillslopes elsewhere. **Anredera cordifolia* (Madeira Vine) is present in dry rainforest on Booti Island and Earps Island in Wallis Lake where it blankets the canopy and ground surface. **Anredera cordifolia* was first reported for Booti Island in 1980 (de Castro Lopo 1980). Another vine, **Ipomoea cairica* (Five-leaf Morning Glory), has the potential to degrade areas of swamp sclerophyll forest and woodland associated with the Wallis Lake estuary. **Ipomoea cairica* forms vine towers on saplings, especially those of *Casuarina glauca*, and this can lead to the death of saplings through competition for sunlight. This may be the case in Yahoo NR where many *Casuarina glauca* stems lie on the ground covered in what appear to be the remains of **Ipomoea cairica*. The shrub **Baccharis halimifolia* (Groundsel Bush) is also considered a threat to the estuarine vegetation of Wallis Lake. Only two plants of this species were observed during the present survey, and both were found in Yahoo NR (and subsequently removed). **Baccharis halimifolia* dominates the understorey of some swamp sclerophyll forests along estuaries on the far North Coast of NSW (e.g. Ballina NR and the Iluka Peninsula), and it has the potential to behave in a similar manner on the lower North Coast. Exotic grasses such as **Pennisetum clandestinum* (Kikuyu) persist in former clearings on headlands close to the sea. Exotic grasses have also invaded severely trampled vegetation, e.g. where 4WD vehicles have damaged *Themeda australis* sod grassland.

Unrestricted access

Unrestricted 4WD vehicle, trail bike and pedestrian access has the potential to further degrade native vegetation, particularly in saltmarsh areas, along foredunes, and in *Themeda australis* sod grassland and graminoid clay heathland on headlands. Rubbish dumping is also a problem along tracks and fire trails where public access is unrestricted.

Table 2. Significant vascular plants of Booti Booti National Park and Yahoo Nature Reserve.

The source of each record is given thus: ¹ = recorded during the present survey; ² = recorded in de Castro Lopo (1980), which includes rainforest data by Clough (1979); ³ = recorded by Floyd (1990, undated); ⁴ = recorded in Dodkin (1978), ⁵ = recorded by M. Matthes and A. Bofeldt (in Muggeridge 1999). The general fire response of each taxon (rainforest taxa excluded) is given where known.

ROTAP = Rare or Threatened Australian Plants schedule (after Briggs & Leigh 1996); TSC = NSW Threatened Species Conservation Act (1995).

Species	Significance	Fire Response
<i>Allocasuarina defungens</i> (Casuarinaceae) ¹	Occurs at southern distribution limit in Forster area. Endangered (Schedule 1 of TSC Act; ROTAP 2E).	Resprouts (Griffith & Williams 1997)
<i>Allocasuarina simulans</i> (Casuarinaceae) ^{1,2}	Endemic to Forster and Nabiac areas in vicinity of Wallis Lake (Harden 1990). Vulnerable (Schedule 2 of TSC Act; ROTAP 2VCa).	Resprouts (Griffith & Williams 1997)
<i>Banksia ericifolia</i> var. <i>macrantha</i> (Proteaceae) ^{1,2}	Restricted to coastal habitats of NSW north from Forster area (Harden 1991).	Adults killed (Griffith & Williams 1997)
<i>Callistemon citrinus</i> (Myrtaceae) ^{1,2}	Although distribution extends from Victoria to Queensland (Harden 1991), not known to occur on coastal sand masses of NSW to north of Forster area.	Resprouts (Griffith & Williams 1997)
<i>Cassinia aculeata</i> (Asteraceae) ¹	Forster is northern distribution limit (Harden 1992).	Adults killed (Benson & McDougall 1994)
<i>Centratherum punctatum</i> subsp. <i>australianum</i> (Asteraceae) ¹	Occurrence in Booti Booti NP represents a southern extension of previously known distribution limit at Wingham, approximately 45 km to NW (Harden 1992).	Not known
<i>Chamaesyce psammogeton</i> (formerly <i>Chamaesyce sparrmanii</i>) (Euphorbiaceae) ¹	Uncommon species of sand dunes near the sea, and endemic to Qld, NSW and Lord Howe Island (Harden 1990, Heyligers 1998). Endangered (Schedule 1 of TSC Act).	Not known, but habitat not fire-prone
<i>Cleistanthus cunninghamii</i> (Euphorbiaceae) ^{1,2,3}	Reaches southern limit of coastal distribution in Booti Booti NP (Floyd 1990).	Rainforest taxon
<i>Coleocarya gracilis</i> (Restionaceae) ¹	Reaches southern distribution limit in Myall Lakes area, approximately 20 km to SSW (Harden 1993, Myerscough & Carolin 1986).	Resprouts (Griffith & Williams 1997)
<i>Cryptandra ericoides</i> (Rhamnaceae) ¹	Previously only known to occur south from Sydney area (Harden 1990).	Adults killed (S.J.G. pers. observ. 1998)
<i>Cynanchum carnosum</i> (Asclepiadaceae) ^{1,2,4}	Records for Wallis Lake area represent a southern extension of previously known distribution limit (Harden 1992).	Not known, but possibly resprouts from rootstock
<i>Cynanchum elegans</i> (Asclepiadaceae) ¹	Endangered (Schedule 1 of TSC Act).	Not known, but possibly resprouts from rootstock
<i>Desmodium nemorosum</i> (Fabaceae) ^{1,2}	Reaches southern distribution limit in Booti Booti NP (refer Harden 1991).	Not known
<i>Durringtonia paludosa</i> (Rubiaceae) ¹	A monotypic species, endemic to coastal lowlands of northern NSW and south-eastern Qld where restricted to swampy habitats (Harden 1992, Henderson & Guymer 1984).	Resprouts (Griffith & Williams 1997)
<i>Eucalyptus fergusonii</i> subsp. <i>fergusonii</i> (Myrtaceae) ^{1,2,3}	A very sporadic distribution, previously thought to extend from Bulahdelah to Morisset on lower North Coast and upper Central Coast of NSW (Harden 1991). Poorly known (ROTAP 3KC-).	Probably resprouts
<i>Galactia</i> species A (Fabaceae) ¹	Apparently uncommon on North Coast of NSW.	Not known
<i>Ixora beckleri</i> (Rubiaceae) ^{2,3}	Reaches southern distribution limit in Forster area (Harden 1992).	Rainforest taxon

Species	Significance	Fire Response
<i>Jagera pseudorhus</i> var. <i>pseudorhus</i> f. <i>pseudorhus</i> (Sapindaceae) ¹	Reaches southern distribution limit in Myall Lakes NP, approximately 20 km to SSW (M. Dodkin, NPWS pers. comm.). Previously known as far south as Black Head, approximately 16 km to the NNW (Floyd 1989).	Rainforest taxon
<i>Kennedia prostrata</i> (Fabaceae) ²	Occurrence in Booti Booti NP represents a range extension northwards from Port Stephens (Harden 1991) and Myall Lakes (McNair 1992, Myerscough & Carolin 1986) areas of lower North Coast of NSW.	Not known
<i>Keraudrenia hillii</i> var. <i>hillii</i> (Sterculiaceae) ²	Occurrence in Booti Booti NP represents a range extension northwards from Port Stephens (Harden 1990) and Myall Lakes (McNair 1992) on lower North Coast of NSW. Considered rare.	Not known
<i>Leptospermum semibaccatum</i> (Myrtaceae) ¹	Harden (1991) has Forster as southern distribution limit.	Resprouts (Griffith & Williams 1997)
<i>Macrozamia communis</i> (Zamiaceae) ^{1,2,3}	Has a near-coastal distribution in north of range (Hill 1998). Reaches northern limit at Hallidays Point, approximately 16 km to NNW.	Resprouts (French & Westoby 1996)
<i>Marsdenia lloydii</i> (Asclepiadaceae) ²	Reaches southern distribution limit in Wang Wauk State Forest, approximately 30 km to WSW (S. Griffith in NPWS database, Northern Zone).	Rainforest taxon
<i>Melaleuca armillaris</i> (Myrtaceae) ^{1,2}	Although range extends into Queensland (Harden 1991), not known from coastal headlands of NSW any further north than Forster area.	Adults killed (Griffith & Williams 1997)
<i>Monococcus echinophorus</i> (Phytolaccaceae) ^{2,4}	Reaches southern distribution limit in Forster area, and considered uncommon in NSW (Harden 1990).	Rainforest taxon
<i>Morinda acutifolia</i> (Rubiaceae) ⁴	Reaches southern distribution limit in Dungog area, approximately 80 km to WSW (A.G. Floyd in NPWS database, Northern Zone). Considered uncommon in NSW (Harden 1992).	Rainforest taxon
<i>Ochrosperma lineare</i> (Myrtaceae) ^{1,2}	Harden (1991) has Forster as southern distribution limit.	Adults killed (Griffith & Williams 1997)
<i>Opercularia varia</i> (Rubiaceae) ¹	Records for Booti Booti NP represent a range extension from previously known northern limit in vicinity of Karuah (Harden 1992) and Myall Lakes (Myerscough & Carolin 1986) on lower North Coast of NSW.	Adults killed (Griffith & Williams 1997)
<i>Parietaria debilis</i> (Urticaceae) ²	Apparently uncommon on North Coast of NSW (refer Harden 1990).	Not known, but an annual species
<i>Parsonia induplicata</i> (Apocynaceae) ¹	Reaches southern distribution limit at Stroud, approximately 55 km WSW of Booti Booti NP (Harden 1992).	Not known, but possibly resprouts from rootstock
<i>Persoonia katerae</i> (Proteaceae) ¹	Endemic to NSW where found on coastal sands between Hastings River on mid North Coast and Myall Lakes on lower North Coast (Harden 1991).	Not known
<i>Pisonia umbellifera</i> (Nyctaginaceae) ^{1,2,3}	Considered widespread but not common in coastal NSW (Harden 1990).	Rainforest taxon
<i>Planchonella myrsinoides</i> (Sapotaceae) ^{1,2,3}	Reaches southern distribution limit in Forster area (Harden 1990).	Rainforest taxon
<i>Poa poiliformis</i> (Poaceae) ¹	Records for Yahoo NR and also Kattang NR south of Port Macquarie (S.J.G. pers. observ.) represent a range extension northwards from Port Stephens on lower North Coast of NSW (Harden 1993).	Not known, but possibly resprouts

