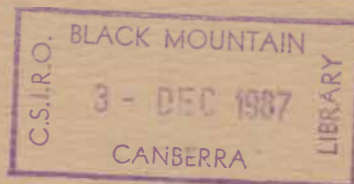




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in the Cooloola-Noosa River Area, Queensland
5. Vascular Plants**

A.G. Harrold, W.J.F. McDonald, M.S. Hopkins, J.Walker,
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**STUDIES IN LANDSCAPE DYNAMICS
IN THE COOLOOLA-NOOSA RIVER AREA, QUEENSLAND.
5. Vascular plants.**

A.G. Harrold¹, W.J.F. McDonald², M.S. Hopkins³, J. Walker⁴
C.S. Sandercoe⁵ and C.H. Thompson⁶

Abstract

This report presents a listing of 865 species and 5 subspecies of plants recorded in the Cooloola-Noosa River area up to 31 December 1986. All the species listed have been identified by the Queensland Herbarium and their occurrence within the area verified by one of the authors. The general distribution of plant species within the area is indicated on the species list and referenced to an accompanying map. The local distribution units used on the map are based on the physiographic features and soil landscapes previously described in the area. Also, there are short notes on the local distribution units, previous botanical surveys, local phytogeography, and alien, rare and endangered plant species.

The publication is intended to serve as a verified botanical reference for reporting soil and vegetation studies in the Cooloola sand dunes, and as a general reference to plant occurrence and distribution in the Cooloola National Park and Womalah State Forest.

INTRODUCTION

This report is one of a series that provide results and data derived from the CSIRO Division of Soils research in landscape dynamics of vegetated coastal dunes in the Cooloola-Noosa River Area, Queensland (Thompson and Moore 1984). It presents a comprehensive listing of plant species recorded in the area to 31 December 1986, plus those recorded in a small extension north and west of the mouth of Kin Kin Creek, in order to coincide with the present National Park boundary there. Also, the general distribution of plants in the area is indicated and there are short notes on the local distribution units used, previous botanical surveys, local phytogeography, alien and rare and endangered species.

The Cooloola-Noosa River Area occupies about 62 000 ha including the eastern and upper western catchments of the Noosa River and the coastal area between Noosa Heads and Inskip

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Point, some 120-180 km north of Brisbane (Thompson and Moore 1984). It comprises the Cooloolool sandmass of large overlapping dune systems, the low hilly promontory of Double Island Point, strandplains and coastal plains, the sandstone hills and riverine plains of the upper Noosa River catchment and a number of freshwater and tidal lakes. The climate is coastal subtropical with hot, moist summers and mild, drier winters; mean annual rainfalls within the area probably vary between 1200 and 1600mm (Thompson and Moore 1984). A large number of plant species occur in the area in a variety of vegetation types ranging from sedgeland and heaths, through low shrubby woodlands, layered woodlands and open forests, to extremely tall forests and rainforests.

The logging of native timbers, the main commercial use, began in the 1870s with uncontrolled logging of native conifers, cabinet timbers and hardwoods on the Cooloolool sandmass. In 1925, most of the area became a State Forest Reserve (S.F. 451) and logging has since been controlled by the Queensland Department of Forestry. Large parts of the sandmass and adjacent coastal plains were proclaimed as National Park in 1975, and the western catchment of the upper Noosa River has recently been added to this; only the central high dunes of the Cooloolool sandmass remain as State Forest and are still logged for hardwoods. Prior to 1975, cattle and horses were run in parts of the area, on native pastures at low stocking rates. Also, part of the strandplain north of Rainbow Beach was dredged for heavy minerals (1966-72) and revegetated using a mixture of native plants dominated by *Acacia* species.

A species list for the area compiled by the senior author (AGH) forms the initial basis of this report. It was derived from records of plants in the general area prior to 1971 and verified and added to by observations and specimen collections in non-rainforest areas, on the sand dunes and coastal plains (1971-74), and in the grassy woodlands and open forests of the western catchment of the upper Noosa River and Tin Can Inlet areas (1974-75). This list has been substantially added to since 1977 from species recorded during CSIRO soil/vegetation studies at some 210 sites in the sand dunes and 40 sites elsewhere, from species recorded during vegetation mapping by Queensland National Parks and Wildlife Service (Sandercoe 1986), and from Queensland Herbarium records of plants submitted for identification.

This publication is intended to meet two needs; firstly as a verified botanical reference for reporting research in soil and vegetation relationships in the Cooloolool sandmass, and secondly as a reliable, general reference to plant occurrence and distribution in the Cooloolool National Park and Womalah State Forest.

PLANTS AND THE COOLOOL SAND DUNES

Vegetation has played an important role in stabilizing and protecting the episodic accumulations of sand which comprise the Cooloolool sandmass. Although the initial deposits of sand may well have begun as sandbars or spits adjacent to headlands or near-shore islands during periods of relatively high sea level, persistence of the deposits during low sea levels depended on plant cover to protect them from dissipation by wind or rain. Without such protection, strong onshore winds would have driven any bare sand further inland across the Noosa Plain into the sandstone hills.

Evidence of the presence of vegetation throughout the development of this sandmass is provided by plant remains in different stratigraphic beds at various localities. Fragments of *Banksia integrifolia*, *Casuarina glauca* and two mangroves (*Ceriops* sp. and *Aegiceras* sp.) were

recovered from depths of 30-37 m below present high water mark during a search for oil (Ball 1924). Their presence in unconsolidated sandy sediments was interpreted by Ball as indicating an estuarine environment, which presumably had been invaded by mobile dunes. Tree-trunks and pieces of wood have also been found imbedded in sandy deposits at heights near that of present sea level. These include a mangrove (*Ceriops* sp.) and a native conifer (*Podocarpus* sp.) in a brown coal band in the intertidal zone, south of Kings Bore (Ball 1924, Coaldrake 1961), myrtaceous wood in sandrock at Rainbow Beach (Coaldrake 1961), and a log and fragments of at least twelve plant species in sands of the Noosa Plain (Thompson and Polach unpublished data). Radiocarbon dates show that all are of Pleistocene age and that the wood samples are older than 40 000 years.

Additional evidence of the presence of vegetation in the history of the sandmass is provided by the five youngest dune systems which have U- or V-shapes (parabolic forms) open to the onshore winds. Such dune forms could develop on a large scale only as sand was blown into vegetated areas or as blow-out dunes within vegetated areas. The development of such dune forms in successive periods of dune-building and their persistence to the present is clear evidence that the Cooloola dunes carried vegetation throughout the last glaciation and probably at least since the last interglacial, some 120 000 years ago (Thompson 1981, 1983, Walker *et al.* 1981). Further proof of continuing vegetation cover over much of the area throughout the late Pleistocene and Holocene is provided by the widespread persistence of giant *podzol* profiles on many of the high exposed dune ridges; without such protection these surely would have been destroyed by the wind (Thompson and Moore 1984, Pickett *et al.* 1985).

The vegetation cover is no less important today and protects the sand dunes from dissipation. Wherever the vegetation cover is destroyed, the wind rapidly deflates the exposed areas forming small, elongated or scallop-shaped blow-out dunes along the coastal margin. Elsewhere, erosion rates due to raindrop splash and local wash are largely determined by the amount of cover on the soil surface provided by grasses, low herbaceous plants and litter from all species (Bridge and Ross 1983, Bridge *et al.* 1985). Also, vegetation is essential for the development of soils on the sand dunes because it provides organic substrate for microbes and soil animals, and contributes organic compounds to the developing *podzols* (Thompson 1983, Thompson and Moore 1984).

Apart from the andesites forming the headland of Double Island Point, all of the soil parent materials contain few weatherable minerals and therefore have a very low potential to provide nutrients for plant growth. Many of the plants have symbiotic relationships or specialized structures that assist the acquisition or storage of particular nutrients. These include a large number of nitrogen-fixers, such as acacias, casuarinas and macrozamia (each of these groups obtains atmospheric nitrogen through different symbiotic organisms), plants with specialized means of nutrient transfer (such as the proteoid roots of banksias or the endo- and ectomycorrhizal fungal associations of many other plants), and plants that have developed specialized storage organs, such as macrozamia, or allow the gradual accumulation of nutrients, such as lignotubers in eucalypts and particularly the sympodial plate-like forms in *Eucalyptus intermedia* described by Walker *et al.* (1987).

Other strategies for survival in the low-nutrient environment include occupancy of sites with the most favoured nutrient supply, e.g. rainforests in corridors or eroded dune floors. These receive nutrients washed in from higher sites and usually have a water table of "white" waters

(Reeve and Fergus 1983) either issuing as springs or within rooting depth (Reeve *et al.* 1985). However, tree growth appears to be restricted or prevented where seasonal water tables containing organic acids ("black" waters) are at or near the surface for long periods during the year, e.g. a large part of the Noosa Plain. Here, trees are restricted to the banks of streams, road drains or sandy fans where the depth to water table is greater (or its duration near the surface is shorter) than on the adjacent open plain.

Along the coastal margins, both the structure and floristics of the vegetation are strongly influenced by the degree of exposure to salt-laden onshore winds or to intense fires initiated near the coast and driven upslope by onshore winds. In some areas, particularly in the high dunes of the Cooloola sandmass, timber-cutting has also changed the structure from open forests to woodlands and has markedly reduced the numbers of some commercial species in the rainforests and their margins, particularly *Agathis*, *Araucaria*, *Gmelina* and *Syncarpia*.

PREVIOUS BOTANICAL STUDIES

The Queensland Herbarium records of plants from the Cooloola-Noosa River area come from many sources and begin about 1900. F.H. Kenny, a medical superintendent at Gympie, apparently made a plant collection prior to 1907 from part of the western margin of the area and perhaps near Tin Can Bay, judging from a specimen of *Stylidium debile*, dated November 1906. J. Keys, a teacher at Norman Park State School, Brisbane, collected plants in the vicinity of Lake Cootharaba between 1909 and 1911 (Lebler 1972); of note in this collection is the type specimen of *Boronia keysii*, a rare species endemic to this locality.

During the following decade, W.D. Francis made extensive collections in the rainforests of the adjacent Kin Kin district (Francis 1929) and collected near Lake Cootharaba. C.T. White, Government Botanist, also visited the Kin Kin district (1916-1917) and Tin Can Bay (1943). Mrs. M.S. Clemens spent about seven weeks during 1946 in the Tin Can Bay-Rainbow Beach area and as far south as Lake Poona, making plant collections for various herbaria. In 1954, S.T. Blake and L.S. Smith (Queensland Herbarium) visited the areas around Lakes Cootharaba and Como with the Queensland Naturalists Club and a list of approximately 280 species was compiled.

The Cooloola-Noosa River area was included in a CSIRO Division of Tropical Pastures ecological study of the coastal lowlands of south-east Queensland (Coaldrake 1961). This increased the record of plant species in the area and provided the first information on plant and soil relationships there. The rainforests of Cooloola and Fraser Island were examined by the CSIRO Rainforest Ecology Unit (Webb 1969) and a rainforest species list published for Cooloola (Webb and Tracey 1975). Brief visits to the area that contributed to knowledge of the taxa were also made by V.K. Moriarty, CSIRO Phytochemical Survey, and L.S. Smith, S.L. Everist, and T.J. McDonald of the Queensland Herbarium.

More recently an extensive collection was made of the plants in the area and their local distribution recorded, beginning with the Cooloola sand dunes and Noosa Plain (Harrold 1971), the orchids of the area (A.H. Buzacott pers. comm. 1972), and then in the western catchment of the upper Noosa River (Harrold 1976). During this period, the vegetation of the area was also described in an assessment of localities of significance for nature conservation in the general region (Stanton 1976, 1979), and the occurrence and distribution of mangrove species in Tin Can Inlet were recorded (Dredge *et al.* 1977).

CURRENT BOTANICAL RESEARCH

Vegetation cover is an important component in the dynamics and persistence of most terrestrial landscapes. Identification of plants and reliable description of structural forms of the vegetation are therefore an essential part of research in landscape dynamics. Also, because a general relationship between the type of vegetation and depth of soil development in the coastal dunes was recorded during reconnaissance soil mapping (Thompson 1975), one of the aims of the research programme was to examine and verify this soil plant association and if possible to determine the causal factors. This required a quantified record of the structure and floristics of the vegetation and of soil profile characteristics at a number of sites on equivalent geomorphic components in each dune system. The species list compiled by Harrold (1971-76) served as a reference base for these investigations and was expanded as the work advanced.

The approach used in quantifying the vegetation of the woodlands and open forests followed the method of Walker and Hopkins (1984). For the purpose of examining plant and soil relationships across the dunes, data for structure and floristics were recorded at sample areas of 400 square metres on the various geomorphic components in each dune system. The shape of the individual sampling area was adjusted according to that of the geomorphic component. In addition to the set site sampling, the search for plants was extended along two or three traverses that crossed each geomorphic unit. Data from both types of sampling are used in this report.

Since 1976, data have been collected from some 180 sample sites under woodlands or eucalypt forests on the dunes. The number of species within the 400 square metres sample sites ranged from 4 to 50 with an average of about 25 species per site; the more wide-spread sampling usually increased species numbers by 5 to 10. About 50 of the sites were revisited between 1976 and 1984 and 2 to 5 ephemerals, not previously recorded, were found at each site. Specimens were checked against reference material held by the senior author (AGH) and doubtful identification resolved by submitting specimens to the Queensland Herbarium.

