

## Appendix 1 - Vegetation community profiles

The following appendix provides a profile of each of the 62 communities delimited during the current surveys. A summary table of the equivalent ecological communities listed in each of the profiles is given in Appendix 5.

Throughout this Appendix, the following abbreviations or conventions are used:

NP, National Park; NR, Nature Reserve; SCA, State Conservation Area; SF, State Forest; TSR, Travelling Stock Route.

Under **Significant taxa**, species are listed with their status under the TSC (Vulnerable, Endangered), relevant ROTAP codes, or as Rare in NSW.

Under **Floristics**, species are arranged by decreasing summed cover abundance. The dominant species of structural layers recorded at sites are noted: E, emergent; T, tallest layer; M, mid-layer; L, lower layer; where two layers are recorded in a strata, the layers are recorded as M1 and M2 or L1 or L2; \*, exotic species. Where there is no entry for groups of plants (e.g. Mistletoes, Ferns, etc.) there were no records in those groups in the sites of that community.

For **Number of taxa per plot**, figures in parentheses are means  $\pm$  standard deviation. A range of the number of taxa from lowest to highest recorded in the community is shown.

The **Indicator native taxa** table provides the results of a fidelity analysis. Taxa with a positive diagnostic relationship to the community are listed. Positive diagnostic species are those that are more likely to be recorded in the target community than in other communities. For each taxa the median cover score and frequency % within the community and in all other sites is recorded.

Species	Group score median cover score	Frequency within community > 50%	Non-group score median cover score	Non-community frequency < 50%	Fidelity class
---------	-----------------------------------	-------------------------------------	---------------------------------------	----------------------------------	----------------

Table A1. The 62 vegetation communities of the FNC identified in the current survey.

Community	Name
Community 1	Saltmarsh
Community 2	Blue Couch–Prickly Couch grasslands of the estuarine plain
Community 3	Broad-leaved Paperbark–Swamp Oak swamp sclerophyll alluvial plain open forest
Community 4	Swamp Oak–Broad-leaved Paperbark estuarine and alluvial plain swamp sclerophyll forest
Community 5	Milky Mangrove–Swamp Oak–Grey Mangrove king-tide forest
Community 6	Swamp Oak–Hoop Pine–Tuckeroo swamp sclerophyll/dry ‘gallery’ floodplain rainforest
Community 7	Prickly Couch–Sea Rush– <i>Schoenoplectus subulatus</i> saltmarsh
Community 8	Swamp Oak king-tide swamp sclerophyll forest
Community 9	Sea Rush–Matgrass saltmarsh
Community 10	Broad-leaved Paperbark–Swamp Oak–fern/sedge swamp sclerophyll forest
Community 11	Broad-leaved Paperbark–Pink-flowered Doughwood swamp sclerophyll open forest
Community 12	Broad-leaved Paperbark–Swamp Oak ferny swamp sclerophyll forest
Community 13	Alluvial plain Broad-leaved Paperbark–Swamp Mahogany–Bangalow Palm–Saw Sedge–Swamp Water Fern swamp sclerophyll forest