Species	Significance	Fire Response
<i>Pterostylis concinna</i> (Orchidaceae) ²	Occurrence in Booti Booti NP represents a range extension north from Mudgee area on Central Western Slopes of NSW (Harden 1993).	Resprouts
<i>Pultenaea blakelyi</i> (Fabaceae) ^{1,2}	Records for Booti Booti NP represent a range extension northwards from Myall Lakes, approximately 20 km to the SSW (Harden 1991).	Adults killed (Benson & McDougall 1996)
<i>Randia benthamiana</i> (Rubiaceae) ^{2,3}	Reaches southern distribution limit in Forster area (Harden 1992).	Rainforest taxon
<i>Ripogonum discolor</i> (Ripogonaceae) ^{2,3,4}	Reaches southern distribution limit in Myall Lakes area, approximately 20 km to the SSW (Harden 1993).	Rainforest taxon
<i>Senna acclinis</i> (Fabaceae) ⁵	Rare (ROTAP 3RC-). Endangered (Schedule 1 of TSC Act).	Rainforest taxon
<i>Tetratheca ericifolia</i> (Tremandraceae) ²	Distribution extends south from Nabiac area on NW side of Wallis Lake (Harden 1992).	Not known, but possibly resprouts
<i>Tripladenia cunninghamii</i> (Uvulariaceae) ^{1,2}	Distribution extends north from Myall Lakes area, approximately 20 km to the SSW (Harden 1993).	Not known, but possibly resprouts from a rhizome
<i>Tylophora paniculata</i> (Asclepiadaceae) ¹	Apart from an apparent outlier in Sydney region (A. Bofeldt in NPWS database, Northern Zone), reaches southern distribution limit at Williams River on lower North Coast of NSW (Harden 1992).	Not known, but possibly resprouts from rootstock
<i>Westringia fruticosa</i> (Lamiaceae) ^{1,2}	Apart from small remnant populations in vicinity of Wallabi Point, approximately 25 km north of Booti Booti NP (S.J.G. pers. observ.), reaches northern distribution limit in Forster area (Harden 1992).	Resprouts (Griffith & Williams 1997)
<i>Xanthosia tridentata</i> (Apiaceae) ¹	Records for Booti Booti NP, Old Bar near Taree (Greater Taree City Council 1996), and Tomaree NP on lower North Coast (Bell 1997) appear to represent a range disjunction northwards from Mount White on Central Coast of NSW (Harden 1992).	Adults killed (Griffith & Williams 1997)

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Appendix 1. Vascular plants of Booti Booti National Park and Yahoo Nature Reserve.

Taxa are listed alphabetically by family and genus within classes. The nomenclature is consistent with current usage at the Royal Botanic Gardens Sydney, and most authorities are given in Harden (1990–93).

The checklist is a compilation of records from the following sources.

- ¹ = Recorded during the present survey (plot-based sampling and incidental records along foot traverses), or an earlier investigation by Griffith (1987).
² = Recorded in a detailed study of the former Booti Booti State Recreation Area by de Castro Lopo (1980). The work of de Castro Lopo also includes rainforest data by Clough (1979).
³ = Recorded by Floyd (1990, undated).
⁴ = Recorded in Dodkin (1978).
⁵ = Record of *Senna acclinis* by M. Matthes and A. Bofeldt (in Muggeridge 1999).

A small number of records from sources other than the present survey have not been included in the checklist because they seem doubtful. Any voucher specimens for these records will need to be located and further examined.

Although the checklist is considered comprehensive, further fieldwork is likely to produce additional records for cryptic taxa such as terrestrial orchids. It is also probable that a closer examination of disturbed sites (e.g. roadsides and rest areas) will yield additional records for exotics. Exotic taxa are prefixed with an asterisk.

Index of codes:

The plant communities are named after dominant indicator species of the tallest (dominant) stratum. Each community (or other map unit) has a unique five-digit numeric code. The fifth digit of each code (highlighted in brackets in the index) is used for mapping purposes to signify the crown cover range of the tallest stratum in each polygon: 1 = mid-dense to dense (e.g. open to closed forest); 2 = very sparse to sparse (e.g. open woodland to woodland); 0 = crown cover variable, or else not determined. The '0' code is only used for 'complex' map units (e.g. Foredune Complex) and 'miscellaneous' map units (e.g. cleared land). Missing codes apply to plant communities or other map units not found in Booti Booti NP or Yahoo NR.

Map Code	Plant community or other map unit
	FOREST AND WOODLAND
	Subtropical rainforest
0003(1)	<i>Livistona australis</i>
	Littoral rainforest
0502(1)	<i>Cupaniopsis anacardioides</i>
0505(1)	<i>Drypetes deplanchei</i> - <i>Sarcomelicope simplicifolia</i> subsp. <i>simplicifolia</i> - <i>Cassine australis</i> var. <i>australis</i> - <i>Podocarpus elatus</i>
	Dry rainforest
1003(1)	<i>Ficus</i> spp.- <i>Streblus brunonianus</i> - <i>Dendrocnide</i> spp.- <i>Cassine australis</i> var. <i>australis</i>
1004(1)	<i>Choricarpia leptopetala</i>
	Mangrove forest and woodland
2502(2)	<i>Avicennia marina</i> subsp. <i>australasica</i>
	Wet sclerophyll forest
3002(1)	<i>Lophostemon confertus</i>
3004(1)	<i>Eucalyptus grandis</i>
3006(1)	<i>Eucalyptus pilularis</i>
3007(1)	<i>Eucalyptus microcorys</i>
3011(1)	<i>Eucalyptus tereticornis</i>
3012(1)	<i>Eucalyptus fergusonii</i> subsp. <i>fergusonii</i>
3013(1)	<i>Corymbia maculata</i> - <i>Eucalyptus fergusonii</i> subsp. <i>fergusonii</i> - <i>E. acmenoides</i>
	Dry sclerophyll forest and woodland
3504(1)	<i>Eucalyptus pilularis</i>
3508(1)	<i>Eucalyptus microcorys</i>
3512(1) 3512(2)	<i>Eucalyptus tereticornis</i>
3513(1)	<i>Allocasuarina littoralis</i>

Map Code	Plant community or other map unit
3522(1) 3522(2)	<i>Angophora costata</i>
3556(1) 3556(2)	<i>Eucalyptus pilularis</i> - <i>Angophora costata</i>
3559(1)	<i>Corymbia maculata</i> - <i>Eucalyptus fergusonii</i> subsp. <i>fergusonii</i> - <i>E. acmenoides</i>
3560(1)	<i>Eucalyptus tereticornis</i> - <i>E. microcorys</i>
3561(1)	<i>Angophora floribunda</i>
3562(1)	<i>Corymbia maculata</i>
Swamp sclerophyll forest and woodland	
4003(1) 4003(2)	<i>Melaleuca quinquenervia</i>
4005(1) 4005(2)	<i>Casuarina glauca</i>
4098(1) 4098(2)	<i>Eucalyptus robusta</i> - <i>Melaleuca quinquenervia</i>
4099(1) 4099(2)	<i>Melaleuca quinquenervia</i> - <i>Casuarina glauca</i>
MALLEE FOREST AND WOODLAND	
Dry sclerophyll mallee forest and woodland	
5002(2)	<i>Eucalyptus pilularis</i>
Swamp sclerophyll mallee forest and woodland	
5102(2)	<i>Eucalyptus robusta</i>
SHRUBLAND (SCRUB)	
Rain-shrubland	
5203(1)	<i>Choricarpia leptopetala</i>
Dry sclerophyll shrubland	
5402(1)	<i>Banksia aemula</i>
5404(1)	<i>Melaleuca armillaris</i>
5410(1)	<i>Leptospermum laevigatum</i>
5411(1)	* <i>Chrysanthemoides monilifera</i> subsp. <i>rotundata</i> - <i>Acacia sophorae</i>
Swamp sclerophyll shrubland	
5506(2)	<i>Melaleuca quinquenervia</i>
HEATHLAND	
Dry heathland	
5804(1)	<i>Banksia aemula</i> - <i>Allocasuarina simulans</i>
5899(1)	Intermediate dry heathland
Graminoid clay heathland	
5905(1)	<i>Banksia spinulosa</i> var. <i>collina</i> - <i>Allocasuarina littoralis</i> - <i>Hakea teretifolia</i> - <i>Ptilothrix deusta</i> - <i>Themeda australis</i>
Wet heathland	
6002(1)	<i>Banksia oblongifolia</i> - <i>Leptospermum liversidgei</i> - <i>Sporadanthus interruptus</i> - <i>Sprengelia sprengelioides</i> - <i>Xanthorrhoea fulva</i>
CHENOPOD SHRUBLAND	
6102(1)	<i>Sarcocornia quinqueflora</i> subsp. <i>quinqueflora</i> - <i>Sporobolus virginicus</i>
TUSSOCK GRASSLAND	
6202(1) 6202(2)	<i>Spinifex sericeus</i>
SOD GRASSLAND	
6302(1)	<i>Themeda australis</i>
SEDGELAND	
6402(1)	<i>Baumea juncea</i>
6403(1)	<i>Leptocarpus tenax</i> - <i>Baloskion pallens</i> - <i>Schoenus brevifolius</i>
RUSHLAND	
6502(1)	<i>Juncus kraussii</i> subsp. <i>australiensis</i>
6503(1)	<i>Phragmites australis</i>

Map Code Plant community or other map unit**VEGETATION COMPLEXES**

9010(0)	Foredune Complex
9020(0)	Saltmarsh Complex
9030(0)	Headland Complex

MISCELLANEOUS MAP UNITS

9102(0)	Beach sand, mobile sand (occasionally sandy tidal flats)
9103(0)	Rock
9104(0)	Open water
9202(0)	Partially cleared
9203(0)	Cleared
9204(0)	Disturbance associated with past mining (includes quarries)
9206(0)	Picnic or camping area
9207(0)	Disturbance associated with roads
9208(0)	Disturbance associated with transmission line
9209(0)	Urban or residential development and associated infrastructure (includes housing, public works etc.)