The rainforests were sampled using a multiple nearest neighbours approach, as recommended by Williams *et al.* (1973). At each site, thirty-three contiguous trees (one tree and its thirty-two nearest neighbours) were identified and their diameter at breast height (dbh) measured. Only trees of 20 cm or greater (dbh) were chosen so as to include a wide range of canopy species in the sample (samples based on ≤ 10 cm dbh tend to be dominated by the palm *Archontophoenix cunninghamiana*). Canopy height and the presence of emergents were recorded and the structure of the lower strata described. The species listing included all trees, shrubs, herbs, epiphytes and lianes observed at each site. Thirty-one sites were sampled across the sand dunes to provide data for plant/soil relationship studies. For the present report, this data has been supplemented by observations and records of plant occurrence made during the previous visits to the rainforests of the area, including those west of the Noosa River.

In the Noosa River delta, upstream of Lake Cootharaba, plant occurrence has been recorded at twenty-six sites and supplemented by observations during previous visits.

DISTRIBUTION OF PLANTS

The presence of 865 species and 5 subspecies of plants in the Cooloola-Noosa River area has been verified. Their distribution has been related to the physiographic units and soil

landscapes of the area (Thompson and Moore 1984) and indicated according to local distribution units in the accompanying tables and map. The local distribution units have been numbered 1-10 on the map and subscripted in the text to indicate particular environments within each locality (a, b, c), or as species occurring within patches of rainforest within the locality (r); the larger areas of rainforest are also shown on the map by hatching.

The map should not be regarded as a vegetation map but as a geographic reference to local areas where the species are definitely known to occur in some part. This has been deduced from our detailed vegetation records from the sand dunes and part of the Noosa River delta and from our collections and observations elsewhere. However, apart from the areas adjacent to the

Table 1. Relationship between physiographic units, soil landscapes and plant distribution units recognized in the Cooloola-Noosa River area.

Physiographic Unit	Soil Landscape	Local Distribution Units	Table and Map Code
Sandstone hills	Como Scarp	Escarpment	1a
	Pertaringa	Low hills	1b
	Mullens	Stony hills	1c
Riverine and coastal plains	Nilkan	Noosa Plain	2
	Tarangau	Sandy fans and low hills	3a
		Rainforests	3r
	Noosa River	Upper Noosa River	
		Levees and plains	4a
	Dibing	Lower Noosa River	
		Levees and plains	4b
Cooloola sandmass	Noosa River	Rainforests	4r
	Mundu, Kabali, Yikiman	Western and northern dunes	5a
		Rainforests	5r
	Chalambar, Burwilla, Warrawonga	Central high dunes	6a
		Rainforests	6r
	Mutyi	Coastal margin of dunes	7a
		Coastal seepage areas and berms	7b
Promontory	Double Island Point	Rocky headland	8a
	Bula Kalim	Aeolianite hills	8b
Littoral zone	Pirri	Tin Can Inlet	9a
		Lower Noosa River	9b
Strand plains and foredunes	Inskip Point	Beach ridges and swales	10a
	Smoooger Point	Sandy sheets (Tin Can Inlet)	10b
	Tingiri	Foredunes (S of Teewah)	10c

Cooloola sandpatch and the Noosa River downstream of Harry Spring's Hut, we have made no record of plants in the area that was previously the Cooloola Fauna Reserve. Plant distribution localities shown for this area have been arrived at through the extrapolation of soil landscape boundaries using photo-interpretation (Thompson and Moore 1984) and should be viewed with caution.

Additional search in the area is likely to add further species and will show that several are more widely distributed than we have indicated. Brief notes on each local distribution unit are given below; the soil landscape descriptions (Thompson and Moore 1984) should be consulted for greater detail.

Local distribution unit 1 includes the Como Scarp, Pertaringa and Mullens soil landscapes (1a, 1b, 1c), i.e. most of the sandstone hills in the western catchment of the upper Noosa River, upstream of Lake Cootharaba, those east of Carland Creek, and the isolated hills protruding through the coastal plain to the north and east of Lake Cooloola, along the northern shore of Lake Cootharaba and east of Lake Cooroibah. Most of the area consists of low hills with gentle or moderate sideslopes to shallow open valleys but moderate to steep slopes are associated with the higher hills, such as East Mullen and with the erosion scarp. Narrow drainage lines continuous with unit 4a are also included. Elevations are mostly 20 to 60 m with the highest hill (Mt. Elliot) reaching 168 m. Micro-climates range from droughty exposed crests to wet lower hill slopes and drainage heads.

Grassy woodlands and open grassy forests are the dominant vegetation types with some small patches of rainforest. From Tarangau north along the Como Scarp there is a transition from wet sclerophyll forests which include tallow-wood (*Eucalyptus microcorys*) through open forests with blackbutt (*Eucalyptus pilularis*) to the widespread open forests and woodlands in which scribbly gum (*Eucalyptus signata*) is common. The piccabeen palm (*Archontophoenix cunninghamiana*) has been recorded in two of the valley heads where springs issue from the base of the scarp but has not been observed elsewhere in the unit.

Local distribution unit 2 equates with the Nilkan soil landscape which is made up of the Noosa Plain and the open coastal plains to the east of Tin Can Inlet and Lakes Cootharaba and Cooroibah. These plains are flat to gently sloping with weakly defined peaty drainage lines; elevations are generally <10 m but reach 20 m along the western and northern margins of the Noosa Plain. The areas are seasonally wet with perched water tables at or near the surface for long periods following prolonged rain.

The vegetation reflects the drainage status; the greater part is treeless and carries heath <1 m tall with sedgelands along the swampy drainage lines and on mound peats. Low shrubby woodlands grow along the channels of eroded gullies and on some of the locally higher sandy banks.

Local distribution unit 3 represents an undulating area of sandy fans and low convex sandstone hills extending north-west from Lake Como to the Como Scarp, i.e. Tarangau soil landscape. Elevations range from < 20 m to about 50 m at the base of the scarp.

The vegetation varies from tall eucalypt forest (3a) to fairly dense rainforest (3r). Small areas of dense tea tree (*Melaleuca quinquenervia*) forest occur along swampy drainage lines which are narrow extensions of unit 4b.

Local distribution unit 4 comprises the levees, floodplains and effluent channels of the Noosa River and its tributaries upstream of Cooloola 050070 (Map 9545-IV, 1:50 000 series), the delta plain, low-lying eastern margins of Lakes Cootharaba and Cooroibah, and the low floodplain near the river mouth. It includes the Noosa River soil landscape (4a) with small patches of rainforest (4r) and the Dibing soil landscape (4b). Elevations range from <1 m to about 20 m in the upper reaches of the Noosa River and Teewah Creek. A large part of the area is swampy and subject to seasonal flooding.

The vegetation varies with the texture of the alluvium, depth to water tables, frequency of river flooding and salinity. Woodlands cover the largest part but there are patches of fringing forest along the river, dense tea tree forests in many of the swampy areas, small areas of sedgeland, and a few patches of rainforest (4r) on sandy banks. Mangroves occur as fringing vegetation as far upstream as the northern end of Lake Cootharaba.

Local distribution unit 5 includes the Mundu, Kabali and Yikiman soil landscapes which together make up the western and northern margins of the Cooloola sandmass. The area consists of strongly degraded dunes, ranging from large sandridges that form much of the western wall of the high dunes (Mundu soil landscape) to broad, whaleback sandhills (Kabali soil landscape), and low gradient sandy fans (Yikiman soil landscape). Thick colluvial aprons that have accumulated during the degradation of the dunes make up the lower and middle slopes of the sandhills. Most of the permanent creeks flowing out of the sandmass to the west or north-west begin in these dunes and derive their water from the lateral seepage of 'coloured' waters and from 'white water' springs which issue in some drainage heads (Reeve *et al.* 1985). Elevations range from 15 to 160 m. The unit includes the 'coloured' water lakes, Cooloomera and Webber Swamp and the unnamed lagoon near Cooloola 058096.

Depth of leached sand to *podzol* B horizon or to water table (coloured waters), and the presence of 'white water' springs appear to determine the type and/or height of vegetation. Shrubby woodlands occupy most of the area; these vary from dwarf forms <3 m tall, where depth of freely-drained leached sand exceeds 20 m, to tall layered woodlands (12-20 m tall), where depth to *podzol* B horizon is about 12 m (Walker *et al.* 1981, Thompson and Walker 1986). Sedgelands, that are really extensions of unit 2, occupy the broader drainage lines and grade into shrubby woodlands towards the drainage heads. Small patches of rainforest (5r) surround the 'white water' springs and extend short distances downstream from them. Small patches of open forest occur in a few areas on steep slopes where the coloured Teewah Sand equivalents (Thompson and Moore 1984) have been exposed by erosion. The development of depauperate, multi-stemmed forms of the bloodwood (*Eucalyptus intermedia*) with large plate-like lignotubers in the area of dwarf woodland is of particular interest, because it probably represents plant adaptation to the extremely low nutrient status (Walker *et al.* 1987).

Local distribution unit 6 represents the main area of high dunes in the Cooloola sandmass, i.e. the Chalambar, Burwilla and Warrawonga soil landscapes. The unit consists of three systems of large parabolic dunes varying from 1 to 6 km in length and extending to 7 km inland; elevations range 30 to 250 m and local relief <15 to >60 m between trailing arm crests and dune floors. Each parabolic dune consists of primary (aeolian) features, such as trailing arms and dune floors, and secondary (degradation) features, such as gullies and fans (Thompson 1983). Each of these features has different soil water and erosion regimes and a different stage of soil development;

collectively these influence the development of vegetation within dune systems (Walker and Thompson in prep.) and between dune systems (Walker *et al.* 1981, Thompson and Walker 1986). Also many of the dune floors, particularly in the Warrawonga soil landscape, have been eroded down close to the 'white' water table, or to pans that have restricted drainage, leading to perched 'coloured' waters at or above the surface. The dune lakes, Poona, Freshwater, and Broutha Waterhole are in this unit.

The vegetation varies with the depth of leached soil to *podzol* B horizon, the age of the dune system, the depth to 'white' or 'coloured' water tables and the permanency of the latter. Freely-drained sites carry forests, tall to extremely tall layered woodlands, grassy open forests or extremely tall open forests. Rainforests (6r) occupy the dune floors of much of the Warrawonga soil landscape where water tables are within rooting depth; small patches of rainforest also occur at a few sites on dune floors in the other two soil landscapes. Tea tree (*Melaleuca quinquenervia*) occurs around the lake margins and as thickets in a few small swampy areas.

Most of the logging in the Cooloola sandmass has been in these high dunes; it has markedly reduced the numbers of some species, e.g. satinay (*Syncarpia hillii*), white beech (*Gmelina leichhardtii*) and kauri pine (*Agathis robusta*) in the rainforests and their margins, and has probably changed the structure of open forests to layered woodlands through the removal of blackbutt (*Eucalyptus pilularis*) in some areas.

Local distribution unit 7 is provided for the coastal margin of the Cooloola sandmass and equates with the Mutyi soil landscape. This is a highly variable unit that includes the seaciffs, badland canyons, sandridge bluffs, the mobile or vegetated dunes of the youngest system (including both the Cooloola Sandpatch and Carlo mobile dune), coastal seepage areas, minor remnants of foredunes and transient berms. Most of the area is exposed to salt-laden, onshore winds and has experienced wild fires driven in from the coast.

The degree of exposure to salt-laden winds, frequency and severity of wild fires, differences in soil materials, the state of plant succession on young dunes, remnants of foredunes and berms, and the occurrence of seepage areas appear to be the main determinants of the type and height of the vegetation. Most of the area carries coastal shrubby woodlands or heath but there are sizeable patches of shrublands. Small patches of low forest occur in niches that are largely protected from wind and fire. The coastal seepage areas and remnants of foredunes and berms (7a) support fringing layered woodlands, grassy woodlands and grasslands, respectively.

Most of the trees and shrubs, other than the coast banksia (*Banksia integrifolia* var. *integrifolia*) and the horsetail oak (*Casuarina equisetifolia* var. *incana*), have been deformed by wind; wind hedging behind these two species is a common feature. Also there is much evidence of the effects of fire, such as stem scars, multi-stem development in the bloodwood (*Eucalyptus intermedia*) and brush box (*Lophostemon confertus*), an absence of old trees and dead wood, even age stands as indicated by size of tree stems, and dense patches of shrubs dominated by *Acacia* spp..

Local distribution unit 8 takes in the rocky headland, rounded hills and young low dunes that together make up the promontory at Double Island Point. This includes the Double Island Point soil landscape (8a) of the rocky headland (andesite) with in places a veneer of aeolian sands, the Bula Kalim soil landscape (8b) covering the three low hills with aeolianite outcrops on their lower slopes, and the mobile and vegetated young dunes that have advanced across the lower parts of

the promontory.

The dominant vegetation type in both 8a and 8b is woodland but the species vary with the different soil materials and degree of exposure. Small patches of grassland (*Spinifex sericeus*) and in places blady grass (*Imperata cylindrica*) have colonized some of the young dunes.

Local distribution unit 9 is provided for the littoral zone along the southern shore of Tin Can Inlet (9a) and along the lower Noosa River (9b).

Various mangrove species occur as fringing woodlands through most of the area, although there are small patches of mangrove forests and in places dense seedlings form small areas of shrubland.