Community	Name
Community 14	Swamp Mahogany–Broad-leaved Paperbark–Bangalow Palm–sedge/fern swamp sclerophyll forest
Community 15	Bangalow Palm–Swamp Box–Cabbage Tree Palm–Weeping Myrtle alluvial riparian forest
Community 16	Tea-tree ( <i>Leptospermum</i> spp.)– <i>Sporodanthus interruptus</i> wet heath
Community 17	<i>Leptospermum liversidgei</i> –Wallum Bottlebrush–Grass Tree–Heath-leaved Banksia wallum wet heath complex
Community 18	Coral Fern fernland
Community 19	Broad-leaved Paperbark–Coast Banksia–Red Ash dunal scrubland
Community 20	Swamp Box–Broad-leaved Paperbark–rush/fern swamp sclerophyll forest
Community 21	Broad-leaved Paperbark–Swamp Oak–rush saline swamp sclerophyll open forest
Community 22	Common Reed–Black Bog–rush reedland/rushland
Community 23	Swamp Box–Broad-leaved Paperbark–Swamp Mahogany swamp sclerophyll forest
Community 24	Swamp Ricegrass–Smartweed– <i>Juncus usitatus</i> swampy meadow
Community 25	Swamp Ricegrass– <i>Bolboschoenus caldwellii</i> – <i>Schoenoplectus validus</i> – <i>Cyperus exaltatus</i> freshwater wetland
Community 26	Hinterland Narrow-leaved Paperbark–tea-tree backswamp shrublands–sedgeland
Community 27	Weeping Myrtle–Water Gum floodplain riparian forest
Community 28	Narrow-leaved Paperbark–Wallum Bottlebrush swamp sclerophyll shrubland
Community 29	Swamp Box–Narrow-leaved Paperbark–Broad-leaved Paperbark alluvial swamp sclerophyll forest
Community 30	Middle Richmond freshwater wetlands
Community 31	Scribbly Gum–Red Mahogany–Brush Box dry sclerophyll open to closed forest on coastal barrier sands
Community 32	Blackbutt–Turpentine open forest complex
Community 33	Coast Cypress Pine on dunes and ridges
Community 34	Coast Banksia frontal dune open forest on Holocene dunes
Community 35	Brush Box lowland rainforest
Community 36	Coast Wattle–Coast Tea-tree–Coast Banksia shrubland on Holocene dunes and ridges
Community 37	Kangaroo Grass headland grassland
Community 38	Scribbly Gum–Old Man Banksia–Slender Tea-tree heathy low open sclerophyll forest/shrubland
Community 39	Wallum Banksia dry heath
Community 40	Lower Richmond mesic successional wet/swamp sclerophyll forest/rainforest
Community 41	Lower Richmond Brush Box–Pink Bloodwood–Grey Ironbark mesic tall open forest
Community 42	Tweed–Brunswick Valleys Brush Box–Blackbutt–Pink Bloodwood–Tallowwood foothill wet sclerophyll forest
Community 43	Brunswick–Tweed Brush Box gully rainforest on meta-sediments
Community 44	Tweed–Brunswick Valley Blue Quandong subtropical rainforest
Community 45	Tweed–Brunswick Valley Bangalow Palm–Lilly Pilly subtropical rainforest

Community	Name
Community 46	Stinging Tree–White Fig–Brush Bloodwood subtropical rainforest
Community 47	Tweed Valley meta-sediment and basalt low-elevation subtropical rainforest
Community 48	Flooded Gum–Pink-flowered Doughwood–Hard Quandong alluvial plain wet sclerophyll forest
Community 49	Camphor Laurel–Forest Red Gum open to closed forest
Community 50	Swamp Oak–Forest Red Gum–Broad-leaved Paperbark–Swamp Box swamp sclerophyll woodland to open forest
Community 51	Forest Red Gum–Willow Bottlebrush–Camphor Laurel dry open forest
Community 52	Small-leaved Fig–Hard Quandong–Bangalow Palm subtropical/littoral rainforest on Pleistocene dunes
Community 53	Patches Beach Broad-leaved Paperbark–Swamp Oak–Cabbage-tree Palm swamp sclerophyll forest on the alluvial plain
Community 54	Whalebone Tree–Thorny Pea–Sweet Myrtle dry rainforest
Community 55	Grey Ironbark–Pink Bloodwood–White Mahogany dry grassy open forest
Community 56	Broad-leaved Paperbark–Swamp Box–Tuckeroo swamp sclerophyll open forest
Community 57	Red Mahogany–Pink Bloodwood–Swamp Mahogany–Swamp Box dry open forest
Community 58	Pink Bloodwood–Grey Ironbark–Swamp Box–Forest Red Gum–Blackbutt tall dry open forest
Community 59	Large-fruited Spotted Gum–Grey Ironbark–Small-fruited Grey Gum dry grassy open forest
Community 60	Grey Ironbark–Thin-leaved Stringybark–Pink Bloodwood–Swamp Box dry open grassy forest
Community 61	Broad-leaved Paperbark–Narrow-leaved Rough-barked Apple–Swamp Box–Pink Bloodwood dry grassy alluvial open forest
Community 62	River Mangrove–Grey Mangrove–Black Mangrove–Milky Mangrove–Spider Mangrove forest to shrubland

## Group 1–Saline Wetlands

### Community 1 Saltmarsh

**Scientific name:** *Sarcocornia quinqueflora*, *Suaeda australis*, Saltwater Couch (*Sporobolus virginicus*) and Sea Rush (*Juncus kraussii* subsp. *kraussii*) Saltmarsh.

**Sites:** (5) BALL01esex, BRU01alch, POT07esticd, POT08esticd, TWE25esttdf.

#### Equivalent communities

Saline Wetlands–Saltmarshes (Keith 2006); Qld Regional Ecosystem 12.1.2 Saltpan vegetation (Young and Dillewaard 1999); 603 – Saltmarsh Communities (Kingston *et al.* 2004); 6102 – Chenopod Shrubland–Tussock Grassland NPWS NSW Coastal Vegetation mapping (Griffith *et al.* 2000); S1 – *Sporobolus virginicus*, *Sarcocornia quinqueflora* (Pressey and Griffith 1992); Forest Ecosystem 125 – Saltbush (NPWS 1999); 6. Sporobolium viginici. 1. sarcocornietosum, 3. sporobolium (Adam *et al.* 1988).