Plant community or other map unit in which found**CLASS LYCOPSIA****Lycopodiaceae**

*Lycopodiella cernua*¹ 05021

Selaginellaceae

Selaginella uliginosa^{1,2} 58991 60021

CLASS FILICOPSIDA**Adiantaceae**

Adiantum aethiopicum^{1,2} 35041

*Adiantum formosum*²

Adiantum hispidulum^{1,2,4} 00031 10031 30131

Adiantum silvaticum^{2,3} 05051

Cheilanthes austrotenuifolia^{1,2} 35131

Pellaea falcata^{1,2,3,4} 00031 05021 05051 10031 35121 35122 35621

Pellaea paradoxa^{1,2,3} 05051 30131 35591

Aspleniaceae

Asplenium attenuatum^{2,3} 05051

Asplenium australasicum^{2,3,4} 05051 10031

*Asplenium difforme*¹ 91030

Blechnaceae

*Blechnum camfieldii*²

Blechnum cartilagineum^{1,2} 30021 30061 30071 35041

Blechnum indicum^{1,2} 30041 40031 40032 40981 40982 51022 64031

*Blechnum patersonii*²

Doodia aspera^{1,2,3,4} 05051 10031 30021 30061 30071 30121 30131

Culcitaceae

Calochlaena dubia^{1,2} 00031 30021 30041 30071 35041 35561 35562

Cyatheaceae

*Cyathea australis*²

*Cyathea leichhardtiana*²

Davalliaceae

Arthropteris tenella^{1,2,3} 05051

Davallia solida var. *pyxidata*^{2,3,4} 05051 10031

**Nephrolepis cordifolia*¹ 92070

Dennstaedtiaceae*Histiopteris incisa*²*Hypolepis muelleri*^{1,2,4}*Pteridium esculentum*^{1,2,3,4}

00031 30071 35081 40051 40052

00031 30021 30061 30121 35041 35081 35131

35221 35222 35561 35562 35591 35611 35621

40031 40032 40981 40982 51022 54021

Dryopteridaceae*Arachniodes aristata*²*Lastreopsis acuminata*²*Lastreopsis decomposita*^{1,2,3}*Lastreopsis microsora* subsp. *microsora*^{1,2}

05021 05051 30021

05051

Lindsaeaceae*Lindsaea linearis*^{1,2}

59051

Polypodiaceae*Platyserium bifurcatum*^{1,2,3}*Pyrosia confluens* var. *confluens*^{1,2,4}

05021 05051 10031 30061 30121 30131

05051 10031

Pteridaceae*Pteris tremula*^{2,3}

05051

Schizaeaceae*Schizaea bifida*¹

58041

Thelypteridaceae*Christella dentata*^{1,2,4}

00031

CLASS CYCADOPSIDA**Zamiaceae***Macrozamia communis*^{1,2,3}

30121 30131 35221 35222 35561 35562 35591

CLASS CONIFEROPSIDA**Araucariaceae****Araucaria heterophylla*¹

92060

Cupressaceae*Callitris rhomboidea*¹

10041

Podocarpaceae*Podocarpus elatus*^{1,2,3}

05021 05051 30121

CLASS MAGNOLIOPSIDA-LILIIDAE**Amaryllidaceae***Crinum pedunculatum*^{1,2,3,4}

00031 05021 05051 10031 40991 40992

Anthericaceae*Arthropodium minus*^{1,2}

35591

Sowerbaea juncea^{1,2}

60021

Thysanotus juncifolius^{1,2}

59051

Tricoryne elatior^{1,2}

35601 59051

Araceae*Alocasia brisbanensis*³

05051

Gymnostachys anceps^{1,2,3,4}

05051 10031 10041 30021 30041 30061 30071

30111 30121 30131 35591 35621 52031

Typhonium brownii^{1,3}

00031 05051

Arecaceae*Livistona australis*^{1,2,3,4}

00031 05021 05051 10031 30021 30041 30061

30071 30121 30131 35041 35221 35222 35561

35562 40051 40052 40981 40982 54041

Asparagaceae

- **Protasparagus aethiopicus*¹ 05021 35041
 **Protasparagus plumosus*^{1,2} 05021 10031

Asteliaceae

*Cordylina stricta*²

Blandfordiaceae

- Blandfordia grandiflora*^{1,2} 58991 60021

Centrolepidaceae

- Centrolepis fascicularis*²
Centrolepis strigosa subsp. *strigosa*¹ 58991

Colchicaceae

- Burchardia umbellata*^{1,2} 58991 59051 60021
*Wurmbea biglandulosa*¹ 59051

Commelinaceae

- Aneilema acuminatum*^{1,3,4} 00031 05051 30021
Commelina cyanea^{1,2,4} 05021 00031 10031 10041 30021 30061 30071
 35041 35081 35121 35122 35131 35221 35222
 35601 35611 35621 40051 40052 40991 40992
 10031 35621

**Tradescantia albiflora*¹

Cyperaceae

- Abildgaardia ovata*¹ 63021
*Baumea acuta*¹ 58991 60021
*Baumea arthropphylla*¹ 64031
Baumea articulata^{1,2} 40031 40032 55062
Baumea juncea^{1,2,4} 40051 40052 40991 40992 51022 55062 59051
 64021 65031
*Baumea muelleri*¹ 60021
Baumea rubiginosa^{1,2} 55062 65031
Baumea teretifolia^{1,2} 64031
Carex appressa^{1,2} 00031 30021
*Carex breviculmis*¹ 35611
*Carex brunnea*²
*Carex pumila*¹ 90100
*Caustis pentandra*¹ 58041 58991
Caustis recurvata var. *recurvata*^{1,2} 50022 54021 58041
 **Cyperus brevifolius*²
*Cyperus enervis*¹ 35591 35601
*Cyperus flaccidus*²
*Cyperus laevis*²
Cyperus lucidus^{2,4} 00031
Cyperus polystachyos^{1,2,4} 40991 40992 63021
Cyperus tetraphyllus^{1,2} 30061
Cyperus trinervis^{1,2} 00031
*Fimbristylis dichotoma*¹ 63021
Fimbristylis ferruginea^{1,2,4} 40051 40052 40991 40992 55062 61021 64021
 65021 65031
Gahnia aspera^{1,2,3,4} 05051 10031 10041 30061 30111 30131 35131
 52031 54041
*Gahnia clarkei*¹ 30041 35561 35562 40031 40032 40051 40052
 40981 40982 51022 54041
Gahnia melanocarpa^{1,2} 00031 05051 10041 30021 30061 30071 30111
 30121 30131 35611
Gahnia sieberiana^{1,2} 60021
Gymnoschoenus sphaerocephalus^{1,2} 60021
*Isolepis cernua*²

Cyperaceae cont.

<i>Isolepis inundata</i> ^{1,2}	40981 40982
<i>Isolepis nodosa</i> ^{1,2,4}	10031 40051 40052 40991 40992 54111 62021 62022 63021
<i>Lepidosperma concavum</i> ¹	54101
<i>Lepidosperma elatius</i> ^{1,2}	30131 35041 35591
<i>Lepidosperma laterale</i> ^{1,2}	00031 30111 30121 30131 35041 35121 35122 35131 35591 35601 54041 59051
<i>Lepidosperma neesii</i> ¹	58991 59051 60021 64031
<i>Ptilothrix deusta</i> ^{1,2}	58991 59051 60021
<i>Schoenoplectus litoralis</i> ^{1,2}	55062 65021 90200
<i>Schoenus apogon</i> ¹	59051
<i>Schoenus brevifolius</i> ^{1,2}	51022 58991 60021 64031
<i>Schoenus ericetorum</i> ^{1,2}	50022 58041
<i>Schoenus lepidosperma</i> subsp. <i>pachylepis</i> ¹	58991 60021
<i>Schoenus melanostachys</i> ^{1,2}	92080
<i>Scleria mackaviensis</i> ¹	35591

Dioscoreaceae

<i>Dioscorea transversa</i> ^{1,2,3,4}	05021 05051 10031 10041 30021 30061 30071 30111 30121 30131 35131 35561 35562 52031
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Flagellariaceae

<i>Flagellaria indica</i> ^{1,2,3}	05021 05051 10031
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Geitonoplesiaceae

<i>Eustrephus latifolius</i> ^{1,2,4}	10031 30021 30061 30071 30111 30121 30131 35041 35561 35562 35621
<i>Geitonoplesium cymosum</i> ^{1,2,3,4}	05021 05051 10031 10041 30021 30041 30061 30071 30111 30121 30131 35121 35122 35601 35611 35621 52031

Haemodoraceae

<i>Haemodorum corymbosum</i> ²	
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Iridaceae

* <i>Freesia hybrid</i> ¹	92060
* <i>Gladiolus gueinzii</i> ¹	62021 62022
<i>Patersonia glabrata</i> ^{1,2}	50022 58041
<i>Patersonia sericea</i> ^{1,2}	58041
<i>Patersonia</i> sp. aff. <i>fragilis</i> ^{1,2,3}	35561 35562 58991 59051 60021
* <i>Romulea rosea</i> var. <i>australis</i> ¹	92060

Juncaceae

* <i>Juncus cognatus</i> ²	
<i>Juncus kraussii</i> subsp. <i>australiensis</i> ^{1,2,4}	25022 40051 40052 40991 40992 55062 61021 65021 65031
<i>Juncus mollis</i> ²	
<i>Juncus planifolius</i> ²	
<i>Juncus usitatus</i> ²	

Juncaginaceae

<i>Triglochin procerum</i> s. lat. ¹	64031
<i>Triglochin striatum</i> ¹	61021

Lomandraceae

<i>Lomandra confertifolia</i> subsp. <i>pallida</i> ¹	35131
<i>Lomandra glauca</i> ¹	50022 58041 58991 59051
<i>Lomandra longifolia</i> ^{1,2,3}	30021 30061 30071 30121 30131 35041 35081 35121 35122 35131 35221 35222 35561 35562 35591 35601 35611 35621 51022 54021 54101 54111 59051 62021 62022 63021

Lomandraceae cont.