Local distribution unit 10 comprises the beach ridges and swales of the strand plain north of Rainbow Beach (10a - Inskip Point soil landscape), the sandy sheets and low sandy banks along the southern margin of Tin Can Inlet (10b - Smooger Point soil landscape), and the narrow belt of foredunes between Teewah Village and the mouth of the Noosa River (10c - Tingirri soil landscape). Elevations range from <1 to about 8 m, and watertables are close to the surface at all lower sites. Parts of the Inskip Point and Tingiri soil landscapes have been dredged for heavy minerals and revegetated using native species.

The vegetation varies with the degree of coastal exposure, depth to water table, frequency and intensity of wild fires, and species used in revegetation following mining. The natural vegetation on 10a grades from woodlands at the coast to eucalypt forest about 0.5 km inland, and patches of tea-tree forest occupy the wetter areas; the revegetated mined areas carry woodlands dominated by *Acacia* spp.. Woodlands occur on 10b and have a dense understorey of *Acacia* and rainforest species in some areas. The foredunes of 10c support woodlands of coast banksia and horsetail oak; the mined areas on 10c have also been revegetated with these two species.

A number of alien species have been introduced to the mined areas. Of these, bitou bush (*Chrysanthemoides monilifera* subsp. *rotundata*) is a potential menace in the Inskip Point area, and groundsel (*Baccharis halimifolia*) is distributed through the two mined areas and along the coastal margins generally.

PLANT SPECIES

The plant species list (Appendix) is arranged under the four main groups of vascular plants:- Pteridophytes, Gymnosperms, Dicotyledons and Monocotyledons. Within these, the families and their genera and species are listed alphabetically. The nomenclature generally conforms with that adopted for the "Flora of South-eastern Queensland" (Stanley and Ross 1983, 1986). The author abbreviations follow the "Draft Index of Author Abbreviations Compiled at the Herbarium, Royal Botanic Gardens, Kew."

PHYTOGEOGRAPHY

This section deals with some of the geographical relationships of the flora and vegetation of Cooloola-Noosa River area. The only previous published comparison of the plants and plant communities of the coastal sandmasses of southern Queensland is that of Blake (1968), but Cooloola was excluded from this discussion, presumably because of a lack of knowledge of its flora.

The affinities of the plant communities in the coastal lowland of the Moreton Region have

been reviewed (McDonald and Elsol 1984) and they may be regarded as part of a series of closely related communities which extend from the Bundaberg district to the Hunter River valley. Many species, particularly those in the heath and forest communities, occur throughout this latitudinal range.

These trends are illustrated by a consideration of the (non-rainforest) species which are at their known limits of distribution at Cooloola (Table 2). Excluding the three local species (*Boronia keysii*, *Glycine argyrea* and *Macarthuria complanata*) most are at their northerly limit (15 species), as opposed to 6 species at or near their southern limit. Of the latter, 3 have a relatively narrow geographic range extending no further north than Bundaberg. A further 40 of the species

Table 2. Plant species at the limits of their range in the Cooloola-Noosa River area, excluding rainforest species (after McDonald and Elsol 1984)

Species	Local Distribution Unit	Limit (N S)	Comment
<i>Acacia leiocalyx</i>			
subsp. <i>herveyensis</i>	1b, 6a	S	
<i>Aegialitis annulata</i>	9a	S	
<i>Angophora woodsiana</i>	1c, 5a, 6a	N	
<i>Baeckea imbricata</i>	2, 4a	N	
<i>Boronia keysii</i>	3a, 3r	N S	Endemic to Kin Kin Creek /Lake Cootharaba area
<i>B. rivularis</i>	1b, 4a	S	
<i>Brachyloma scortechinii</i>	5a	N	
<i>Chorizandra sphaerocephala</i>	2	N	
<i>Comesperma hispidulum</i>	1b, 10b	N	
<i>Dillwynia glaberrima</i>	2	N	
<i>Durringtonia paludosa</i>	4a, 4b	N	
<i>Eleocharis tetraquetra</i>	1a	N	
<i>Glycine argyrea</i>	6a	N S	Endemic to Cooloola/Noosa area
<i>Livistona decipiens</i>	10a, 10b	S	
<i>Macarthuria complanata</i>	5a	N (S)	Endemic to Cooloola/Noosa area
<i>Micromyrtus leptocalyx</i>	2, 4a	S	(coastal range only; also occurs in inland areas)
<i>Osbornea octodonta</i>	9a	S	
<i>Oxylobium robustum</i>	1a, 6a	N	
<i>Ptilanthelium deustum</i>	1b, 1c	N	
<i>Restio complanatus</i>	2, 4a, 4b	N	
<i>Schoenus scabripes</i>	2, 4a	N	
<i>Sphaerolobium vimineum</i>	4a	N	(coastal range only)
<i>Viminaria juncea</i>	4b	N	

recorded for Cooloola reach their northern limit on Fraser Island (McDonald and Elsol 1984).

Species checklists have been compiled for Moreton Island (Durrington 1977), North Stradbroke Island (Clifford and Specht 1979) and Fraser Island (G. Applegate, unpublished). Similarity measures, using Sorensen's Index (Mueller-Dombois and Ellenberg 1974) between these floras and that of the Cooloola sandmass (i.e. excluding those species recorded only in the western catchment of the upper Noosa River) are presented in Table 3. Because it is likely that the lists of monocotyledons (i.e. grasses, sedges and lilies) are incomplete, a second series of similarities has been calculated using only the dicotyledonous species. In fact the differences

Table 3. Comparison of floras in the major sandmass areas of south-eastern Queensland.

	Fraser Island	Moreton Island	N. Stradbroke Island	Moreton Island plus N. Stradbroke Island
All species				
Totals	618	409	450	535
(Cooloola total)*	(603)	(603)	(603)	(603)
No. shared with Cooloola	428	295	315	370
Similarity Index	70	58	60	65
Dicotyledons only				
Totals	398	239	247	299
(Cooloola total)	(343)	(343)	(343)	(343)
No. shared with Cooloola	259	170	175	208
Similarity Index	70	58	59	65

* not including species in the western catchment of Noosa River.

between the two groups of similarities are insignificant (Table 3).

Some of the major floristic difference between Cooloola/Fraser Island and Moreton/North Stradbroke Island are indicated in Table 4.

In a floristic analysis of Australian rainforests, Webb *et al.* (1984) placed the Cooloola and Fraser Island rainforests in their A1 floristic province. The floras are very closely related with a similarity index exceeding 75%.

These rainforests have marked affinities with a series of so-called "littoral" rainforests from the Gold Coast south along the northern coast of New South Wales (Webb *et al.* 1984). Species characterising the Cooloola-Fraser Island rainforests include *Agathis robusta*, *Archidendron lovelliae*, *Arytera lautereriana*, *Backhousia citriodora*, *Canarium australasicum*, *Cinnamomum baileyianum*, *Cryptocarya* sp. aff. *C. cunninghamii*, *Elaeocarpus eumundi*, *Guioa acutifolia*, *Rhodamnia acuminata* and *Schizomeria ovata*. There are also structural and floristic links with the rainforests on other relatively infertile substrates (e.g. metasediments and acid volcanics) of the Blackall and Conondale Ranges (Young and McDonald 1984).

Several rainforest species which are at or near their southern limit of distribution at Cooloola are widespread in northern Queensland. They include the trees *Emmenosperma cunninghamii*, *Guioa acutifolia*, *Pittosporum venulosum*, *Polyscias australiana*, *Rapanea porosa* and *Syzygium johnsonii*, the climber *Freycinetia scandens* and the sedge *Cyperus pedunculatus*.

Table 4. Species comparisons between floras of Cooloola/Fraser Island and Moreton/North Stradbroke Island sandmasses.

Species	Cooloola/ Fraser Island	Moreton/ N. Stradbroke Island	Comments
<i>Acacia flavescens</i>	+		
<i>A. leiocalyx</i> subsp. <i>herveyensis</i>	+		Not recorded Fraser Island
<i>A. sophorae</i>		+	
<i>Boronia parviflora</i>		+	Not recorded Moreton Island
<i>B. rivularis</i>	+		
<i>B. saffrolifera</i>		+	Not recorded Moreton Island
<i>Carex fascicularis</i>		+	North Stradbroke Island only
<i>Eriachne rara</i>	+		
<i>Eriostemon australasius</i> subsp. <i>australasius</i>	+		
<i>E. myoporoides</i> subsp. <i>queenslandicus</i>	+		Not recorded Fraser Island
<i>Eucalyptus planchoniana</i>		+	
<i>Glycine argyrea</i>	+		Cooloola only
<i>Gompholobium virgatum</i> var. <i>emarginatum</i>	+		
<i>Ischaemum fragile</i>	+		
<i>Leucopogon ericoides</i>		+	
<i>Macarthuria complanata</i>	+		Cooloola only
<i>Macrozamia miquellii</i>	+		
<i>M. pauli-guilielmi</i> subsp. <i>pauli-guilielmi</i>	+		Not recorded Fraser Island
<i>Melichrus adpressus</i>		+	Moreton Island only
<i>Olax stricta</i>		+	
<i>Petrophila canescens</i>		+	
<i>Podocarpus spinulosus</i>		+	North Stradbroke Island only
<i>Schoenus ericetorum</i>		+	
<i>Xyris operculata</i>		+	

Species with marked disjunctions in range include *Cinnamomum baileyianum* (Cooloola/Fraser Island to McIlwraith Range), *Tecomathe hillii* (Cooloola/Fraser Island to Thornton Peak and Mt Finnegan, also in New Guinea) and *Cerbera manghas*. The latter species is quite common in beach scrubs from near Innisfail to Cape York and the Torres Strait islands but is represented in southern Queensland only by a small group of trees at Freshwater Creek, Cooloola.

Also of interest in the Cooloola and Fraser Island rainforests is the vine *Ripogonum discolor* which otherwise occurs at higher altitudes (>1000 m) on the McPherson Range and southward.

RARE OR THREATENED FLORA

Rare or threatened species in the Cooloola-Noosa River area are listed (Table 5) followed by brief notes on the occurrence and habitat of individual species. Table 5 has been extracted from a checklist of rare and threatened Queensland plants (Thomas and McDonald 1987). Five species previously regarded as at risk (Leigh *et al.* 1981) have been omitted, viz. *Dicksonia youngiae*, *Galeola cassythoides*, *Leptospermum whitei*, *Platycerium superbum* and *Strangea linearis*, because they are neither geographically restricted nor under severe threat.

Table 5. Rare or threatened flora of the Cooloola-Noosa River area.

Species	Status Code#	Local Distribution Unit		
<i>Acacia attenuata</i>	3VC	1b		
<i>A. bakeri</i>	3VC	3r		
<i>Archidendron lovelliae</i>	3VC	1a,	3r,	6r
<i>Arthraxon hispidus</i>	3EC +	4a		
<i>Boronia keysii</i>	2VC	3a,	3r	
<i>B. rivularis</i>	3RC	1b,	4a	
<i>Cinnamomum baileyannum</i>	3RC	6r		
<i>Cryptocarya foetida</i>	3VC	6r		
<i>Durringtonia paludosa</i>	3RC	4a,	4b	
<i>Glycine argyrea</i>	2RC	6a		
<i>Macarthuria complanata</i>	2RC	5a		
<i>Phaius tancarvilleae</i>	3VC+	2,	4b	
<i>Schoenus scabripes</i>	3VC	2,	4a	
<i>Symplocos</i> sp. aff.				
<i>S. baeuerlenii</i>	3VC	3r		
<i>Syncarpia hillii</i>	3RC	5a,	6a,	6r
<i>Tecomanthe hillii</i>	3RC+	1a,	4a,	5r, 6r
<i>Tephrosia baueri</i>	3K	8a		
<i>Xanthostemon oppositifolius</i>	3VC	3r		

The composite status code comprises a distribution, conservation status and sometimes a supplementary code. The categories have been defined by Leigh *et al.* (1981).

Distribution - 2 = range of less than 100 km; 3 = greater than 100 km

Conservation status - E = endangered; V = vulnerable; R = rare in Australia (but not currently considered endangered or vulnerable); K = poorly known.

Supplementary code - C = species represented within a national park or other proclaimed reserve; + = species with distribution extending beyond Australian continent.

Acacia attenuata (3VC) is an inconspicuous shrub confined to coastal heaths between the Maryborough district and the Gold Coast. Much of its recorded habitat has now been destroyed (e.g. Southport to Miami and Caloundra to Beerwah). At Cooloola, it occurs below the Como Scarp just south of Mt. Elliot, in local distribution unit 1b.

Acacia bakeri (3VC) is locally common in lowland rainforest remnants between Maryborough and Brunswick Heads, New South Wales. At Cooloola, it has been recorded north of Kin Kin Creek in local distribution unit 3r.

Archidendron lovelliae (3VC) is restricted to Fraser Island and the Cooloola-Noosa River area where it occurs infrequently in the rainforests of local distribution units 3r and 6r and along springs in 1a.

Arthraxon hispidus var. *hispidus* (3EC+) occurs widely through the old world tropics (central and eastern Africa, Madagascar, Mauritius, southern and eastern Asia and Malesia, excluding Borneo) but in Australia has been recorded only from the central eastern coast. It favours shady gullies and creek banks as well as seepage areas in frontal dune systems. It appears to have been moderately widespread in the Nambour district, the Canungra-Beaudesert area, at Noosa and Coolool and on North Stradbroke Island but has been rarely collected in the past 30 years. It occurs along the Noosa River in local distribution unit 4a.

Boronia keysii (2VC) is restricted to several localities in the Kin Kin Creek - Banyan Creek - Lake Cootharaba area with an isolated population north of Harry Springs Hut. It occurs in fringing forests along watercourses and in gaps in the rainforest in local distribution units 3a and 3r. It was 're-discovered' in 1971, there being no record of it previously since the type collection in 1909 (Lebler 1972).