#### Description

Dominated by a dense cover of Saltwater Couch (*Sporobolus virginicus* var. *minor*), *Sarcocornia quinqueflora* subsp. *quinqueflora*, Sea Rush (*Juncus kraussii* subsp. *australiensis*) and other grasses, sedges, rushes and herbs. Rarely, emergent Swamp Oak (*Casuarina glauca*), River Mangrove (*Aegiceras corniculatum*), Grey Mangrove (*Avicennia marina* subsp. *australasica*) and *Myoporum acuminatum* present. The community has low species diversity.



#### Distribution and Habitat

**Habitat:** Very low-lying sites located in Quaternary estuarine alluvium mixed with Pleistocene sands, associated with Pottsville and Tyagarah soil landscapes.

Species composition within coastal saltmarsh varies with elevation: *Sarcocornia quinqueflora* dominates at lower, and hence more frequently flooded levels than *Sporobolus virginicus*, which dominates the mid-elevation saltmarsh, while *Juncus kraussii* and *Baumea juncea* are upper saltmarsh species (NSW Scientific Committee). Adam *et al.* (1988) states that stands dominated by *Sarcocornia quinqueflora* are often present adjacent to mangroves.

**Disturbance:** Weeds uncommon, grazing moderate.

**Locations:** Recorded at survey sites at Ballina, Brunswick Heads, Pottsville Environmental Park, Vallances Road and Fingal.

#### Conservation

**Threats:** Clearing and filling for coastal development, grazing, rubbish dumping, increased sedimentation and invasion by mangrove species, modified tidal flow and climate change.

**Conservation status:** Saltmarsh is an EEC listed under the TSC. In the study area, small areas are reserved in the Tweed Estuary NR, Ukerebagh Island NR, Cudgen NR, Wooyung NR, Marshalls Creek NR, Tyagarah NR and

Richmond River NR. West *et al.* (1985) estimated the approximate total area of coastal saltmarsh in NSW at 5700 ha distributed in fragmented patches, mostly <100 ha in area. In the intervening two decades further reduction and fragmentation have occurred.

**Significant taxa:** None recorded.

## Structure

Layer	Height (m)	Cover (%)
Emergent	5–8	5
Tallest	0–4	10–90
Lower 1	0–1	50–100
Lower 2	0–0.5	40–90

## Floristics

**Emergent small tree and shrubs:** *Avicennia marina* subsp. *australasica* (T), *Myoporum acuminatum* (T), *Aegiceras corniculatum* (E), *Casuarina glauca* (T), *Melaleuca styphelioides*, *Glochidion ferdinandi*, *Excoecaria agallocha*.

**Grasses:** *Sporobolus virginicus* var. *minor* (T), *Eriochloa procera*, *Paspalum vaginatum*, *Phragmites australis*.

**Ferns:** None recorded.

**Sedges and rushes:** *Juncus kraussii* subsp. *australiensis*, *Fimbristylis dichotoma*, *Baumea juncea*, *Triglochin striatum*, *Fimbristylis ferruginea*, *Cyperus polystachyos*, *Juncus cognatus*\*.

**Herbs and shrubs:** *Sarcocornia quinqueflora* subsp. *quinqueflora* (T), *Suaeda australis*, *Apium prostratum*, *Bacopa monnieri*, *Aster subulatus*\*, *Atriplex semibaccata*, *Asparagus aethiopicus*\*.

**Climbers:** *Cynanchum carnosum*, *Stephania japonica* var. *discolor*.

Number of native taxa: 25

Number of taxa per plot: 3–25 (mean 10 ± 10)

Number of exotic species: 4

## Indicator native taxa

Species	Group score	Group frequency	Non-group score	Non-group frequency	Fidelity class
<i>Atriplex semibaccata</i>	2	25%	0	0%	positive
<i>Juncus cognatus</i>	1	25%	0	0%	positive
<i>Juncus kraussii</i>	4	50%	3	6%	positive
<i>Sarcocornia quinqueflora</i>	4	75%	3	1%	positive
<i>Sporobolus virginicus</i>	6	100%	4	1%	positive



## Community 2 Blue Couch–Prickly Couch grasslands of the estuarine plain

**Scientific name:** Blue Couch (*Cynodon dactylon*) and Prickly Couch (*Zoysia macrantha*) derived grasslands of the estuarine plain.

**Sites:** (2) BALL06ESTba, WOO13estss.

### Equivalent communities

Saline Wetlands–Saltmarshes (Keith 2006); Qld Regional Ecosystem 12.1.2 Saltpan vegetation (Young and Dillewaard 1999); 902 – Native Grassland (Kingston *et al.* 2004); *Cynodon dactylon* sod grassland (Adam *et al.* 1988).