<i>Lomandra multiflora</i> subsp. <i>multiflora</i> ¹	30071 30131 35041 35081 35591 59051
<i>Lomandra spicata</i> ¹	05021 05051 30041

Orchidaceae

<i>Acianthus exsertus</i> ²	
<i>Caladenia catenata</i> ²	
<i>Calanthe triplicata</i> ^{1,3}	05051
<i>Cymbidium suave</i> ²	
<i>Dendrobium aemulum</i> ³	05051
<i>Dendrobium gracilicaule</i> ³	05051
<i>Dendrobium speciosum</i> ³	05051
<i>Dendrobium tetragonum</i> ^{1,3}	05021 05051
<i>Dipodium variegatum</i> ¹	35561 35562
<i>Erythrorchis cassythoides</i> ¹	90300
<i>Microtis parviflora</i> ¹	92060
<i>Pterostylis concinna</i> ²	
<i>Pterostylis nutans</i> ^{1,2}	35041
<i>Sarcochilus falcatus</i> ³	05051

Philydraceae

<i>Philydrum lanuginosum</i> ^{1,2}	64031
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Phormiaceae

<i>Dianella caerulea</i> ^{1,2,3,4}	00031 30021 30061 30071 30121 30131 35041 35081 35121 35122 35131 35221 35222 35561 35562 35591 35601 35611 35621 40051 40052 40981 40982 51022 54021 54041 54101
<i>Dianella congesta</i> ¹	54111 62021 62022
<i>Dianella longifolia</i> ¹	40991 40992
<i>Dianella longifolia</i> var. <i>longifolia</i> ⁴	00031
<i>Dianella revoluta</i> ¹	35041 35591 50022
<i>Stypandra glauca</i> ²	
<i>Thelionema caespitosum</i> ²	

Poaceae

* <i>Ammophila arenaria</i> ¹	54111
* <i>Andropogon virginicus</i> ¹	35041 51022 64031 92030
<i>Aristida ramosa</i> ¹	35621
<i>Aristida warburgii</i> ¹	59051
* <i>Axonopus affinis</i> ^{1,2}	92030
* <i>Axonopus compressus</i> ²	
* <i>Briza maxima</i> ^{1,2}	92030 92070
* <i>Briza minor</i> ^{1,2}	92070
* <i>Bromus cartharticus</i> ¹	92030
<i>Capillipedium parviflorum</i> ¹	35041
<i>Cenchrus caliculatus</i> ²	
<i>Chloris divaricata</i> var. <i>divaricata</i> ²	
* <i>Chloris gayana</i> ^{1,2}	92030 92070
<i>Cymbopogon refractus</i> ^{1,2}	35041 35131 35591 63021
<i>Cynodon dactylon</i> ^{1,2}	35131 92030
<i>Dichelachne micrantha</i> ¹	35041
* <i>Digitaria ciliaris</i> ¹	92070
<i>Digitaria didactyla</i> ¹	63021
<i>Digitaria parviflora</i> ^{1,2}	35041 35591 35611
<i>Echinopogon ovatus</i> ²	
* <i>Ehrharta erecta</i> ^{1,2}	10031 40051 40052 54101 54111
* <i>Eleusine indica</i> ^{1,2}	92070

Poaceae cont.

<i>Entolasia marginata</i> ^{1,2}	00031 05021 30021 30071 30131 35041 35121 35122 35131 35221 35222 35601 35621
<i>Entolasia stricta</i> ^{1,2}	30071 35121 35122 40981 40982 58991
<i>Eragrostis benthamii</i> ²	
<i>Eragrostis brownii</i> s. lat. ^{1,2}	35041 58041 59051
* <i>Eragrostis tenuifolia</i> ¹	92030 92060
<i>Eragrostis trachycarpa</i> ²	
<i>Eriochloa procera</i> ^{1,2,4}	40051 40052 40991 40992 64021
<i>Hemarthria uncinata</i> ^{1,2,4}	40981 40982 40991 40992 51022 64021
<i>Imperata cylindrica</i> var. <i>major</i> ^{1,2,3,4}	00031 30061 30131 35041 35081 35121 35122 35131 35561 35562 35591 35601 35611 35621 40031 40032 50022 51022
<i>Ischaemum australe</i> ¹	40031 40032
<i>Leersia hexandra</i> ²	
<i>Microlaena stipoides</i> var. <i>stipoides</i> ^{1,2}	90100
<i>Oplismenus aemulus</i> ^{1,2,4}	00031 05021 05051 35121 35122 35591 35611 35621 40991 40992
<i>Oplismenus imbecillis</i> ^{1,2}	00031 05051 10031 30021 30041 30061 30111 30121 30131 35041 35081 35591 35601 35611 54041
* <i>Panicum maximum</i> ²	
<i>Panicum pygmaeum</i> ¹	10041
<i>Panicum simile</i> ^{1,2}	50022 58041
<i>Paspalidium aversum</i> ²	
<i>Paspalidium distans</i> ¹	35041 35131 40981 40982 51022
* <i>Paspalum dilatatum</i> ^{1,2}	63021 92030 92070
<i>Paspalum orbiculare</i> ¹	40981 40982
* <i>Paspalum urvillei</i> ¹	92030 92070
<i>Paspalum vaginatum</i> ¹	90200
* <i>Pennisetum clandestinum</i> ^{1,2}	92030
<i>Phragmites australis</i> ^{1,2,4}	40051 40052 40991 40992 65031
<i>Poa labillardieri</i> ^{1,2}	30061 30071 30121 30131 35041 35081 35131 35591 35601 35611 35621
<i>Poa poiformis</i> ¹	40051 40052
* <i>Polypogon monspeliensis</i> ²	
<i>Sacciolepis indica</i> ¹	40991 40992
* <i>Setaria gracilis</i> ^{1,2}	40991 40992
* <i>Setaria pumila</i> ^{1,2,4}	40991 40992
<i>Spinifex sericeus</i> ^{1,2}	54111 62021 62022
* <i>Sporobolus indicus</i> var. <i>capensis</i> ^{1,2}	35041 35611 63021 92030
<i>Sporobolus virginicus</i> ^{1,2,4}	25022 40051 40052 40991 40992 61021 63021 64021 65021 91030
* <i>Stenotaphrum secundatum</i> ^{1,2}	63021
<i>Themeda australis</i> ^{1,2}	35041 35081 35121 35122 35561 35562 35591 35601 35611 35621 50022 58041 59051 63021
<i>Thonandia longifolia</i> ²	
<i>Zoysia macrantha</i> ^{1,2}	40991 40992 54111 62021 62022 63021
Restionaceae	
<i>Balaskion pallens</i> ^{1,2}	51022 60021 64031
<i>Balaskion tetraphyllum</i> subsp. <i>meiostachyum</i> ^{1,2}	40031 40032 40981 40982 51022
<i>Coleocarya gracilis</i> ¹	50022 58041
<i>Eurychorda complanata</i> ^{1,2}	64031
<i>Hypolaena fastigiata</i> ^{1,2}	50022 58041 58991 60021
<i>Leptocarpus tenax</i> ^{1,2}	51022 58991 60021 64031
<i>Lepyrodia muelleri</i> ¹	64031

Restionaceae cont.

<i>Lepyrodia scariosa</i> ¹	58991 60021
<i>Lepyrodia species A</i> ¹	64031
<i>Sporadanthus interruptus</i> ^{1,2}	51022 58991 60021

Ripogonaceae

<i>Ripogonum album</i> ^{1,2}	05051
<i>Ripogonum discolor</i> ^{2,3,4}	05051 10031
<i>Ripogonum fawcettianum</i> ^{1,2,3,4}	05051 10031 30021 30131

Smilacaceae

<i>Smilax australis</i> ^{1,2,3,4}	05021 05051 10031 10041 30021 30041 30061 30071 30111 30121 30131 35621 52031
<i>Smilax glycyphylla</i> ^{1,2,3}	05021 30061 30071 35561 35562 54041

Uvulariaceae

<i>Tripladenia cunninghamii</i> ^{1,2}	05021 30021 30121
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Xanthorrhoeaceae

<i>Xanthorrhoea fulva</i> ^{1,2}	40031 40032 51022 54021 60021
<i>Xanthorrhoea macronema</i> ^{1,2,3}	30121 30131 35041 35121 35122 35221 35222 35561 35562 35591

Xyridaceae

<i>Xyris gracilis</i> subsp. <i>gracilis</i> ¹	58991
<i>Xyris juncea</i> ²	
<i>Xyris operculata</i> ^{1,2}	64031

Zingiberaceae

<i>Alpinia arundelliana</i> ¹	30021
<i>Alpinia caerulea</i> ¹	05051 30021 30061 30071
<i>Alpinia caerulea</i> s. lat. ^{2,3}	05051

CLASS MAGNOLIOPSIDA-MAGNOLIIDAE**Acanthaceae**

<i>Pseuderanthemum variabile</i> ¹	00031 05021 05051 10031 30021 30041 30061 30071 30121 30131 35041 35081 35561 35562 35601 35621
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Aizoaceae

<i>Carpobrotus glaucescens</i> ^{1,2,4}	54101 54111 62021 62022 63021
<i>Macarthuria neocambrica</i> ¹	58041
<i>Sesuvium portulacastrum</i> ^{1,2,4}	64021
<i>Tetragonia tetragonoides</i> ^{1,2,4}	62021 62022

Alangiaceae

<i>Alangium villosum</i> subsp. <i>polyosmoides</i> ^{1,2,3}	05051 10031
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Amaranthaceae

<i>Alternanthera denticulata</i> ^{1,2,4}	40051 40052 40991 40992
<i>Deeringia amaranthoides</i> ^{1,2}	05051

Anacardiaceae

<i>Euroschinus falcata</i> var. <i>falcata</i> ^{1,2,3,4}	05051 10031 30021 30111 30121
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Apiaceae

<i>Actinotus helianthi</i> ^{1,2}	50022 54021 58041
<i>Apium prostratum</i> subsp. <i>prostratum</i> ^{1,2}	40051 40052 40991 40992 65031 91030
<i>Centella asiatica</i> ^{1,2}	35081 35621 63021
* <i>Ciclospermum leptophyllum</i> ²	
<i>Daucus glochidiatus</i> ²	
<i>Hydrocotyle acutiloba</i> ^{1,2}	35611
* <i>Hydrocotyle bonariensis</i> ^{1,2}	54111 62021 62022 90100
<i>Hydrocotyle geraniifolia</i> ¹	30061

Apiaceae cont.