Boronia rivularis (3RC) has been recorded only on Fraser Island and in the Cooloola-Noosa River area. It occurs mainly along watercourses, such as the Noosa River and Teewah Creek, in local distribution units 1b and 4a.

Cinnamomum baileyianum (3RC) has been recorded at Cooloola, Fraser Island, near Cooktown and on the McIlwraith Range, north Queensland. At Cooloola, it is a relatively uncommon shrub or small tree in the rainforests of local distribution unit 6r.

Cryptocarya foetida (3VC) occurs along the coast between Fraser Island and Ballina in rainforests on beach ridges, high dune systems and rocky headlands, e.g. Burleigh Heads. Much of its habitat has been destroyed; it occurs in rainforests on the high dunes at Cooloola (local distribution unit 6r).

Duringtonia paludosa (3RC) is a recently described species (Henderson and Guymer 1985) that is now known to range from Cooloola to Smiths Lake on the central coast of New South Wales. It occurs in wet heaths and sedgelands, and was recorded in swamps with *Melaleuca quinquenervia*, *Blechnum indicum* and *Gleichenia dicarpa* on the floodplain of the lower Noosa River (local distribution unit 4b).

Glycine argyrea (2RC), another recently described species (Tindale 1984), is known only from a relatively small part of the Cooloola sandmass, south-east of Rainbow Beach and from Noosa National Park. It occurs in open forests of *Eucalyptus pilularis* - *Eucalyptus signata* on high dunes of Holocene age or Pleistocene dunes with a thin veneer of Holocene sands, in local distribution unit 6a.

Macarthuria complanata (2RC) is restricted to the Cooloola, Noosa and Sunshine Beach areas. It commonly occurs in heathlands with *Banksia aemula* and *Casuarina littoralis* in local distribution unit 5a.

Phaius tancarvilleae (3VC+) is widely distributed, occurring in India, China, Indonesia, New Guinea, northern Australia and down the east coast to the Richmond River, New South Wales. It is found in sedgelands and *Melaleuca* forests but at Cooloola has been recorded only

from the eastern side of Lake Cootharaba in local distribution units 2 and 4b.

Schoenus scabripes (3VC) occurs infrequently in coastal sedgelands and sedge/heath communities between Cooloola and Kempsey, New South Wales. At Cooloola, it has been recorded near Teewah Creek in local distribution units 2 and 4a.

Symplocos sp. aff. *S. baeuerlenii* (3VC) was apparently widespread in the drier rainforest communities from Imbil and Kin Kin south to the Beenleigh district but most of these have now been cleared for agriculture or forestry. At Cooloola, this species has been recorded to the north of Kin Kin Creek in local distribution unit 3r.

Syncarpia hillii (3RC) is distributed mainly in the Fraser Island to Tewantin area, with small disjunct populations on Moreton and North Stradbroke Islands (McDonald and Elsol 1984). It occurs in tall open forests on high dunes of Pleistocene age (local distribution units 5a and 6a) and is often in transitional rainforest with prominent *Backhousiamyrtifolia* understorey (local distribution unit 6r). This species has been heavily logged at Cooloola and most occurrences are coppice regeneration.

Tecomanthe hillii (3RC+) has been recorded at Cooloola, Fraser Island, Thornton Peak and Mt Finnegan in North Queensland and the Morobe district in New Guinea. This showy vine grows in moist situations and is usually associated with rainforests; at Cooloola it has been found in local distribution units 1a, 4a, 5r and 6r.

Tephrosia baueri (3K) is a very poorly known species with a few isolated records between Gladstone and the Hunter Valley, New South Wales. At Cooloola, it was recorded from a cliff top at Double Island Point (local distribution unit 8a).

Xanthostemon oppositifolius (3VC) is restricted mainly to the Cooran and Kin Kin areas, with a disjunct population near Miriamvale. It is locally common in the rainforest and rainforest regeneration areas along Kin Kin Creek and near Harry Springs Hut (local distribution unit 3r).

Other species of local significance

Reference has already been made to *Cerbera manghas*, which has a very small, isolated population at Cooloola (see notes on phytogeography). Similarly, *Polyscias australiana* was recorded only as a small group of shrubs in a single locality, a moist area of a dune floor in local distribution unit 6r. The nearest recorded occurrence to the north is along Waterpark Creek at Byfield, north of Yeppoon.

Euodia vitiflora occurs widely in north Queensland and New Guinea, but the southern populations (Cooloola to Richmond River) are under severe threat. Apart from the present survey, recent collections have been made only at Broken Head and Brunswick Heads Nature Reserves and Minyon Falls Flora Reserve in north-eastern New South Wales.

Another species which assumes local significance is *Acacia cincinnata*. It is relatively common from Mackay north but the only area in which the southern population is secure is the Noosa River catchment. Other localities where it occurs (Bribie Island/Toorbul and Burleigh Heads/Mermaid Beach) are under pressure for residential development.

Podocarpus spinulosus has a very disjunct distribution in Queensland and has been recorded only from Blackdown Tableland, Cooloola, Beerwah and North Stradbroke Island. At Cooloola, it occurs south-west of Lake Como in local distribution unit 1b.

ALIEN PLANT SPECIES

Forty-two alien species are naturalized in the Cooloola-Noosa River area (Table 6). This

Table 6. Alien plant species in the Cooloola-Noosa River area.

Species	Family	Local Distribution Unit
<i>Ageratum houstonianum</i>	ASTERACEAE	1a, 8a
<i>Asclepias curassavica</i>	ASCLEPIADACEAE	4a
<i>Axonopus affinis</i>	POACEAE	1b, 4a
<i>Baccharis halimifolia</i>	ASTERACEAE	1b, 1c, 4a, 4b, 8a, 10c
<i>Bidens bipinnata</i>	ASTERACEAE	8a
<i>B. pilosa</i>	ASTERACEAE	8a
<i>Cañile edentula</i> subsp. <i>edentula</i>	BRASSICACEAE	7b
<i>Cassia floribunda</i>	CAESALPINIACEAE	3a
<i>Cenchrus echinatus</i>	POACEAE	10c
<i>Chenopodium murale</i>	CHENOPODIACEAE	9a
<i>Chrysanthemoides monilifera</i> subsp. <i>rotundata</i>	ASTERACEAE	10a
<i>Conyza bonariensis</i>	ASTERACEAE	1c, 6r, 10c
<i>Crassocephalum crepidioides</i>	ASTERACEAE	1c
<i>Crotalaria lanceolata</i>	FABACEAE	10c
<i>Cyperus brevifolius</i>	CYPERACEAE	4b
<i>C. flavus</i>	CYPERACEAE	6a, 7a, 10a
<i>Digitaria eriantha</i> subsp. <i>pentzii</i>	POACEAE	10c
<i>Erechtites valerianifolia</i>	ASTERACEAE	1c, 6r
<i>Gaillardia pulchella</i>	ASTERACEAE	8a
<i>Gnaphalium americanum</i>	ASTERACEAE	1b
<i>Hydrocotyle bonariensis</i>	APIACEAE	7b, 10c
<i>Ipomoea cairica</i>	CONVOLVULACEAE	10c
<i>Lantana camara</i>	VERBENACEAE	1b, 6a, 6r, 8a, 8b, 10a, 10c
<i>Melinis minutiflora</i>	POACEAE	5a
<i>Nymphaea capensis</i>	NYMPHAEACEAE	4b, 10c
<i>Oenothera affinis</i>	ONAGRACEAE	10c
<i>O. drummondii</i>	ONAGRACEAE	7a, 10a, 10c
<i>Opuntia stricta</i> var. <i>stricta</i>	CACTACEAE	8a, 8b
<i>Paspalum notatum</i>	POACEAE	4b
<i>P. urvillei</i>	POACEAE	4a, 4b
<i>Passiflora foetida</i>	PASSIFLORACEAE	8a
<i>P. suberosa</i>	PASSIFLORACEAE	8a, 8b, 10a, 10b
<i>Petrorhagia velutina</i>	CARYOPHYLLACEAE	8a
<i>Phyla nodiflora</i> var. <i>longifolia</i>	VERBENACEAE	10c
<i>Physalis peruviana</i>	SOLANACEAE	3a
<i>Pinus elliotii</i>	PINACEAE	1a
<i>Richardia brasiliensis</i>	RUBIACEAE	7a, 10c
<i>Scoparia dulcis</i>	SCROPHULARIACEAE	4b
<i>Sida rhombifolia</i>	MALVACEAE	4a
<i>Silene gallica</i>	CARYOPHYLLACEAE	8a
<i>Sonchus oleraceus</i>	ASTERACEAE	7a
<i>Stenotaphrum secundatum</i>	POACEAE	8a

total may appear unusually low, but is possibly accounted for by the widespread low soil fertility, by isolation from farmlands, and by the fact that the species list has been compiled from records in natural plant communities and excludes species in the Rainbow Beach township and Tarangau grazing property. Several of the listed species, e.g. *Axonopus affinis*, *Bidens pilosa* and *Paspalum urvillei*, are confined to locally disturbed situations, e.g. road verges and table drains, campsites and logging areas.

Of the 42 species, 32 are dicotyledons (11 in the family Asteraceae), 9 monocotyledons (7 in Poaceae) and 1 gymnosperm (*Pinus elliotii*). Only two could be considered major weeds, viz. *Lantana camara* and *Baccharis halimifolia*, although *Chrysanthemoides monilifera* subsp. *rotundata* is a very serious potential threat. This species occurs in mined and rehabilitated areas north of Rainbow Beach and is spreading into undisturbed communities, particularly along the coastal margin.

Pinus elliotii is a local threat in the western catchment of the upper Noosa River where it is invading from the Toolara State Forest plantations to the west. *Cinnamomum camphora* and *Celtis sinensis* are common in the vicinity of Kin Kin and are spreading along Kin Kin Creek; they may eventually invade parts of the Tarangau area (3a, 3r).

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REFERENCES

- Ball, L.C. (1924). Report on oil prospecting near Tewantin. *Qd Govt Min. J.* **25**, 354-362.
- Blake, S.T. (1968). The plants and plant communities of Fraser, Moreton and Stradbroke Islands. *Queensl. Nat.* **19**, 23-30.
- Bridge, B.J. and Ross, P.J. (1983). Water erosion in vegetated sand dunes at Cooloolo, south-east Queensland. *Z. Geomorph. Suppl.* **45**, 227-244.
- Bridge, B.J., Ross, P.J. and Thompson, C.H. (1985). Studies in landscape dynamics in the Cooloolo-Noosa River area. 3. Sand movement on vegetated dunes. CSIRO Aust. Div. Soils Divl Rep. No. 75.
- Clifford, H.T. and Specht, R.L. (1979). 'The Vegetation of North Stradbroke Island'. Queensl. Univ. Press, St. Lucia.
- Coaldrake, J.E. (1961). The ecosystem of the coastal lowlands ('wallum') of southern Queensland. CSIRO Aust. Bull. No. 283.
- Dredge, M., Kirkman, H. and Potter, M. (1977). A short term biological survey of Tin Can Inlet/ Great Sandy Strait. CSIRO Aust. Div. Fish. Oceanogr. Rep. No. 68.
- Durrington, L.R. (1977). Vegetation of Moreton Island. Dept. Primary Ind. Brisbane, Bot. Branch Tech. Bull. No. 1.

- Francis, W.D. (1929). 'Australian Rain-Forest Trees'. Forestry and Timber Bur. Govt Print., Canberra.
- Harrold, A.G. (1971). Cooloola - an ecological mosaic. *Queensl. Nat.* **20**, 7-14.
- Harrold, A.G. (1976). Report on the vegetation of the western basin of the Noosa River. (in mimeo) Cooloola Committee, Noosa Heads, Qld.
- Henderson, R.J.F. and Guymner, G.P. (1985). *Durrintonia* (Durrintonieae), a new genus and tribe of Rubiaceae in Australia. *Kew. Bull.* **40**, 97-107.
- Lebler, B.A. (1972). A long-lost *Boronia*. *Queensl. Agric. J.* **98**, 618-620.
- Leigh, J., Briggs, J. and Hartley, W. (1981). Rare or threatened Australian plants. Aust. Nat. Parks and Wildlife Serv. Canberra. Spec. Publ. No. 7.
- McDonald, W.J.F. and Elsol, J.A. (1984). Moreton Region Vegetation Map Series: Summary Report and Species Checklist for Caloundra, Brisbane, Beenleigh and Murwillumbah Map Areas. Dept. Primary Ind. Bot. Branch, Brisbane.
- Muller-Dombois, D. and Ellenberg, H. (1974). 'Aims and Methods of Vegetation Ecology.' John Wiley and Sons, New York.
- Pickett, J.W., Thompson, C.H., Kelley, R.A. and Roman, D. (1985). Evidence of high sea level during Isotope Stage 5c in Queensland, Australia. *Quat. Res.* **24**, 103-114.
- Reeve, R. and Fergus, I.F. (1983). Black and white waters and their possible relationship to the podzolization process. *Aust. J. Soil Res.* **21**, 59-66.
- Reeve, R., Fergus, I.F. and Thompson, C.H. (1985). Studies in landscape dynamics in the Cooloola-Noosa River area, Queensland. 4. Hydrology and water chemistry. CSIRO Aust. Div. Soils Divl Rep. No. 77.
- Sandercoe, C.S. (1986). Womalah State Forest and part of Cooloola National Park Map (1:25 000) Edition 1. Dept. For., Qld., Brisbane.
- Stanley, T.D. and Ross, E.M. (1983). 'Flora of South-eastern Queensland' Vol. 1. Queensl. Dept. Primary Ind., Brisbane. Misc. Publ. 81020.
- Stanley, T.D. and Ross, E.M. (1986). 'Flora of South-eastern Queensland'. Vol. 2. Queensl. Dept. Primary Ind., Brisbane. Misc. Publ. QM84007.
- Stanton, J.P. (1976). The conservation of Cooloola. (in mimeo) Cooloola Committee, Noosa Heads, Qld.
- Stanton, J.P. (1979). Wide Bay-Burnett regional study. (in mimeo) Report to Queensl. Nat. Parks and Wildlife Serv., Brisbane.
- Thomas, M.B. and McDonald, W.J.F. (1987). Rare and threatened plants of Queensland. Queensl. Dept. Primary Ind., Brisbane. Inf. Ser. QI87003.
- Thompson, C.H. (1975). Coastal areas of southern Queensland; some land use conflicts. *Proc. R. Soc. Qd* **86**, 109-120.
- Thompson, C.H. (1981). Podzol chronosequences on coastal dunes of eastern Australia. *Nature* **291**, 59-61.

- Thompson, C.H. (1983). Development and weathering of large parabolic dune systems along the sub-tropical coast of eastern Australia. *Z. Geomorph. Suppl.* **45**, 205-225.
- Thompson, C.H. and Moore, A.W. (1984). Studies in landscape dynamics in the Cooloola-Noosa River area. 1. Introduction, general description and research approach. CSIRO Aust. Div. Soils Divl Rep. No. 73.
- Thompson, C.H. and Walker, J. (1986). Temporal changes in soils and vegetation on subtropical coastal dunes at Cooloola, Queensland, Australia - a synthesis. Proc. Welsh Soil Discus. Grp. Meet. 'Soils and the time factor' Aberystwyth May, 1983.
- Tindale, M.D. (1984). Two new eastern Australian species of *Glycine* Willd. (Fabaceae). *Brunonia* **7**, 207-213.
- Walker, J. and Hopkins, M.S. (1984). Vegetation. 'In Australian Soil and Land Survey Field Handbook' (McDonald, R.C., Isbell, R.F., Speight, J.G., Walker, J. and Hopkins, M.S.), pp. 40-60 Inkata Press, Melbourne.
- Walker, J., Thompson, C.H., Fergus, I.F. and Tunstall, B.R. (1981). Plant succession and soil development in coastal sand dunes of sub-tropical eastern Australia. In 'Forest Succession: Concepts and Application', pp. 107-131 (eds. D.C. West, H.H. Shugart and D.B. Botkin) Springer-Verlag, New York.
- Walker, J., Thompson, C.H. and Lacey, C.J. (1987). Morphological differences in lignotubers of *Eucalyptus intermedia* R.T. Bak. and *Eucalyptus signata* F. Muell. associated with different stages of podzol development on coastal dunes, Cooloola, Queensland. *Aust. J. Bot.* **35**, 301-311.
- Webb, L.J. (1969). Edaphic differentiation of some forest types in eastern Australia. II. Soil chemical factors. *Ecol.* **57**, 817-830.
- Webb, L.J. and Tracey, J.G. (1975). The Cooloola rainforests. *Proc. Ecol. Soc. Aust.* **9**, 317-321.
- Webb, L.J., Tracey, J.G. and Williams, W.T. (1984). A floristic framework of Australian rainforests. *Aust. J. Ecol.* **9**, 169-198.
- Williams, W.T., Lance, G.N., Webb, L.J. and Tracey, J.G. (1973). Studies in the numerical analysis of complex rain-forest communities. VI. Models for the classification of quantitative data. *J. Ecol.* **61**, 47-69.
- Young, P.A.R. and McDonald, W.J.F. (1984). Distribution, composition and status of the rainforests of southern Queensland. In 'Australian National Rainforest Study Report to the World Wildlife Fund (Australia)' Vol. 1., (eds G.L. Werren and A.P. Kershaw). Proc. Workshop Past, present and future of Australian rainforests, Griffith Univ. December 1983. Dept. Geogr., Monash Univ., Melbourne.

APPENDIX

Plant species in the Cooloola-Noosa River area arranged under the four main groups of plants: Pteridophytes, Gymnosperms, Dicotyledons and Monocotyledons; families, genera and species are listed alphabetically and a key to their distribution is given. * indicates alien species.

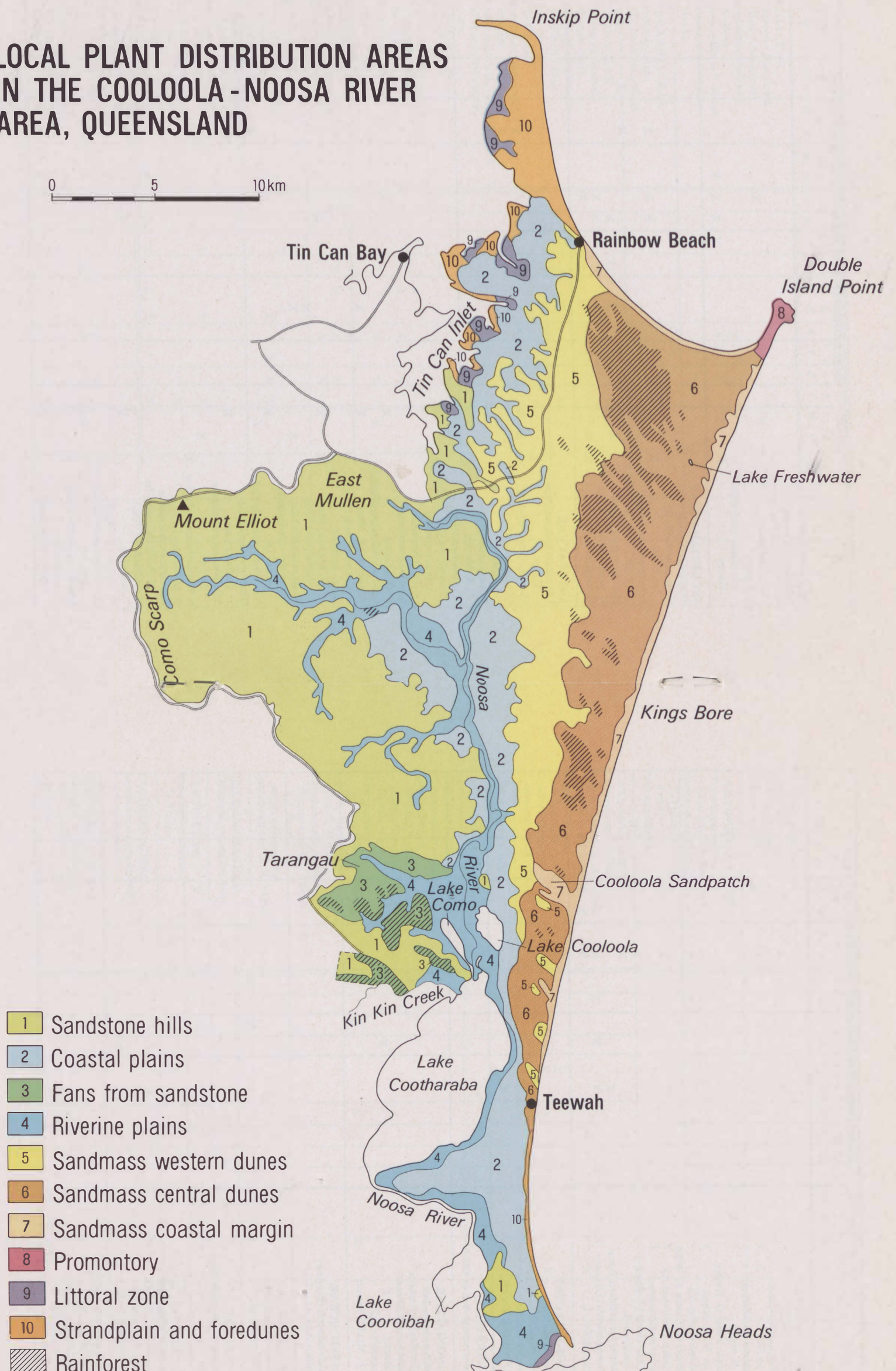
LOCAL DISTRIBUTION UNITS WHERE SPECIES WERE RECORDED																	
1			2	3		4		5	6	7	8		9	10			
a	b	c		a	r	a	b	r	a	r	a	b	a	b	a	b	c
PTERIDOPHYTES																	
ADIANTACEAE																	
<i>Adiantum hispidulum</i> Sw.			X							X	X						
ASPLENIACEAE																	
<i>Asplenium australasicum</i> (J. Smith) Hook.							X			X							
BLECHNACEAE																	
<i>Blechnum camfieldii</i> Tind.			X						X								
<i>B. cartilagineum</i> Sw.			X	X		X	X			X							
<i>B. indicum</i> N. Burman							X								X	X	X
<i>Doodia aspera</i> R. Br.			X														
<i>D. caudata</i> (Cav.) R. Br. var. <i>caudata</i>												X					
CYATHEACEAE																	
<i>Cyathea cooperi</i> (Hook. ex. F. Muell.) Domin			X														
<i>C. leichhardtiana</i> (F. Muell.) Copel.					X												
DAVALLIACEAE																	
<i>Davallia pyxidata</i> Cav.							X			X							
DENNSTAEDTIACEAE																	
<i>Hypolepis muelleri</i> Wakef.			X				X										
<i>Pteridium esculentum</i> (G. Forster) Cockayne			X	X		X	X	X	X	X	X				X	X	X
DICKSONIACEAE																	
<i>Culcita dubia</i> (R. Br.) Maxon			X	X													
<i>Dicksonia youngiae</i> C. Moore ex Baker			X						X								
GLEICHENIACEAE																	
<i>Dicranopteris linearis</i> (N. Burman) Underw.							X	X									
<i>Gleichenia dicarpa</i> R. Br.							X	X									
<i>G. mendellii</i> (G. Schneid.) S. Andrews ms.				X			X	X									
<i>Sticherus flabellatus</i> (R. Br.) H. St. John							X										
HYMENOPHYLLACEAE																	
<i>Macroglena caudata</i> (Brackenr.) Copel.									X								

LOCAL DISTRIBUTION UNITS WHERE SPECIES WERE RECORDED																					
1			2	3		4		5		6		7		8		9		10			
a	b	c		a	r	a	b	r	a	r	a	r	a	b	a	b	a	b	a	b	c
LINDSAEACEAE																					
<i>Lindsaea brachypoda</i> (Baker) Salomon																					
						X			X												
<i>L. dimorpha</i> Bailey																					
		X																			
<i>L. ensifolia</i> Sw.																					
subsp. <i>agatii</i>																					
(Brackenr.) Kramer																					
																				X	
<i>L. ensifolia</i> Sw.																					
		X	X	X																	
subsp. <i>ensifolia</i>																					
						X															
<i>L. fraseri</i> Hook.																					
						X															
<i>L. incisa</i> Prentice																					
LYCOPODIACEAE																					
<i>Lycopodium cernuum</i> L.																					
		X		X		X	X														
<i>L. laterale</i> R. Br.																					
				X		X															
NEPHROLEPIDACEAE																					
<i>Arthropteris tenella</i> (G. Forster) J. Smith ex J.D. Hook.																					
												X									
OPHIOGLOSSACEAE																					
<i>Ophioglossum pendulum</i> L.																					
												X									
OSMUNDACEAE																					
<i>Todea barbara</i> (L.) T. Moore																					
						X	X		X		X										
POLYPODIACEAE																					
<i>Drynaria rigidula</i> (Sw.) Beddome																					
											X	X									
<i>Microsorium punctatum</i> (L.) Copel.																					
												X									
<i>Platyserium bifurcatum</i> (Cav.) C. Chr.																					
								X			X										
<i>P. superbum</i> Jonch. & Hennipman																					
								X			X										
<i>Pyrrosia rupestris</i> (R. Br.) Ching																					
											X										
PSILOACEAE																					
<i>Psilotum nudum</i> (L.) Beauv.																					
								X			X										
PTERIDACEAE																					
<i>Acrostichum speciosum</i> Willd.																					
								X													
<i>Pteris tremula</i> R. Br.																					
		X																			
SCHIZAEACEAE																					
<i>Lygodium microphyllum</i> (Cav.) R. Br.																					
						X	X				X		X							X	
<i>Schizaea bifida</i> Willd.																					
		X	X	X					X		X		X								
<i>Schizaea dichotoma</i> (L.) Smith																					
		X	X	X				X	X	X	X	X	X		X				X	X	X
SELAGINELLACEAE																					
<i>Selaginella uliginosa</i> (Labill.) Spring																					
				X		X	X														