<i>Hydrocotyle peduncularis</i> ¹	00031 30131 35041 35081 35591
<i>Hydrocotyle verticillata</i> ²	
<i>Platysace ericoides</i> ^{1,2}	50022 58041 59051
<i>Platysace lanceolata</i> ^{1,2}	50022 51022 58041 58991 60021
<i>Trachymene incisa</i> subsp. <i>incisa</i> ^{1,2}	35561 35562 58041
<i>Xanthosia pilosa</i> ^{1,2}	35561 35562 50022 54021 54101 58041 59051 60021
<i>Xanthosia tridentata</i> ¹	59051

Apocynaceae

<i>Melodinus australis</i> ²	
<i>Parsonsia induplicata</i> ¹	30111
<i>Parsonsia straminea</i> ^{1,2,3,4}	05021 05051 10031 10041 30041 30111 30131 40051 40052 52031 54041
<i>Parsonsia velutina</i> ^{2,3}	05051

Araliaceae

<i>Astrotricha longifolia</i> ^{1,2}	30061
<i>Polyscias elegans</i> ^{1,2,3,4}	00031 05021 05051 10031 30111 35221 35222 35591
<i>Polyscias sambucifolia</i> ^{1,2}	35041 35561 35562

Asclepiadaceae

<i>Cynanchum carnosum</i> ^{1,2,4}	40051 40052 40991 40992 65021
<i>Cynanchum elegans</i> ¹	30111
* <i>Gomphocarpus fruticosus</i> ^{1,2}	35121 35122 35591 35611 35621 40991 40992
<i>Marsdenia flavescens</i> ^{2,4}	10031
<i>Marsdenia rostrata</i> ^{1,2}	10031 35041 35221 35222 35561 35562
<i>Marsdenia lloydii</i> ²	
<i>Tylophora paniculata</i> ¹	30041 30121 30131 52031

Asteraceae

* <i>Ageratina adenophora</i> ^{1,2,4}	00031 35611 92030
* <i>Ageratina riparia</i> ¹	92070
* <i>Arctotheca calendula</i> ¹	92060
* <i>Arctotheca populifolia</i> ¹	62021 62022
* <i>Aster subulatus</i> ¹	40991 40992 64021 65031 92030
* <i>Baccharis halimifolia</i> ¹	40051 40052 65031
* <i>Bidens pilosa</i> ¹	92030
* <i>Bidens tripartita</i> ²	
<i>Brachycome angustifolia</i> var. <i>heterophylla</i> ²	
<i>Cassinia aculeata</i> ¹	54101
<i>Cassinia uncata</i> ^{1,2}	90100
<i>Centratherum punctatum</i> subsp. <i>australianum</i> ¹	35601
* <i>Chrysanthemoides monilifera</i> subsp. <i>rotundata</i> ^{1,2}	30021 30061 30071 35041 35081 35121 35122 35131 35561 35562 35601 35611 35621 40051 40052 40991 40992 54041 54101 54111 59051 62021 62022 63021
* <i>Cirsium vulgare</i> ^{1,2}	40051 40052 92070
* <i>Conyza albida</i> ¹	40051 40052 40991 40992 92030
* <i>Conyza bilbaoana</i> ¹	54111 62021 62022
* <i>Conyza bonariensis</i> ²	
* <i>Conyza canadensis</i> var. <i>canadensis</i> ^{2,4}	40991 40992
* <i>Conyza parva</i> ¹	40031 40032
* <i>Cotula coronopifolia</i> ^{1,2}	40051 40052
<i>Craspedia variabilis</i> ^{1,2}	59051
* <i>Delairea odorata</i> ^{1,2}	05021 40051 40052
<i>Eclipta platyglossa</i> ^{1,2}	40991 40992

Asteraceae cont.

<i>Enydra fluctuans</i> ²	
<i>Epaltes australis</i> ²	
* <i>Erechtites valerianifolia</i> ²	
* <i>Gazania rigens</i> ¹	92070
<i>Gnaphalium sphaericum</i> ¹	35591
<i>Helichrysum scorpioides</i> ^{1,2}	59051
* <i>Hypochaeris glabra</i> ^{1,2}	92060
* <i>Hypochaeris radicata</i> ^{1,2}	40991 40992 63021 92030
* <i>Lactuca serriola</i> ²	
<i>Lagenifera gracilis</i> ¹	35041 59051
<i>Leptinella longipes</i> ^{2,4}	90200
<i>Melanthera biflora</i> ^{1,2}	9130
<i>Olearia nernstii</i> ^{1,2,3}	30061 35131 35561 35562
<i>Ozothamnus diosmifolius</i> ^{1,2}	35121 35122 92030
<i>Pseudognaphalium luteoalbum</i> ^{1,2}	40991 40992
<i>Senecio hispidulus</i> var. <i>dissectus</i> ²	
<i>Senecio hispidulus</i> var. <i>hispidulus</i> ^{1,2}	35121 35122 35621 40991 40992
<i>Senecio lautus</i> subsp. <i>maritimus</i> ¹	62021 62022 63021 91030
<i>Senecio linearifolius</i> ¹	05051
* <i>Senecio madagascariensis</i> ^{1,2}	40991 40992 92030 54101
<i>Senecio vagus</i> ¹	30021
* <i>Senecio vulgaris</i> ²	
<i>Sigesbeckia orientalis</i> subsp. <i>orientalis</i> ^{1,2}	35121 35122 35591 35621
* <i>Soliva anthemifolia</i> ²	
* <i>Sonchus asper</i> subsp. <i>glaucescens</i> ¹	40051 40052 40991 40992
* <i>Sonchus oleraceus</i> ^{1,2}	10031 63021
* <i>Tagetes minuta</i> ¹	92070
<i>Vernonia cinerea</i> var. <i>cinerea</i> ^{1,2}	35041 35081 35621 65031
* <i>Xanthium italicum</i> ¹	92070

Avicenniaceae

<i>Avicennia marina</i> subsp. <i>australasica</i> ^{1,2,4}	25022
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Basellaceae

* <i>Anredera cordifolia</i> ^{1,2}	10031
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Baueraceae

<i>Bauera capitata</i> ^{1,2}	60021
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Bignoniaceae

<i>Pandorea pandorana</i> ^{1,2,3}	05021 05051 10031 10041 30041 30111 30121 30131 35221 35222 50022 54101
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Brassicaceae

* <i>Cakile edentula</i> ²	
* <i>Cakile maritima</i> ¹	62021 62022

Buddlejaceae

* <i>Buddleja madagascariensis</i> ¹	40051 40052
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Campanulaceae

<i>Wahlenbergia communis</i> ²	
<i>Wahlenbergia stricta</i> ¹	35041

Capparaceae

<i>Capparis arborea</i> ^{1,2,3,4}	05021 05051 10031 10041 30111
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Caprifoliaceae

* <i>Lonicera japonica</i> ¹	35621
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Caryophyllaceae

* <i>Petrorhagia velutina</i> ¹	92070
* <i>Spergularia marina</i> ¹	40051 40052
<i>Stellaria flaccida</i> ²	

Casuarinaceae

<i>Allocasuarina defungens</i> ¹	58991
<i>Allocasuarina littoralis</i> ^{1,2}	35081 35131 35591 59051
<i>Allocasuarina simulans</i> ^{1,2}	58041
<i>Allocasuarina torulosa</i> ^{1,2,3}	30131 35041 35121 35122 35591 35601
* <i>Casuarina equisetifolia</i> subsp. <i>incana</i> ^{1,2}	90100
<i>Casuarina glauca</i> ^{1,2,4}	00031 10031 30111 35121 35122 40031 40032 40051 40052 40991 40992 54041 55062 61021 63021 64021 65021 65031

Celastraceae

<i>Cassine australis</i> var. <i>australis</i> ^{1,2,3,4}	05021 05051 10031 10041 30111 30121 30131 52031
<i>Celastrus australis</i> ^{1,2,4}	10031
<i>Celastrus subspicata</i> ^{1,2}	30071 30111 35041

Chenopodiaceae

<i>Atriplex australasica</i> ^{2,4}	40991 40992
* <i>Atriplex prostrata</i> ¹	40051 40052
<i>Chenopodium glaucum</i> ^{1,2}	40051 40052
<i>Enchylaena tomentosa</i> ¹	91030
<i>Einadia hastata</i> ^{1,2}	54111
<i>Einadia nutans</i> ²	
<i>Einadia nutans</i> subsp. <i>linifolia</i> ¹	91030
<i>Rhagodia candolleana</i> subsp. <i>candolleana</i> ²	10031
<i>Sarcocornia quinqueflora</i> subsp. <i>quinqueflora</i> ^{1,2,4}	25022 61021 64021 65021
<i>Suaeda australis</i> ^{1,2,4}	40051 40052

Chloanthaceae

<i>Chloanthes stoechadis</i> ^{1,2}	50022 54021 58041
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Clusiaceae

<i>Hypericum gramineum</i> ¹	35041 59051
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Convolvulaceae

<i>Calystegia marginata</i> ¹	00031
<i>Calystegia soldanella</i> ¹	62021 62022
<i>Dichondra repens</i> ^{1,2}	30071 30111 30121 35081 35121 35122 35131 35591 35601 35621 63021
* <i>Ipomoea cairica</i> ^{1,2,4}	10031 40051 40052 40991 40992 54111 65021
<i>Ipomoea pes-caprae</i> subsp. <i>brasiliensis</i> ¹	62021 62022
<i>Polymeria calycina</i> ^{1,2}	35041 63021

Crassulaceae

<i>Crassula sieberiana</i> ¹	91030
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Cunoniaceae

<i>Aphanopetalum resinosum</i> ^{1,2,3,4}	05051 10031
<i>Schizomeria ovata</i> ^{1,2}	30021

Dilleniaceae

<i>Adrastaea salicifolia</i> ^{1,2}	60021
<i>Hibbertia aspera</i> ^{1,2}	35041 35081 35221 35222 35561 35562
<i>Hibbertia dentata</i> ^{1,2}	30021 30061 30071 30121 30131 35221 35222 35561 35562 35601 35611 40031 40032 40981 40982 59051
<i>Hibbertia diffusa</i> ^{1,2}	54021
<i>Hibbertia empetrifolia</i> ¹	59051

Dilleniaceae cont.