LOCAL DISTRIBUTION UNITS WHERE SPECIES WERE RECORDED																			
1			2	3		4			5		6		7	8		9	10		
a	b	c		a	r	a	b	r	a	r	a	r	a	b	a	b	a	b	c
AIZOACEAE																			
<i>Carpobrotus glaucescens</i> (Haw.) Schwantes																			
<i>Macarthuria complanata</i> E. Ross																			
<i>M. neocambrica</i> F. Muell.																			
<i>Sesuvium portulacastrum</i> (L.) L.																			
ANACARDIACEAE																			
<i>Euroschinus falcata</i> J.D. Hook var. <i>falcata</i>																			
ANNONACEAE																			
<i>Polyalthia nitidissima</i> (Dunal) Benth.																			
<i>Rauwenhoffia leichhardtii</i> (F. Muell.) Diels																			
APIACEAE																			
<i>Apium prostratum</i> Labill. ex Vent.																			
<i>Centella asiatica</i> (L.) Urban																			
<i>*Hydrocotyle bonariensis</i> Lam.																			
<i>H. tripartita</i> R. Br. ex A. Rich.																			
<i>Platysace ericoides</i> (Sieber ex DC.) Norman																			
<i>P. lanceolata</i> (Labill.) Druce																			
<i>P. linearifolia</i> (Cav.) Norman																			
<i>Trachymene incisa</i> Rudge																			
<i>Xanthosia pilosa</i> Rudge																			
APOCYNACEAE																			
<i>Alyxia magnifolia</i> Bailey																			
<i>A. ruscifolia</i> R. Br.																			
<i>Cerbera manghas</i> L.																			
<i>Ervatamia angustisepala</i> (Benth.) Domin																			
<i>Melodinus australis</i> (F. Muell.) Pierre																			
<i>Parsonsia latifolia</i> (Benth.) S.T. Blake																			
<i>P. straminea</i> (R. Br.) F. Muell.																			
ARALIACEAE																			
<i>Astrotricha glabra</i> (F. Muell.) Domin																			
<i>A. longifolia</i> Benth.																			
<i>Cephalalaria cephalobotrys</i> (F. Muell. & C. Moore) Harms																			

LOCAL PLANT DISTRIBUTION AREAS IN THE COOLOOLA - NOOSA RIVER AREA, QUEENSLAND

0 5 10 km



[illegible]

LOCAL DISTRIBUTION UNITS WHERE SPECIES WERE RECORDED																						
1			2	3		4			5		6		7		8		9		10			
a	b	c		a	r	a	b	r	a	r	a	r	a	b	a	b	a	b	a	b	c	
<i>Wahlenbergia graniicola</i> Carolín X																						
<i>W. stricta</i> Sweet subsp. <i>stricta</i> X X X																						
CARYOPHYLLACEAE																						
<i>*Petrorhagia velutina</i> (Guss.) Ball & Heywood X																						
<i>Polycarpha corymbosa</i> (L.) Lam var. <i>minor</i> Pedley X X																						
<i>*Silene gallica</i> L. X																						
CASUARINACEAE																						
<i>Casuarina equisetifolia</i> J.R. Forster & G. Forster var. <i>incana</i> Benth. X X X X																						
<i>C. glauca</i> Sieber ex Sprengel X X X X X X																						
<i>C. littoralis</i> Salisb. X X X X X X																						
<i>C. torulosa</i> Aiton X X X X																						
CELASTRACEAE																						
<i>Denhamia celastroides</i> (F. Muell.) L. Jessup X X X																						
CHENOPODIACEAE																						
<i>*Chenopodium murale</i> L. X																						
<i>Halosarcia indica</i> (Willd.) Paul G. Wilson subsp. <i>leiostachya</i> (Benth.) Paul G. Wilson X																						
<i>H. pergranulata</i> (J. Black) Paul G. Wilson subsp. <i>queenslandica</i> Paul G. Wilson X																						
<i>Sarcocornia quinqueflora</i> (Bunge ex Ung. - Stemb.) A.J. Scott subsp. <i>quinqueflora</i> X X																						
<i>Suaeda australis</i> (R. Br.) Moq. X																						
CHLOANTHACEAE																						
<i>Chloanthes parviflora</i> Walp. X X X																						
CLUSIACEAE																						
<i>Hypericum gramineum</i> G. Forster X X X																						
COMBRETACEAE																						
<i>Lumnitzera racemosa</i> Willd. var. <i>racemosa</i> X																						
CONVOLVULACEAE																						
<i>Evolvulus alsinoides</i> (L.) L. var. <i>decumbens</i> (R. Br.) Ooststr. X																						

LOCAL DISTRIBUTION UNITS WHERE SPECIES WERE RECORDED																				
1			2	3		4			5		6		7	8		9	10			
a	b	c		a	r	a	b	r	a	r	a	r	a	b	a	b	a	b	a	c
Poranthera microphylla Brongn.																				
	X	X					X		X		X		X		X				X	X
Pseudanthus orientalis (Baillon) F. Muell.																				
						X	X		X											
Ricinocarpus pinifolius Desf.																				
	X					X			X		X								X	
EUPOMATIACEAE																				
Eupomatia bennettii F. Muell.																				
				X	X															
E. laurina R. Br.																				
	X				X						X									
FABACEAE																				
Aotus ericoides (Vent.) G. Don																				
	X	X	X	X		X	X		X											
A. lanigera Cunn. ex Benth.																				
	X	X	X	X		X	X		X		X									
Austrosteenisia blackii (F. Muell.) Geesink																				
	X																			
Bossiaea ensata Sieber ex DC.																				
									X											
B. heterophylla Vent.																				
									X		X		X							
Canavalia rosea (Sw.) DC.																				
														X						
Chorizema parviflorum Benth.																				
	X					X					X									
*Crotalaria lanceolata E. Meyer																				
																				X
C. medicaginea Lam.																				
			X										X	X						X
C. montana Roth																				
											X		X							
Daviesia umbellulata Smith																				
	X		X			X	X		X		X									
Desmodium heterocarpon (L.) DC. var. <i>heterocarpon</i>																				
	X																			
D. nemorosum F. Muell. ex Benth.																				
	X				X		X				X									
D. rhytidophyllum F. Muell. ex Benth.																				
	X	X	X				X		X		X		X						X	
D. varians Endl.																				
											X								X	
Dillwynia floribunda Smith																				
	X		X			X	X		X											
D. glaberrima Smith																				
			X																	
D. retorta (Wendl.) Druce var. <i>retorta</i>																				
									X		X									
Flemingia parviflora Benth.																				
	X		X																	
Galactia tenuiflora (Willd.) Wight & Arn.																				
	X	X							X		X		X							
Glycine argyrea Tind.																				
									X		X									
G. clandestina Wendl.																				
	X	X				X	X		X		X		X						X	
G. cyrtoloba Tind.																				
											X		X						X	
G. tomentella Hayata																				
									X		X		X							X
Gompholobium pinnatum Smith																				
	X					X	X		X		X									
G. virgatum Sieber ex DC. var. <i>emarginatum</i> Bailey																				
											X									
G. virgatum Sieber ex DC. var. <i>virgatum</i>																				
	X		X						X		X		X							
Hardenbergia violacea (Schneev.) Stearn																				
	X								X		X		X							X

LOCAL DISTRIBUTION UNITS WHERE SPECIES WERE RECORDED																						
1			2	3		4			5		6		7		8		9		10			
a	b	c		a	r	a	b	r	a	r	a	r	a	b	a	b	a	b	a	b	c	
<i>Hovea acutifolia</i> Cunn. ex G. Don																						
	X	X	X		X	X	X	X		X		X		X								
<i>H. purpurea</i> Lodd.																						
			X																			
<i>Jacksonia scoparia</i> R. Br.																						
	X	X	X				X			X		X		X		X						
<i>J. stackhousii</i> F. Muell.																						
										X												
<i>Kennedia rubicunda</i> (Schneev.) Vent.																						
	X																					
<i>Milletia megasperma</i> F. Muell.																						
	X				X			X		X	X	X										
<i>Mirbelia rubiifolia</i> (Andrews) G. Don																						
		X		X			X	X														
<i>Oxylobium robustum</i> J. Thompson																						
	X											X										
<i>Phyllota phyllicoides</i> (Sieber ex DC.) Benth.																						
										X		X		X								
<i>Platylobium formosum</i> Smith																						
	X	X																				
<i>Pultenaea myrtoides</i> Cunn. ex Benth.																						
		X					X	X														
<i>P. paleacea</i> Willd. var. <i>paleacea</i>																						
				X			X	X														
<i>P. paleacea</i> Willd. var. <i>pauciflora</i> C. White																						
																					X	
<i>P. retusa</i> Smith																						
	X						X															
<i>P. villosa</i> Willd.																						
		X								X		X		X							X	
<i>Smithia sensitiva</i> Aiton																						
							X															
<i>Sphaerolobium vimineum</i> Smith																						
							X															
<i>Tephrosia baueri</i> Benth. ex A. Gray																						
																X						
<i>T. filipes</i> Benth.																						
			X													X						
<i>Vigna marina</i> (Burman) Merr.																						
														X								
<i>V. vexillata</i> (L.) A. Rich.																						
							X															
<i>Viminaria juncea</i> (Schrader) Hoffmanns.																						
								X														
<i>Zornia dyctiocarpa</i> DC.																						
							X							X								
<i>Z. muriculata</i> Mohl.																						
			X																			
FLACOURTIACEAE																						
<i>Scolopia braunii</i> (Klotzsch) Sleumer																						
													X									
FLINDERSIACEAE																						
<i>Flindersia australis</i> R. Br.																						
						X																
<i>F. bennettiana</i> F. Muell. ex Benth.																						
						X						X										
<i>F. schottiana</i> F. Muell.																						
						X						X										
<i>F. xanthoxyla</i> (Cunn. ex Hook.) Domin																						
						X																
GENTIANACEAE																						
<i>Centaurium spicatum</i> (L.) Fritsch																						
																		X				

LOCAL DISTRIBUTION UNITS WHERE SPECIES WERE RECORDED																					
1			2	3		4			5		6		7		8		9		10		
a	b	c		a	r	a	b	r	a	r	a	r	a	b	a	b	a	b	a	b	c
GOODENIACEAE																					
<i>Dampiera stricta</i> (Smith) R. Br. X X																					
<i>Goodenia paniculata</i> Smith X X																					
<i>G. rotundifolia</i> R. Br. X X X X																					
<i>G. stelligera</i> R. Br. X X X X																					
<i>Scaevola calendulacea</i> (Andrews) Druce X X																					
<i>Velleia spathulata</i> R. Br. X X																					
HALORAGACEAE																					
<i>Gonocarpus chinensis</i> (Lour.) Orch. subsp. <i>verrucosus</i> (Maiden & Betche) Orch. X X																					
<i>G. micranthus</i> Thunb. subsp. <i>ramosissimus</i> Orch. X X																					
<i>Haloragis aspera</i> Lindley X X																					
<i>Myriophyllum gracile</i> Benth. X X																					
<i>M. verrucosum</i> Lindley X X																					
HIPPOCRATEACEAE																					
<i>Hippocratea barbata</i> F. Muell. X																					
LAMIACEAE																					
<i>Ajuga australis</i> R. Br. X																					
<i>Plectranthus parviflorus</i> Willd. X X X																					
<i>Westringia tenuicaulis</i> C. White & Francis X X X																					
LAURACEAE																					
<i>Beilschmiedia elliptica</i> C. White & Francis X X																					
<i>B. obtusifolia</i> (F. Muell. ex Meisner) F. Muell. X X																					
<i>Cassylia filiformis</i> L. X X																					
<i>C. glabella</i> R. Br. X X																					
<i>C. pubescens</i> R. Br. X X X X																					
<i>Cinnamomum baileyianum</i> (F. Muell. ex Bailey) Francis X X																					
<i>C. oliveri</i> Bailey X X																					
<i>Cryptocarya foetida</i> R. Baker X X																					
<i>C. glaucescens</i> R. Br. X X X X																					
<i>C. obovata</i> R. Br. X X																					
<i>C. triplinervis</i> R. Br. X X																					
<i>C. sp. aff. C. cunninghamii</i> Meisner X X X X																					
<i>Endiandra discolor</i> Benth. X X X X																					
<i>E. sieberi</i> Nees X X X X																					

LOCAL DISTRIBUTION UNITS WHERE SPECIES WERE RECORDED																																						
1			2	3		4			5		6		7		8		9		10																			
a	b	c		a	r	a	b	r	a	r	a	r	a	b	a	b	a	b	a	b	c																	
<i>Osbornea octodonta</i> F. Muell.																																		X				
<i>Pilidiostigma glabrum</i> Burret																													X									
<i>P. rhytispermum</i> (F. Muell.) Burret																								X					X									
<i>Rhodamnia acuminata</i> C. White																								X					X	X								
<i>R. argentea</i> Benth.																													X	X								
<i>Rhodomertus psidioides</i> (G. Don) Benth.																				X								X										
<i>Syncarpia hillii</i> Bailey																											X		X	X								
<i>Syzygium australe</i> (Wendl. ex Link)																																						
<i>S. johnsonii</i> (F. Muell.) B. Hyland																										X												
<i>S. luehmannii</i> (F. Muell.) L. Johnson																				X				X		X		X		X								
<i>S. oleosum</i> (F. Muell.) B. Hyland																				X				X	X	X		X	X	X							X	X
<i>Tristaniaopsis laurina</i> (Smith) Peter G. Wilson & J. T. Waterhouse																								X														
<i>Waterhousea floribunda</i> (F. Muell.) B. Hyland																								X														
<i>Xanthostemon oppositifolius</i> Bailey																								X														
NYMPHAEACEAE																																						
<i>*Nymphaea capensis</i> Thunb.																										X											X	
OLACACEAE																																						
<i>Olax retusa</i> F. Muell. ex. Benth.																							X					X										
OLEACEAE																																						
<i>Notelaea longifolia</i> Vent. f. <i>glabra</i> P. Green																								X	X		X			X								
<i>N. ovata</i> R. Br.																																						
<i>Olea paniculata</i> R. Br.																														X								
ONAGRACEAE																																						
<i>Ludwigia octovalvis</i> (Jacq.) Raven																										X											X	
<i>*Oenothera affinis</i> Cambess.																																					X	
<i>*O. drummondii</i> Hook.																															X					X	X	
OXALIDACEAE																																						
<i>Oxalis rubens</i> Haw.																										X					X					X	X	
PASSIFLORACEAE																																						
<i>Passiflora aurantia</i> G. Forster																														X								

LOCAL DISTRIBUTION UNITS WHERE SPECIES WERE RECORDED																					
1			2	3		4		5		6		7		8		9		10			
a	b	c		a	r	a	b	r	a	r	a	r	a	b	a	b	a	b	a	b	c
* <i>Passiflora foetida</i> L.						X									X						
<i>P. herbertiana</i> Ker-Gawler																					
subsp. <i>herbertiana</i>											X										
* <i>P. suberosa</i> L.						X									X	X			X	X	
PIPERACEAE																					
<i>Piper novae-hollandiae</i>																					
Miq.			X								X	X	X								
PITTOSPORACEAE																					
<i>Billardiera scandens</i> Smith																					
var. <i>scandens</i>			X	X																	
<i>Bursaria spinosa</i> Cav.																					
<i>Citriobatus pauciflorus</i>																					
Cunn. ex Ettingsh.					X																
<i>Pittosporum revolutum</i>																					
Aiton ex Dryander			X	X		X			X	X	X	X	X								
<i>P. venulosum</i> F. Muell.												X									
PLUMBAGINACEAE																					
<i>Aegialitis annulata</i> R. Br.																	X				
<i>Limonium australe</i> (R. Br.)																	X				
Kuntze																					
POLYGALACEAE																					
<i>Comesperma defoliatum</i>																					
F. Muell.			X			X	X														
<i>C. hispidulum</i> Pedley																					X
<i>Polygala linariifolia</i> Willd.																					
<i>Salomonina ciliata</i> (L.) DC.			X																		
POLYGONACEAE																					
<i>Polygonum salicifolium</i>																					
Brouss. ex Willd.																					X
<i>P. strigosum</i> R. Br.						X															
PORTULACACEAE																					
<i>Portulaca bicolor</i> F. Muell.															X						
PRIMULACEAE																					
<i>Samolus repens</i>																					
(J.R. Forster &																					
G. Forster) Pers.																	X				
PROTEACEAE																					
<i>Banksia aemula</i> R. Br.			X			X	X		X	X									X	X	
<i>B. integrifolia</i> L.f.																					
var. <i>compar</i> (R. Br.)																					
Bailey			X	X		X	X		X	X	X		X						X		
<i>B. integrifolia</i> L.f.																					
var. <i>integrifolia</i>													X		X	X			X	X	X
<i>B. oblongifolia</i> Cav.			X		X	X							X								
<i>B. robur</i> Cav.			X		X	X													X		
<i>B. serrata</i> L.f.																			X		
<i>B. spinulosa</i> Smith												X		X							
var. <i>spinulosa</i>			X																		

LOCAL DISTRIBUTION UNITS WHERE SPECIES WERE RECORDED																					
1			2	3		4			5		6		7		8		9		10		
a	b	c		a	r	a	b	r	a	r	a	r	a	b	a	b	a	b	a	b	c
<i>Conospermum taxifolium</i> Smith																					
	X		X				X		X												
<i>Grevillea hilliana</i> F. Muell.																					
<i>G. leiophylla</i> F. Muell.																					
	X					X	X														
<i>Hakea florulenta</i> Meisner																					
	X	X				X			X												
<i>H. plurinervia</i> F. Muell.																					
	X																				
<i>H. sp. aff. H. sericea</i> Schrader																					
	X		X			X	X		X										X		
<i>Lomatia silaifolia</i> (Smith) R. Br.																					
	X	X	X								X										
<i>Persoonia cornifolia</i> Cunn. ex R. Br.																					
	X	X									X		X							X	
<i>P. tenuifolia</i> R. Br.																					
	X		X																		
<i>P. virgata</i> R. Br.																					
	X	X	X			X	X		X		X		X					X			
<i>Petrophila shirleyae</i> Bailey																					
	X		X			X			X												
<i>Stenocarpus sinuatus</i> Endl.																					
					X							X									
<i>Strangea linearis</i> Meisner																					
	X		X			X			X												
<i>Xylomelum</i> sp.																					
	X	X				X			X		X										
RANUNCULACEAE																					
<i>Clematis glycinoides</i> DC.																					
											X										
<i>Ranunculus lappaceus</i> Smith var. <i>lappaceus</i>																					
						X															
RHAMNACEAE																					
<i>Alphitonia excelsa</i> (Cunn. ex Fenzl) Reisseck ex Benth.																					
	X	X	X		X	X	X	X	X		X	X	X		X	X		X	X	X	
<i>Emmenosperma cunninghamii</i> Benth.																					
												X									
RHIZOPHORACEAE																					
<i>Bruguiera gymnorhiza</i> (L.) Lam.																					
						X											X				
<i>Ceriops tagal</i> (Perrottet) C. Robinson var. <i>australis</i> C. White																					
						X											X				
<i>Rhizophora stylosa</i> Griffith																					
						X											X				
ROSACEAE																					
<i>Rubus moluccanus</i> L.																					
	X	X			X																
RUBIACEAE																					
<i>Canthium coprosmoides</i> F. Muell.																					
									X		X	X		X	X			X		X	
<i>C. lamprophyllum</i> F. Muell.																					
											X										
<i>Coelospermum paniculatum</i> F. Muell.																					
					X						X										
<i>Durringtonia paludosa</i> R. Henderson & Guymmer																					
						X	X														
<i>Hedyotis herbacea</i> L.																					
						X															
<i>Hodgkinsonia ovatiflora</i> F. Muell.																					
											X										

LOCAL DISTRIBUTION UNITS WHERE SPECIES WERE RECORDED																						
1			2	3		4			5		6		7		8		9		10			
a	b	c		a	r	a	b	r	a	r	a	r	a	b	a	b	a	b	a	b	c	
<i>Morinda jasminoides</i> Cunn.					X		X			X	X											
<i>Opercularia diphylla</i> Gaertner										X		X										
<i>Pomax umbellata</i> (Gaertner) Sol. ex A. Rich.			X		X		X		X	X									X	X		
<i>Psychotria loniceroides</i> Sieber ex DC.			X	X		X				X	X	X							X			
<i>Randia chartacea</i> (F. Muell.) F. Muell.				X																		
* <i>Richardia brasiliensis</i> (Moq.) Gomes													X								X	
<i>Spermacoce multicaulis</i> Benth.													X									
RUTACEAE																						
<i>Acronychia imperforata</i> F. Muell.					X		X	X	X	X	X								X			
<i>A. oblongifolia</i> (Cunn. ex Hook.) Endl. ex Heynh.				X	X	X																
<i>A. pauciflora</i> C. White					X																	
<i>A. wilcoxiana</i> (F. Muell.) T. Hartley					X						X											
<i>Boronia falcifolia</i> Cunn. ex Lindley				X		X																
<i>B. keysii</i> Domin					X	X																
<i>B. rivularis</i> C. White			X			X																
<i>B. rosmarinifolia</i> Cunn. ex Endl.				X			X		X	X												
<i>Eriostemon australasius</i> Pers. subsp. <i>australasius</i>						X			X													
<i>E. myoporoides</i> DC. subsp. <i>queenslandicus</i> (C. White) Paul G. Wilson			X			X			X													
<i>Euodia elleryana</i> F. Muell.			X			X		X				X										
<i>E. vitiflora</i> F. Muell.												X										
<i>Halfordia kendack</i> (Montrouz) Guillaumin						X	X		X	X	X	X							X			
<i>Phebalium woombye</i> (Bailey) Domin			X			X	X		X	X	X		X							X		
<i>Sarcomelicope simplicifolia</i> (Endl.) T. Hartley subsp. <i>simplicifolia</i>											X											
<i>Zieria laxiflora</i> (Benth.) Domin			X			X			X	X												
<i>Zieria minutiflora</i> (F. Muell.) Domin				X			X															
<i>Z. smithii</i> Andrews sens. lat.			X			X	X				X	X							X			
SANTALACEAE																						
<i>Choretrum candollei</i> F. Muell. ex Benth.									X													
<i>Exocarpos cupressiformis</i> Labill.			X						X	X	X		X					X	X	X		

LOCAL DISTRIBUTION UNITS WHERE SPECIES WERE RECORDED																						
1			2	3		4		5		6		7	8		9		10					
a	b	c		a	r	a	b	r	a	r	a	r	a	b	a	b	a	b	a	b	c	
<i>Exocarpos latifolius</i> R. Br.			X		X	X					X											
<i>Leptomeria acida</i> R. Br.			X						X													
SAPINDACEAE																						
<i>Alectryon coriaceus</i> (Benth.) Radlk.											X		X		X							
<i>Aryteradivaticata</i> F. Muell.											X											
<i>A. lautereriana</i> (Bailey) Radlk.													X									
<i>Cupaniopsis anacardioides</i> (A. Rich.) Radlk.					X	X					X								X			
<i>Dodonaea triquetra</i> Andrews			X	X	X		X		X		X		X		X				X	X		
<i>D. viscosa</i> (L.) Jacq. subsp. <i>burmanniana</i> (DC.) J. West															X	X						
<i>Guioa acutifolia</i> (F. Muell.) Radlk.					X			X			X		X									
<i>Jagera pseudorhus</i> (A. Rich.) Radlk. var. <i>pseudorhus</i>			X																			
<i>Mischocarpus pyriformis</i> (F. Muell.) Radlk. subsp. <i>pyriformis</i>			X		X			X		X	X											
<i>Sarcopteryx stipata</i> (F. Muell.) Radlk.					X					X	X											
<i>Toeckima tenax</i> (Benth.) Radlk.					X																	
SAPOTACEAE																						
<i>Planchonella australis</i> (R. Br.) Pierre					X																	
<i>P. chartacea</i> (F. Muell. ex Benth.) H.J. Lam			X					X		X	X											
<i>P. laurifolia</i> (A. Rich.) Pierre					X			X			X											
SCROPHULARIACEAE																						
<i>Artanema fimbriatum</i> D. Don			X																			
<i>Bacopa monnieri</i> (L.) Wettst.								X							X							
<i>Buchnera urticifolia</i> R. Br.			X										X									
<i>Centranthera cochinchinensis</i> (Lour.) Merr.						X																
<i>Gratiola pendunculata</i> R. Br.						X																
<i>Limnophila aromatica</i> (Lam.) Merr.			X																			
<i>Lindernia crustacea</i> (L.) F. Muell.																					X	
<i>*Scoparia dulcis</i> Benth.						X																
SIMAROUBACEAE																						
<i>Ailanthus triphysa</i> (Dennst.) Alston											X											
SOLANACEAE																						
<i>Duboisia myoporoides</i> R. Br.											X											
<i>Solanum stelligerum</i> Smith													X									

LOCAL DISTRIBUTION UNITS WHERE SPECIES WERE RECORDED																					
1			2	3		4			5		6		7		8		9		10		
a	b	c		a	r	a	b	r	a	r	a	r	a	b	a	b	a	b	a	b	c
<i>*Physalis peruviana</i> L.				X																	
SPIGELIACEAE																					
<i>Mitrasacme alsinoides</i>																					
R. Br.			X	X	X		X	X												X	
<i>M. paludosa</i> R. Br.				X			X														
<i>M. pygmaea</i> R. Br.			X																		
STACKHOUSIACEAE																					
<i>Stackhousia spathulata</i>																					
Sieber ex Sprengel													X							X	
<i>S. viminea</i> Smith			X				X	X													
STERCULIACEAE																					
<i>Argyrodendron trifoliolatum</i>																					
F. Muell.												X									
<i>A. sp. aff. A. trifoliolatum</i>																					
F. Muell.					X							X									
<i>Commersonia bartramia</i>																					
(L.) Merr.					X							X									
<i>Sterculia quadrifida</i> R. Br.												X									
STYLIDIACEAE																					
<i>Stylidium debile</i> F. Muell.																					
var. <i>debile</i>							X	X													
<i>S. graminifolium</i> Swartz																					
ex. Willd.			X																		
<i>S. ornatum</i> S.T. Blake			X																		
SYMPLOCACEAE																					
<i>Symplocos stawellii</i>																					
F. Muell.			X			X						X									
<i>S. thwaitesii</i> F. Muell.								X													
<i>S. sp. aff. S. baeuerlenii</i>																					
R. Baker						X															
TETRAGONIACEAE																					
<i>Tetragonia tetragonioides</i>																					
(Pallas) Kuntze														X							
THYMELAEACEAE																					
<i>Pimelea linifolia</i> Smith																					
subsp. <i>linifolia</i>			X				X	X		X		X		X					X		X
<i>Wikstroemia indica</i> (L.)																					
C.A. Meyer																				X	X
TILIACEAE																					
<i>Grewia latifolia</i> Benth.															X						
<i>Triumfetta rhomboidea</i>																					
Jacq.														X	X						
TREMANDRACEAE																					
<i>Tetradlea thymifolia</i>																					
Smith			X				X			X											