<i>Hibbertia fasciculata</i> ^{1,2}	54021 58041 58991 60021
<i>Hibbertia linearis</i> ^{1,2}	50022 54021 58041
<i>Hibbertia obtusifolia</i> ^{1,2,3}	35561 35562 54101
<i>Hibbertia riparia</i> s. lat. ^{1,2}	58991
<i>Hibbertia rufa</i> s. lat. ¹	54021
<i>Hibbertia scandens</i> ^{1,2,4}	00031 10041 35041 35081 35131 35221 35222 35561 35562 35591 35611 35621 54101 63021

Droseraceae

<i>Drosera auriculata</i> ^{1,2}	60021
<i>Drosera peltata</i> ¹	58991 59051 60021
<i>Drosera pygmaea</i> ¹	58991
<i>Drosera spatulata</i> ^{1,2}	64031

Ebenaceae

<i>Diospyros australis</i> ^{1,2,3,4}	05021 05051 10031 10041 30041 30111 30121 30131 35591 52031
<i>Diospyros pentamera</i> ^{1,2,3,4}	05021 05051 10031 30071 30111 30121 30131 52031

Elaeocarpaceae

<i>Elaeocarpus obovatus</i> ^{1,2,3}	00031 05021 05051 10031 30061
<i>Elaeocarpus reticulatus</i> ^{1,2}	05021

Epacridaceae

<i>Astroloma pinifolium</i> ^{1,2}	54101
<i>Brachyloma daphnoides</i> ¹	50022 58041
<i>Epacris microphylla</i> var. <i>microphylla</i> ²	
<i>Epacris obtusifolia</i> ^{1,2}	60021
<i>Epacris pulchella</i> ^{1,2}	58991 59051
<i>Leucopogon ericoides</i> ^{1,2}	50022 54021
<i>Leucopogon juniperinus</i> ^{1,2}	35041
<i>Leucopogon lanceolatus</i> var. <i>gracilis</i> ^{1,2}	40981 40982
<i>Leucopogon lanceolatus</i> var. <i>lanceolatus</i> ²	
<i>Leucopogon leptospermoides</i> ¹	54021 58991
<i>Leucopogon parviflorus</i> ^{1,2}	40991 40992 62021 62022
<i>Leucopogon virgatus</i> ^{1,2}	58041 58991
<i>Monotoca elliptica</i> ^{1,2}	30131 35561 35562 54101
<i>Monotoca scoparia</i> ^{1,2}	50022 54021 58041 58991 59051
<i>Sprengelia incarnata</i> ^{1,2}	60021
<i>Sprengelia sprengelioides</i> ¹	60021
<i>Styphelia viridis</i> ²	
<i>Trochocarpa laurina</i> ^{1,2}	05021 30021 30061 30071 30121 30131 35081
<i>Woolfsia pungens</i> ^{1,2}	54021

Escalloniaceae

*Abrophyllum ornans*²

Euphorbiaceae

<i>Actephila lindleyi</i> ^{1,2,3}	05051
<i>Alchornea ilicifolia</i> ^{1,2,3}	05021 05051 10031
<i>Amperea xiphoclada</i> ^{1,2}	50022 54021 58041
<i>Baloghia inophylla</i> ^{1,2,3}	05021 05051 30041
<i>Breynia oblongifolia</i> ^{1,2,3,4}	00031 05021 10041 30021 30041 30061 30071 30111 30121 30131 35041 35131 35221 35222 35561 35562 35591 35611 52031 54101
<i>Chamaesyce psammogeton</i> ¹	62021 62022
<i>Claoxylon australe</i> ^{1,2,3,4}	05051 10031 30021 30041 30071
<i>Cleistanthus cunninghamii</i> ^{1,2,3}	05051

Euphorbiaceae cont.

<i>Croton insularis</i> ^{1,2,3}	05051 90300
<i>Croton verreauxii</i> ^{1,2}	30071
<i>Drypetes deplanchei</i> ^{1,2,3,4}	05021 05051 10031 10041 30021 30041 30071 30111 52031
<i>Glochidion ferdinandi</i> var. <i>ferdinandi</i> ^{1,2,3,4}	00031 05021 05051 10031 10041 30041 35041 35561 35562
<i>Mallotus philippensis</i> ^{1,2,3,4}	05051 10031 30021 30071 30111
<i>Omalanthus nutans</i> ^{1,2}	40051 40052
<i>Phyllanthus gunnii</i> ^{1,2}	30071 30131
<i>Poranthera corymbosa</i> ¹	90100
<i>Poranthera microphylla</i> ^{1,2}	35041
<i>Pseudanthus orientalis</i> ^{1,2}	58991
<i>Ricinocarpus pinifolius</i> ^{1,2}	50022 58041 58991

Eupomatiaceae

<i>Eupomatia laurina</i> ^{1,2}	05051 30021 30061
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Fabaceae-Caesalpinioideae

<i>Senna acclinis</i> ⁵	
* <i>Senna X floribunda</i> ^{1,2,3}	05021 92030
* <i>Senna pendula</i> var. <i>glabrata</i> ^{1,2,3}	00031 05051 35081 35131 40051 40052

Fabaceae-Faboideae

<i>Aotus ericoides</i> ^{1,2}	54021 58991
<i>Aotus lanigera</i> ²	
<i>Austrosteenisia blackii</i> var. <i>blackii</i> ¹	10031
<i>Bossiaea ensata</i> ^{1,2}	50022 58041
<i>Bossiaea heterophylla</i> ^{1,2}	35561 35562 50022 54021 54101 58041
<i>Bossiaea prostrata</i> ^{1,2}	59051
<i>Canavalia rosea</i> ^{1,2}	63021 91030
<i>Chorizema parviflorum</i> ²	
* <i>Crotalaria semperflorens</i> ¹	92070
<i>Daviesia ulicifolia</i> ¹	35041 35561 35562
<i>Desmodium brachypodium</i> ^{1,2}	30131 35081 35121 35122 35591 35601 35621 40031 40032
<i>Desmodium nemorosum</i> ^{1,2}	35221 35222
<i>Desmodium rhytidophyllum</i> ^{1,2}	35041 35081 35131 35561 35562 35591 35601 35621
<i>Desmodium varians</i> ^{1,2}	30061 30071 30121 30131 35041 35081 35121 35122 35561 35562 35591 35601 35611 35621
<i>Dillwynia floribunda</i> var. <i>floribunda</i> ^{1,2}	58991 60021
<i>Dillwynia glaberrima</i> ^{1,2}	58041
<i>Dillwynia retorta</i> ^{1,2}	35561 35562 50022 54021 58041
* <i>Erythrina X sykesii</i> ^{1,2}	92060
<i>Galactia species A</i> ¹	63021
<i>Glycine clandestina</i> s. lat. ^{1,2}	30061 35621
<i>Glycine microphylla</i> ¹	30131 35041 35081 35121 35122 35131 35561 35562 35591
<i>Glycine tabacina</i> s. lat. ^{1,2}	35121 35122 35601
<i>Gompholobium glabratum</i> ¹	58041
<i>Gompholobium latifolium</i> ^{1,2}	35221 35222 35561 35562
<i>Gompholobium pinnatum</i> ¹	60021
<i>Gompholobium virgatum</i> var. <i>virgatum</i> ^{1,2}	50022 58041
<i>Hardenbergia violacea</i> ^{1,2}	30131 35041 35081 35131 35561 35562 35591 35601 35611 35621 50022 58041
<i>Indigofera australis</i> ^{1,2}	35591
<i>Jacksonia scoparia</i> ¹	35041
<i>Kennedia prostrata</i> ²	

Fabaceae-Faboideae cont.

Kennedia rubicunda^{1,2,4} 00031 30041 30071 35041 35121 35122 35561
35562 35621 40981 40982 51022

*Mirbelia rubiifolia*²

Oxylobium ilicifolium^{1,2} 35041 35591

Phyllota phyllicoides^{1,2} 50022 54021 58041

Platylobium formosum^{1,2,3} 35041 35561 35562

Pultenaea blakelyi^{1,2} 30061 40981 40982

Pultenaea retusa^{1,2} 35041 59051

Pultenaea villosa^{1,2} 35041

*Sphaerolobium vimineum*¹ 59051

**Trifolium repens*^{1,2} 92070

**Vicia sativa*¹ 92070

Viminaria juncea^{1,2} 40991 40992 64031

Fabaceae-Mimosoideae

Acacia baueri subsp. *baueri*¹ 58991

Acacia binervata^{1,2} 30041 30061 35041

*Acacia brownii*¹ 59051

Acacia elongata^{1,2} 40981 40982

Acacia falcata^{1,2} 35041

*Acacia floribunda*³ 35591

Acacia irrorata subsp. *irrorata*^{1,2} 10041 35561 35562 92030

Acacia longifolia^{1,2,3,4} 00031 10041 35041 35561 35562 35621 40051
40052 40981 40982 40991 40992 54021

Acacia maidenii^{1,2,3,4} 00031 05021 05051 10031 10041 30021 30061
30071 30111 30121 30131 35041 35081 35121
35122 35131 35221 35222 35591 35601 35611
35621 52031 92030

Acacia melanoxylon^{1,2} 10041

Acacia myrtifolia^{1,2} 35041 59051

*Acacia quadrilateralis*¹ 58041

**Acacia saligna*¹ 54111

Acacia sophorae^{1,2,4} 00031 54101 54111 59051 60021 62021 62022
63021

Acacia stricta^{1,2} 35041 35591

Acacia suaveolens^{1,2} 35561 35562 50022 54021 58041

Acacia terminalis^{1,2} 35561 35562

Acacia ulicifolia^{1,2} 35041 35081 35561 35562 50022 54021 58041

Pararchidendron pruinosum var. *pruinosum*^{1,2,3,4} 05051 10031 35591

Flacourtiaceae

Scolopia braunii^{1,2,3,4} 05021 05051 10031 30111

Fumariaceae

**Fumaria capreolata* subsp. *capreolata*²

Gentianaceae

*Centaurium spicatum*¹ 40991 40992 64021

**Centaurium tenuiflorum*²

Geraniaceae

*Geranium homeanum*¹ 00031 30061 30071 35041 35081 35611

Geranium solanderi var. *solanderi*^{1,2} 35591 35621

Goodeniaceae

Dampiera stricta^{1,2} 50022 51022 58041 58991 59051

Goodenia heterophylla subsp. *eglandulosa*^{1,2} 35041

Goodenia ovata^{1,2} 40051 40052

Goodenia paniculata^{1,2} 59051 63021 64021

Goodenia stelligera^{1,2} 60021 64031

Scaevola calendulacea^{1,2} 54111 62021 62022 90100

Gyrostemonaceae*Codonocarpus attenuatus*²**Haloragaceae***Gonocarpus micranthus*^{1,2}

58991

Gonocarpus tetragynus^{1,3}

35041 35131 35561 35562 35601 59051

Gonocarpus teucrioides^{1,2}

35561 35562 50022 51022 54101 58041

Lamiaceae*Mentha diemenica*¹

35561 35562 35601

*Mentha satureioides*²*Plectranthus parviflorus*^{1,2,4}

10031 35081 35121 35122 35591 35621

Westringia fruticosa^{1,2}

54041 59051 63021 91030

Lauraceae*Beilschmiedia elliptica*^{1,2,3}

05051

Cassytha filiformis^{1,2}

58041 63021

Cassytha glabella forma *glabella*^{1,2}

40991 40992 54021 58991 59051 60021

Cassytha pubescens^{1,2}

54101

*Cinnamomum oliveri*²*Cryptocarya glaucescens*¹

05021 30041

*Cryptocarya microneura*¹

30021 30061 30071 30131 35561 35562

Cryptocarya obovata^{1,2,3}

05051

Cryptocarya rigida^{1,2}05021 05051 30021 30061 30071 30121 35561
35562*Endiandra discolor*^{1,2}