LOCAL DISTRIBUTION UNITS WHERE SPECIES WERE RECORDED																					
1			2	3		4			5		6		7		8		9		10		
a	b	c		a	r	a	b	r	a	r	a	r	a	b	a	b	a	b	a	b	c
<i>Cladium procerum</i>																					
S.T. Blake																					
<i>Cyathochaeta diandra</i> (R. Br.)																					
Nees																					
<i>Cyperus bowmannii</i> F. Muell.																					
ex Benth.																					
<i>*C. brevifolius</i> (Rottb.)																					
Hassk.																					
<i>C. flavidus</i> Retz.																					
<i>*C. flavus</i> (Vahl) Nees																					
<i>C. haspan</i> L.																					
<i>C. laevigatus</i> L.																					
<i>C. laevis</i> R. Br.																					
<i>C. leiocaulon</i> Benth.																					
<i>C. pedunculatus</i> F. Muell.																					
<i>C. pilosus</i> Vahl																					
<i>C. polystachyos</i> Rottb.																					
<i>C. scaber</i> (R. Br.) Boeck.																					
<i>C. sphaeroideus</i>																					
L. Johnson & O. Evans																					
<i>C. stradbokensis</i> Domin																					
<i>C. subulatus</i> R. Br.																					
<i>C. tetraphyllus</i> R. Br.																					
<i>C. trinervis</i> R. Br.																					
<i>C. unioides</i> R. Br.																					
<i>Eleocharis caribaea</i>																					
(Rottb.) S.T. Blake																					
<i>E. equisetina</i> C. Presl																					
<i>E. ochrostachys</i> Steudel																					
<i>E. sphacelata</i> R. Br.																					
<i>E. spiralis</i> (Rottb.) Roemer																					
& J.A. &																					
J.H. Schultes																					
<i>E. tetraquetra</i> Nees																					
<i>Fimbristylis brownii</i> Benth.																					
<i>F. cinnamometorum</i> (Vahl)																					
Kunth																					
<i>F. depauperata</i> R. Br.																					
<i>F. dichotoma</i> (L.)																					
Vahl sens. lat.																					
<i>F. ferruginea</i> (L.) Vahl																					
<i>F. furva</i> R. Br.																					
<i>F. nutans</i> (Retz.) Vahl																					
<i>F. ovata</i> (N. Burman) Kern																					
<i>F. pauciflora</i> R. Br.																					
<i>F. polytrichoides</i> (Retz.)																					
R. Br.																					
<i>Fuirena ciliaris</i> (L.) Roxb.																					
<i>F. umbellata</i> Rottb.																					
<i>Gahnia aspera</i> (R. Br.)																					
Sprengel																					
<i>G. clarkii</i> Benl																					
<i>G. sieberiana</i> Kunth																					
<i>Isolepis inundata</i> R. Br.																					
<i>I. nodosa</i> (Rottb.) R. Br.																					
<i>Lepidosperma laterale</i>																					
R. Br.																					

	LOCAL DISTRIBUTION UNITS WHERE SPECIES WERE RECORDED									
	1 a b c	2	3 a r	4 a b r	5 a r	6 a r	7 a b	8 a b	9 a b	10 a b c
<i>Lepidosperma longitudinale</i> Labill.				X X	X					
<i>Lepironia articulata</i> (Retz.) Domin				X X		X				
<i>Ptilanthelium deustum</i> (R. Br.) Kukenthal	X X									
<i>Rhynchospora brownii</i> Roemer & J.A. & J.H. Schultes	X X			X X						X
<i>R. corymbosa</i> (L.) Britton	X									
<i>R. rubra</i> (Lour.) Makino	X			X X						
<i>Schoenoplectus mucronatus</i> (L.) Palla ex Kerner	X									
<i>S. validus</i> (Vahl) A. Love & D. Love				X			X			
<i>Schoenus apogon</i> Roemer & J.A. & J.H. Schultes	X X	X		X X	X					
<i>S. brevifolius</i> R. Br.	X	X		X X						X
<i>S. calostachyus</i> (R. Br.) Poiret		X		X			X	X		
<i>S. melanostachys</i> R. Br.				X						
<i>S. ornithopodioides</i> (Kukenthal) S.T. Blake					X					
<i>S. pachylepis</i> S.T. Blake		X								
<i>S. paludosus</i> (R. Br.) Poiret	X	X		X						
<i>S. scabripes</i> Benth.		X		X						
<i>S. turbinatus</i> (R. Br.) Poiret					X					
<i>S. vaginatus</i> F. Muell.	X X			X						
<i>Scleria brownii</i> Kunth	X X X			X						
<i>S. levis</i> Retz.	X			X						
<i>S. mackaviensis</i> Boeck.	X									
<i>S. sphacelata</i> F. Muell.	X									
<i>Trachystylis stradbokensis</i> (Domin) Kukenthal					X	X				X
DIOSCOREACEAE										
<i>Dioscorea transversa</i> R. Br.	X					X				
ERIOCAULACEAE										
<i>Eriocaulon australe</i> R. Br.	X			X X						
<i>E. scariosum</i> Smith				X X						X
FLAGELLARIACEAE										
<i>Flagellaria indica</i> L.	X		X	X X		X				
HAEMODORACEAE										
<i>Haemodorum austroqueenslandicum</i> Domin	X			X		X				
<i>H. tenuifolium</i> Cunn. ex Benth.	X	X		X						
HYDROCHARITACEAE										
<i>Vallisneria spiralis</i> L.				X						

LOCAL DISTRIBUTION UNITS WHERE SPECIES WERE RECORDED																						
1			2	3		4			5		6		7	8		9		10				
a	b	c		a	r	a	b	r	a	r	a	r	a	b	a	b	a	b	a	b	c	
<i>Bulbophyllum exiguum</i> F. Muell.												X										
<i>Caladenia carnea</i> R. Br.			X	X			X															
<i>C. catenata</i> (Smith) Druce									X													
<i>Calanthe triplicata</i> (Willemet) Ames			X					X		X		X										
<i>Caleana major</i> R. Br.				X			X															
<i>Calochilus campestris</i> R. Br.				X									X									
<i>Chiloglottis reflexa</i> (Labill.) Druce				X							X											
<i>Corybas aconitiflorus</i> Salisb.				X																		
<i>C. undulatus</i> (R. Cunn.) Rupp & Nicholls ex Rupp				X																		
<i>Cryptostylis subulata</i> (Labill.) H.G. Reichb.				X			X															
<i>Cymbidium madidum</i> Lindley				X	X		X	X	X													
<i>C. suave</i> R. Br.			X	X	X		X		X		X		X	X								
<i>Dendrobium aemulum</i> R. Br.							X						X	X								
<i>D. gracilicaule</i> F. Muell.												X										
<i>D. linguiforme</i> Sw.				X								X										
<i>D. speciosum</i> Smith												X										
<i>D. tetragonum</i> Cunn.												X										
<i>Dipodium hamiltonianum</i> Bailey				X	X				X													
<i>D. punctatum</i> (Smith) R. Br.				X	X				X		X											
<i>Diuris aurea</i> Smith					X				X													
<i>D. punctata</i> Smith var. <i>alba</i> (R. Br.) Doehner					X			X														
<i>D. punctata</i> Smith var. <i>punctata</i>									X			X										
<i>Eriochilus cucullatus</i> (Labill.) H.G. Reichb.				X	X																	
<i>Galeola cassythoides</i> (Cunn.) H.G. Reichb.				X					X		X											
<i>G. foliata</i> (F. Muell.) F. Muell.												X										
<i>Geodorum densiflorum</i> (Lam.) Schltr.				X	X	X																
<i>Glossodia minor</i> R. Br.				X	X		X		X													
<i>Liparis habenarina</i> (F. Muell.) Benth.				X																		
<i>L. simmondsii</i> Bailey				X																		
<i>Lyperanthus suaveolens</i> R. Br.				X																		
<i>Microtis unifolia</i> (G. Forster) H.G. Reichb.																					X	
<i>Oberonia palmicola</i> F. Muell.												X										
<i>Peristeranthus hillii</i> (F. Muell.) Hunt												X										

LOCAL DISTRIBUTION UNITS WHERE SPECIES WERE RECORDED										
	1	2	3	4	5	6	7	8	9	10
	a b c		a r	a b r	a r	a r	a b	a b	a b	a b c
<i>Phaius tancarvilleae</i> (Banks ex L'Herit.) Blume		X		X						
<i>Prasophyllum acuminatum</i> R. Rogers	X									
<i>P. archeri</i> J.D. Hook.				X						
<i>P. aureoviride</i> Rupp var. <i>aureoviride</i>					X					
<i>P. aureoviride</i> Rupp var. <i>elmae</i> (Rupp) Rupp					X					
<i>P. australe</i> R. Br.	X	X								X
<i>P. brevilabre</i> (Lindley) J.D. Hook.		X		X						
<i>P. densum</i> Fitzg.		X			X					
<i>P. elatum</i> R. Br.	X	X								
<i>P. viride</i> Fitzg.		X								
<i>Pterostylis baptistii</i> Fitzg.						X X				X
<i>P. ophioglossa</i> R. Br.	X									
<i>P. parviflora</i> R. Br.					X					
<i>Rhinerrhiza divitiflora</i> (F. Muell. ex Benth.) Rupp						X				
<i>Thelymitra ixioides</i> Sw.	X	X								
<i>T. pauciflora</i> R. Br.	X									
<i>Zeuxine oblonga</i> R. Rogers & C. White						X				
PANDANACEAE										
<i>Freycinetia scandens</i> Gaudich.	X									
<i>Pandanus tectorius</i> Sol. ex Parkinson							X	X X		X
PHILESIACEAE										
<i>Eustrephus latifolius</i> R. Br.	X X X		X		X	X	X			X X
<i>Geitonoplesium cymosum</i> (R. Br.) Cunn. ex Hook.	X		X	X		X X	X		X	X
PHILYDRACEAE										
<i>Philydrum lanuginosum</i> Banks & Sol. ex Gaertner				X X						X X
POACEAE										
<i>Alloteropsis semialata</i> (R. Br.) Hitchc.	X X			X X	X	X	X	X		
<i>Aristida acuta</i> S.T. Blake							X			
<i>A. benthamii</i> Henrard	X			X X						
<i>A. browniana</i> Henrard						X				
<i>A. calycina</i> R. Br.					X	X	X	X		X X
<i>A. vagans</i> Cav.				X						
<i>A. warburgii</i> Mez	X			X						
<i>Arthraxon hispidus</i> (Thunb.) Makino var. <i>hispidus</i>				X						
* <i>Axonopus affinis</i> Chase	X			X						

LOCAL DISTRIBUTION UNITS WHERE SPECIES WERE RECORDED																					
1			2	3		4		5		6		7		8		9		10			
a	b	c		a	r	a	b	r	a	r	a	r	a	b	a	b	a	b	a	b	c
<i>Bothriochloa bladhii</i> (Retz.) S.T. Blake																					
	X																				
<i>Capillipedium parviflorum</i> (R. Br.) Stapf																					
						X															
<i>C. spicigerum</i> S.T. Blake																					
						X															
<i>*Cenchrus echinatus</i> L.																					
																					X
<i>Cymbopogon refractus</i> (R. Br.) A. Camus																					
	X					X	X														X
<i>Dichelachne micrantha</i> (Cav.) Domin																					
		X					X														
<i>Digitaria didactyla</i> Willd.																					
<i>*D. eriantha</i> Steudel																					
subsp. <i>pentzii</i> (Stent.) Kok																					
																					X
<i>D. leucostachya</i> (Domin) Henrard																					
	X												X								
<i>D. orbata</i> Hughes																					
						X															
<i>D. parviflora</i> (R. Br.) Hughes																					
			X							X											
<i>D. ramularis</i> (Trin.) Henrard																					
		X																			
<i>Elionurus citreus</i> (R. Br.) Munro ex Benth.																					
															X						
<i>Entolasia marginata</i> (R. Br.) Hughes																					
							X		X	X		X				X					X
<i>E. stricta</i> (R. Br.) Hughes																					
X	X				X	X	X		X		X		X			X					
<i>Eragrostis brownii</i> (Kunth) Nees ex Steudel																					
X	X	X				X	X		X		X		X						X		X
<i>E. interrupta</i> Beauv.																					
									X		X		X		X	X			X		X
<i>E. pubescens</i> (R. Br.) Steudel																					
															X						
<i>E. sororia</i> Domin																					
			X																		
<i>Eremochloa bimaculata</i> Hackel																					
X			X				X								X						
<i>Eriachne glabrata</i> (Maiden) W. Hartley																					
							X		X												
<i>E. pallescens</i> R. Br.																					
	X		X			X	X		X		X				X						
<i>E. rara</i> R. Br.																					
	X										X										
<i>Eriochloa procera</i> (Retz.) C.E. Hubb.																					
							X														
<i>Eulalia trispicata</i> (Schultz) Henrard																					
	X																				
<i>Hemarthria uncinata</i> R. Br.																					
							X														
<i>Hyparrhenia filipendula</i> (Hochst.) Stapf.																					
	X																				
<i>Imperata cylindrica</i> (L.) Beauv.																					
X	X	X	X	X	X	X	X		X		X		X		X	X			X	X	X
<i>Isachne globosa</i> (Thunb.) Kuntze																					
						X															
<i>Ischaemum australe</i> R. Br.																					
							X														X
<i>I. fragile</i> R. Br.																					
									X												
<i>I. triticeum</i> R. Br.																					
													X	X					X		X
<i>Leersia hexandra</i> Sw.																					
						X															X
<i>Lepturus repens</i> (J.R. Forster) R. Br.																					
	X																				
<i>*Melinis minutiflora</i> Beauv.																					
									X												