05051 10041 30111

Endiandra sieberi^{1,2,3}

05021 35561 35562

Litsea reticulata^{1,2,3,4}

00031 05021 10031 35591

Neolitsea dealbata^{1,2,3}

05051

Lentibulariaceae*Utricularia dichotoma*¹

35561

Lobeliaceae*Lobelia alata*^{1,2}

40991 40992 63021 64021 91030

Pratia purpurascens^{1,2}30061 30071 30121 30131 35041 35081 35121
35122 35131 35591 35601 35611 35621 54041**Loganiaceae***Logania albiflora*^{1,2}

35041 54041 63021

*Mitrasacme paludosa*²*Mitrasacme polymorpha*^{1,2}

58041 60021

Loranthaceae*Amyema congener* subsp. *congener*^{1,2}

30111

Amyema congener subsp. *rotundifolia*²*Dendrophthoe vitellina*¹

35561 35562

*Muellerina eucalyptoides*¹

30121 35591

Malvaceae*Hibiscus heterophyllus* subsp. *heterophyllus*^{2,3}

05051

*Hibiscus trionum*²**Modiola caroliniana*¹

92060

**Sida rhombifolia*^{1,2,4}

35611 40991 40992 92030 92060

Meliaceae*Dysoxylum fraserianum*^{1,2,3}

05021 05051 10031

*Melia azedarach*²*Synoum glandulosum*^{1,2}00031 05051 10031 30021 30041 30061 30071
30111 30121 35561 35562 40051 40052 54041

Menispermaceae

<i>Legnephora moorei</i> ^{1,2}	10041
<i>Sarcopetalum harveyanum</i> ^{1,2,3}	05021 10031 30061 35041 54111
<i>Stephania japonica</i> var. <i>discolor</i> ^{1,2,3,4}	00031 05021 05051 10041 30021 30061 30071 35041 35121 35122 35221 35222 35561 35562 35621 54041

Menyanthaceae

<i>Villarsia exaltata</i> ^{1,2}	64031
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Monimiaceae

<i>Daphnandra micrantha</i> ^{1,3}	05051
<i>Wilkiea huegeliana</i> ^{1,2,3,4}	05021 05051 10031 30021 30041 35041 40051 40052 52031 54041

Moraceae

<i>Ficus coronata</i> ^{1,2,3}	00031 05051 35041
<i>Ficus fraseri</i> ^{1,2,3,4}	00031 05021 10031 30111
<i>Ficus obliqua</i> ^{2,3}	05051
<i>Ficus rubiginosa</i> ^{1,2,3,4}	05051 10031 10041
<i>Ficus superba</i> var. <i>henneana</i> ^{1,2,3}	05051 10031 52031
<i>Ficus watkinsiana</i> ^{1,2,3}	05021 05051 10031 30041
<i>Maclura cochinchinensis</i> ^{1,2,3,4}	00031 05021 10031 92030
<i>Malaisia scandens</i> subsp. <i>scandens</i> ^{1,2,3,4}	05021 05051 10031
<i>Streblus brunonianus</i> ^{1,2,3,4}	05051 10031 30111 30121

Myoporaceae

<i>Myoporum acuminatum</i> s. str. ^{1,2,4}	00031 10031 40051 40052 40991 40992
<i>Myoporum boninense</i> subsp. <i>australe</i> ^{1,2}	63021

Myrsinaceae

<i>Aegiceras corniculatum</i> ^{1,2}	25022 40051 40052
<i>Embelia australiana</i> ^{1,2,3,4}	05021 05051 10031 10041 30021 30041 30071 30111 30121
<i>Rapanea howittiana</i> ¹	05021
<i>Rapanea variabilis</i> ^{1,2,3,4}	05021 05051 10031 10041 30021 30061 30111 30121 30131 35041 52031

Myrtaceae

<i>Acmena smithii</i> ^{1,2,3,4}	00031 05021 05051 10031 30021 30131 54041
<i>Angophora costata</i> ^{1,2,3}	35041 35221 35222 35561 35562 50022 59051
<i>Angophora floribunda</i> ^{1,2}	35081 35131 35601 35611
<i>Austromyrtus acmenoides</i> ^{2,3}	05051
<i>Austromyrtus bidwillii</i> ^{1,2,3,4}	05021 05051 10031
<i>Backhousia myrtifolia</i> ^{1,2}	05051
<i>Baeckea diosmifolia</i> ¹	58991
<i>Baeckea imbricata</i> ^{1,2}	58991
<i>Callistemon citrinus</i> ^{1,2}	60021
<i>Callistemon pachyphyllus</i> ^{1,2}	51022 60021 64031
<i>Callistemon salignus</i> ^{1,2,4}	00031 40991 40992 30111 30121 35561 35562
<i>Calytrix tetragona</i> ^{1,2}	58041
<i>Choricarpia leptopetala</i> ¹	10041 30111 52031
<i>Corymbia intermedia</i> ¹	30041 35041 35601 35621
<i>Corymbia maculata</i> ^{1,2,3}	30131 35041 35591 35621
<i>Darwinia leptantha</i> ^{1,2}	58991 60021
<i>Eucalyptus acmenoides</i> ^{1,2,3}	30121 30131 35591
<i>Eucalyptus carnea</i> ¹	35041 35081
<i>Eucalyptus fergusonii</i> subsp. <i>fergusonii</i> ^{1,2,3}	30121 30131 35591
<i>Eucalyptus grandis</i> ^{1,2}	30041 30061 35601
<i>Eucalyptus microcorys</i> ^{1,2}	30021 30041 30061 30071 35041 35081 35121 35122 35601 35611

Myrtaceae cont.

<i>Eucalyptus pilularis</i> ^{1,2,3}	30041 30061 35041 35081 35121 35122 35221 35222 35561 35562 50022
<i>Eucalyptus propinqua</i> ^{1,2}	30061 35041 35121 35122
<i>Eucalyptus resinifera</i> subsp. <i>hemilampra</i> ¹	35041 35081
<i>Eucalyptus robusta</i> ^{1,2}	00031 40031 40032 40981 40982 51022 54021 64031
<i>Eucalyptus tereticornis</i> ^{1,2}	30111 35041 35081 35121 35122 35131 35601
<i>Leptospermum juniperinum</i> ^{1,2}	58991 59051 60021 64031
<i>Leptospermum laevigatum</i> ^{1,2}	54101 58041
<i>Leptospermum liversidgei</i> ^{1,2}	58991 60021
<i>Leptospermum polygalifolium</i> ^{1,2}	40031 40032 40981 40982 51022 54021 58991 59051
<i>Leptospermum semibaccatum</i> ¹	58991
<i>Leptospermum trinervium</i> ^{1,2}	40981 40982 50022 54021 58041 58991
<i>Lophostemon confertus</i> ^{1,2}	00031 10041 30021 30041 30061 30071 35041
<i>Melaleuca armillaris</i> ^{1,2}	54041
<i>Melaleuca ericifolia</i> ^{1,2}	40031 40032 40991 40992
<i>Melaleuca linariifolia</i> ^{1,2}	40981 40982
<i>Melaleuca nodosa</i> ^{1,2}	51022 54021 58991 60021
<i>Melaleuca quinquenervia</i> ^{1,2,4}	00031 30041 40031 40032 40051 40052 40981 40982 40991 40992 51022 54041 55062 59051 60021 64021 64031
<i>Melaleuca sieberi</i> ^{1,2}	51022 60021
<i>Melaleuca thymifolia</i> ^{1,2}	51022 59051 64031
<i>Ochrosperma lineare</i> ^{1,2}	54021
<i>Rhodamnia rubescens</i> ^{1,2,3}	05051 30021 30061 30071
<i>Rhodomyrtus psidioides</i> ^{1,2,3,4}	00031 05021
<i>Syncarpia glomulifera</i> ^{1,2}	35041
<i>Syzygium australe</i> ^{2,3}	05051
<i>Syzygium francisi</i> ^{2,3}	05051
<i>Syzygium oleosum</i> ^{1,2,3}	05021 05051 40051 40052
<i>Tristaniopsis laurina</i> ^{2,3}	05051

Nyctaginaceae

Pisonia umbellifera^{1,2,3} 05051

Olapaceae

Olax stricta^{1,2} 51022 58041

Oleaceae

<i>Jasminum volubile</i> ^{1,2,3,4}	05021 05051 10031 30111 35591 52031
<i>Notelaea longifolia</i> forma <i>intermedia</i> ^{1,2,3,4}	00031 05021 05051 10031 10041 30021 30041 30061 30071 30111 30121 30131 35081 35221 35222 35561 35562 35591 52031
<i>Olea paniculata</i> ^{1,2,3,4}	00031 05021 05051 10031 30111 30121 35591

Onagraceae

**Oenothera affinis*²

**Oenothera mollissima*¹ 92070

Oxalidaceae

<i>Oxalis chnoodes</i> ¹	30071 30121 35591
<i>Oxalis exilis</i> ¹	35611
<i>Oxalis rubens</i> ¹	62021 62022

Passifloraceae

**Passiflora edulis*^{1,2}

Passiflora herbertiana subsp. *herbertiana*^{1,2} 30071 35601 35611

**Passiflora subpeltata*^{1,2,3,4} 00031 05051 10031 10041 30021 30061 30071
30121 35081 35121 35122 35131 35611 35621
92030

Peperomiaceae*Peperomia blanda* var. *floribunda*^{2,3,4} 05051 10031**Phytolaccaceae***Monococcus echinophorus*^{2,4} 10031**Phytolacca octandra*²**Pittosporaceae***Billardiera scandens*^{1,2} 35041 59051*Citriobatus pauciflorus*^{1,2,3,4} 05021 05051 10031 30021 30041 30061 30071
30111 30121 35591*Hymenosporum flavum*^{1,2,3} 05051 30021 30041 30061*Pittosporum revolutum*^{1,2,3,4} 00031 05021 10031 10041 30041 30111 52031*Pittosporum undulatum*^{1,2,3} 05051 10031 10041 30111 30121 30131 35041
35591 40051 40052 52031**Plantaginaceae***Plantago debilis*¹ 35591 35621 54041 63021**Plantago major*²**Plantago lanceolata*^{1,2} 92030 92060**Polygalaceae***Comesperma ericinum*^{1,2} 58041**Polygonaceae***Muehlenbeckia gracillima*²*Persicaria decipiens*²*Rumex brownii*²**Rumex crispus*²**Portulacaceae***Portulaca oleracea*^{1,2} 91030**Primulaceae****Anagallis arvensis*^{1,2} 63021*Samolus repens*^{1,2} 40991 40992 61021 64021 65021**Proteaceae***Banksia aemula*^{1,2} 50022 51022 54021 58041 58991 60021*Banksia ericifolia* var. *macrantha*^{1,2} 58991 60021*Banksia integrifolia* subsp. *integrifolia*^{1,2,3} 05021 05051 35561 35562 35611 54101 54111
59051 63021*Banksia oblongifolia*¹ 51022 54021 58991 60021*Banksia robur*^{1,2} 60021*Banksia serrata*^{1,2} 35221 35222 35561 35562 54101*Banksia spinulosa* var. *collina*^{1,2} 59051*Conospermum taxifolium*^{1,2} 58041 58991 60021*Hakea sericea*^{1,2} 35041*Hakea teretifolia*^{1,2} 59051 60021 64031*Isopogon anemonifolius*^{1,2} 50022 58041 58991 59051*Lomatia silaifolia*^{1,2} 35041*Persoonia katerae*¹ 35561 35562*Persoonia lanceolata*^{1,2} 35561 35562 54101 59051*Persoonia levis*^{1,2,3} 35561 35562 59051*Persoonia linearis*^{1,2} 35041 35561 35562 63021*Petrophile pulchella*^{1,2} 58041*Stenocarpus salignus*^{1,2,3} 05051**Ranunculaceae***Clematis aristata*^{1,2} 05051 30021 35561 35562 35621*Clematis glycinoides*^{1,2,4} 10031 30111 35591*Ranunculus inundatus*²*Ranunculus lappaceus*^{1,2} 35121 35122

Rhamnaceae

<i>Alphitonia excelsa</i> ^{1,2,3,4}	00031 05021 05051 10031 10041 30111 35591 40051 40052
<i>Cryptandra amara</i> ^{1,2}	59051
<i>Cryptandra ericoides</i> ¹	60021
<i>Emmenosperma alphitonioides</i> ²	
<i>Pomaderris lanigera</i> ¹	10041 35131

Rosaceae

* <i>Rubus fruticosus</i> spp. aggr. ^{1,4}	00031 92030
<i>Rubus moluccanus</i> var. <i>trilobus</i> ^{1,2}	00031 30021 35041 35121 35122 35611
<i>Rubus nebulosus</i> ²	
<i>Rubus parvifolius</i> ^{1,2}	30061 35081 35121 35122 35621
<i>Rubus rosifolius</i> ¹	00031 35611

Rubiaceae

<i>Canthium coprosmoides</i> ^{1,2,3}	05021 05051 10041 30071 30111 30121 52031
* <i>Coprosma repens</i> ¹	92060
<i>Durringtonia paludosa</i> ¹	40031 40032 40981 40982
<i>Galium binifolium</i> ^{1,2}	30061
<i>Galium ciliare</i> ¹	35591
<i>Galium propinquum</i> ¹	35041
<i>Ixora beckleri</i> ^{1,2,3}	05051
<i>Morinda acutifolia</i> ⁴	10031
<i>Morinda jasminoides</i> ^{1,2}	05021 05051 10041 30021 30041 30061 30131 52031
<i>Opercularia aspera</i> ^{1,2}	51022 54101
<i>Opercularia diphylla</i> ¹	35041 35591
<i>Opercularia hispida</i> ²	
<i>Opercularia varia</i> ¹	50022 51022 58041
<i>Pomax umbellata</i> ^{1,2}	35561 35562 40031 40032 50022 58041
<i>Psychotria loniceroides</i> ^{1,2}	30021 30061 30071 30121 30131 52031
<i>Randia benthamiana</i> ^{2,3}	05051

Rutaceae

<i>Acronychia oblongifolia</i> ^{1,2,4}	00031 10031 30021 30041
<i>Acronychia wilcoxiana</i> ^{1,2,3,4}	05021 05051 10031 30111
<i>Boronia falcifolia</i> ^{1,2}	58991 60021
<i>Boronia parviflora</i> ^{1,2}	60021
<i>Boronia pinnata</i> ^{1,2}	54021 58991
<i>Boronia polygalifolia</i> ^{1,2}	59051
* <i>Citrus limonia</i> s. lat. ¹	92030
<i>Correa reflexa</i> var. <i>reflexa</i> ^{1,2,3}	35561 35562 54101 58041
<i>Eriostemon australasius</i> subsp. <i>australasius</i> ^{1,2}	35561 35562 50022 58041
<i>Geijera latifolia</i> ^{1,2,3}	00031 05051
<i>Phebalium squameum</i> subsp. <i>squameum</i> ^{1,2}	35561 35562
<i>Philotheca salsolifolia</i> ²	
<i>Sarcomelicope simplicifolia</i> subsp. <i>simplicifolia</i> ^{1,2,3,4}	05051 10031 30111 30131
<i>Zieria laxiflora</i> ^{1,2}	50022 54021
<i>Zieria smithii</i> ^{1,2}	30061 30071 30111 35041 35561 35562

Santalaceae

<i>Exocarpos cupressiformis</i> ^{1,2,4}	00031 30111 35041 40991 40992
<i>Leptomeria acida</i> ²	

Sapindaceae

<i>Alectryon coriaceus</i> ^{1,2,3,4}	05021 05051 10031
<i>Alectryon subcinereus</i> ^{1,2,4}	05051 10031 30111 52031
<i>Arytera divaricata</i> ^{1,2,3,4}	05021 05051 10031

Sapindaceae cont.

<i>Cupaniopsis anacardioides</i> ^{1,2,3,4}	00031 05021 05051 10031 30021 30041 30061 30071 30111 30121 30131 35221 35222 40991 40992
<i>Dodonaea triquetra</i> ^{1,2}	30061 30071 30131 35041 35561 35562 35621 54101
<i>Elattostachys nervosa</i> ^{1,2,3,4}	05051 10031 30111
<i>Guioa semiglaucula</i> ^{1,2,3}	00031 05021 05051 10031 10041 30041 30061 30071 30111 30121 30131 40051 40052
<i>Jagera pseudorhus</i> var. <i>pseudorhus</i> forma <i>pseudorhus</i> ¹	05021
<i>Mischocarpus pyriformis</i> subsp. <i>pyriformis</i> ^{1,2,3,4}	05051 10031
<i>Rhysotoechia bifoliolata</i> ^{1,2,3,4}	05051 10031

Sapotaceae

<i>Planchonella australis</i> ^{1,2,3,4}	05021 05051 10031 30021 30111 30121
<i>Planchonella myrsinoides</i> ^{1,2,3}	05051 10031

Scrophulariaceae

<i>Bacopa monnieri</i> ^{1,2}	40991 40992 55062 91030
<i>Euphrasia collina</i> ^{1,2}	58041
<i>Mimulus repens</i> ²	

Solanaceae

<i>Duboisia myoporoides</i> ^{2,3}	05051
* <i>Physalis peruviana</i> ²	
<i>Solanum americanum</i> ²	
* <i>Solanum linnaeanum</i> ²	
* <i>Solanum mauritianum</i> ^{1,2,4}	10031 40051 40052 92070
* <i>Solanum nigrum</i> ^{1,2,4}	00031 30071
<i>Solanum prinophyllum</i> ^{1,2}	35121 35122
<i>Solanum pungetium</i> ²	
<i>Solanum stelligerum</i> ^{1,2}	30021 30061 35121 35122
<i>Solanum vescum</i> ²	

Stackhousiaceae

<i>Stackhousia nuda</i> ²	
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Sterculiaceae

<i>Commersonia fraseri</i> ^{1,2,3}	00031 05051 10031 30021 30071
<i>Heritiera actinophylla</i> ^{1,2,3}	05051
<i>Keraudrenia hillii</i> var. <i>hillii</i> ²	

Stylidiaceae

<i>Stylidium graminifolium</i> ^{1,2}	58991 60021
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Symplocaceae

<i>Symplocos thwaitesii</i> ^{2,3}	05051
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Thymelaeaceae

<i>Pimelea linifolia</i> ^{1,2}	35041 35561 35562 50022 58041 58991 59051 60021 63021
<i>Wikstroemia indica</i> ^{1,2}	10031 40051 40052

Tropaeolaceae

* <i>Tropaeolum majus</i> ²	
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Tremandraceae

<i>Tetratheca ericifolia</i> ²	
<i>Tetratheca thymifolia</i> ^{1,2}	59051

Ulmaceae

<i>Celtis paniculata</i> ^{1,2,3}	05021 05051 10031
<i>Trema aspera</i> ¹	05051 10031 10041 30041 30071 35131 35611

Urticaceae

Dendrocnide photinophylla^{1,2,3,4} 05051 10031 30111
*Parietaria debilis*²

Verbenaceae

Clerodendrum tomentosum^{1,2,3,4} 05021 10031 10041 30021 30041 30111 30131
 52031
Gmelina leichhardtii^{1,2} 05051
 **Lantana camara*^{1,2,3,4} 00031 05021 05051 10031 10041 30041 30061
 30071 30111 30121 30131 35121 35122 35131
 35221 35222 35561 35562 35591 35601 35611
 35621 40051 40052 54041 54101 54111
 **Verbena incompta*^{1,2} 92030
 **Verbena rigida*¹ 92030

Violaceae

*Hybanthus monopetalus*²
Viola betonicifolia^{1,2} 35041
Viola hederacea^{1,2,4} 00031 05021 30121 35081 35221 35222 35601
 35611 35621 54041 63021

Viscaceae

*Notothixos cornifolius*¹ 05051

Vitaceae

Cayratia clematidea^{1,2,3,4} 00031 05021 05051 10031 10041 30021 30041
 30061 30071 30111 35121 35122 35591 35601
 35611 35621 40051 40052 54041
Cissus antarctica^{1,2,3,4} 00031 05021 05051 10031 10041 30021 30061
 30071 30111 30121 40031 40032
Cissus hypoglauca^{1,2} 00031 05051 10041 30021 30041 30061 30071
Tetrastigma nitens^{1,2,3,4} 05051 10031 30021 30041 30111