### Description

This community was represented by two, possibly derived, grassland sites growing on saline clay soils of the estuarine plain. The community was dominated by a dense cover of Blue Couch (*Cynodon dactylon*), with Swamp Millet, (*Ischaemum australe*), Swamp Ricegrass (*Leersia hexandra*) and Prickly Couch (*Zoysia macrantha*), with sedges, rushes and herbs also present. Emergent Swamp Oak (*Casuarina glauca*) and Broad-leaved Paperbark (*Melaleuca quinquenervia*) were recorded in one site. The community has low species richness, and 30% of species are exotic. Griffith (2005) notes that Blue Couch often occurs as a community on the upper edge of saltmarsh.



### Distribution and Habitat

**Habitat:** The tidal floodplain of the Evans River, in low-lying saline swamps, and on the upper limit of the estuarine basin of Roberts Creek, near Ballina. Blue Couch is recorded as an upper saltmarsh community (Adam *et al.* 1988). Griffith (2005) states ‘that Blue Couch also occurs as a common pasture species on floodplains and extends into wet meadows.’

**Disturbance:** The site at Ballina Airport had been heavily cleared in the past and was severely disturbed by weeds. The Woodburn site had moderate weed and grazing disturbance.

**Locations:** Recorded at survey sites at Ballina Airport and Tuckombil Canal.

### Conservation

**Threats:** Threatened by past and present clearing, grazing, modified tidal flows, and weed infestation.

**Conservation status:** Natural occurrences of Blue Couch grassland on the floodplain are part of the Freshwater Wetland of Coastal Floodplains EEC. Sites on the estuarine plain qualify as Coastal saltmarsh in the NSW North Coast, Sydney Basin and South East Corner bioregions EEC. Natural occurrences of these communities are probably very rare and poorly reserved. Griffith (2005) suggests a poor reservation status.

**Significant taxa:** None recorded. The fern *Marsilea mutica* was recorded at the Tuckombil Canal ; this species was only recorded at one other sites in the present survey.

## Structure

Layer	Height (m)	Cover (%)
Tallest	0.1–4	3–70
Lower 1	0.5–1	10
Lower 2	0–0.3	75

## Floristics

**Small trees and shrubs:** *Casuarina glauca* (T), *Melaleuca quinquenervia*, *Erythrina crista-galli*\*, *Baccharis halimifolia*\*

**Grasses:** *Cynodon dactylon* (T), *Zoysia macrantha* (L2), *Ischaemum australe*, *Leersia hexandra*, *Paspalum dilatatum*\*, *Paspalum distichum*.

**Climbers:** *Parsonsia straminea*.

**Ferns:** *Marsilea mutica*.

**Sedges and rushes:** *Carex appressa* (L1), *Cyperus polystachyos*, *Juncus usitatus* (L1), *Baumea articulata*, *Cyperus haspan* subsp. *juncooides*, *Juncus mollis*, *Eleocharis acuta*, *Eleocharis equisetina*, *Eleocharis minuta*\*, *Fimbristylis dichotoma*, *Juncus kraussii* subsp. *australiensis*, *Juncus subsecundus*.

**Herbs and shrubs:** *Centella asiatica*, *Cuphea carthagenensis*\* (L1), *Persicaria hydropiper*, *Senecio madagascariensis*\* (L2), *Cirsium vulgare*\*, *Commelina cyanea*, *Persicaria decipiens*, *Cotula coronopifolia*\*, *Ludwigia octovalvis*, *Philydrum lanuginosum*, *Ranunculus inundatus*, *Eclipta prostrata*.

Number of native taxa: 31

Number of taxa per site: 17–29 (mean 23 ± 8)

Number of exotic species: 10

## Indicator native taxa

Species	Group score	Group frequency	Non-group score	Non-group frequency	Fidelity class
<i>Baumea articulata</i>	2	50%	1	3%	positive
<i>Carex appressa</i>	3	50%	2	6%	positive
<i>Centella asiatica</i>	2	100%	2	12%	positive
<i>Cynodon dactylon</i>	4	100%	2	5%	positive
<i>Cyperus haspan</i>	2	50%	2	1%	positive
<i>Cyperus polystachyos</i>	3	50%	1	3%	positive
<i>Ischaemum australe</i>	2	50%	2	6%	positive
<i>Juncus mollis</i>	2	50%	2	2%	positive
<i>Juncus subsecundus</i>	1	50%	0	0%	positive
<i>Juncus usitatus</i>	2	50%	1	4%	positive
<i>Leersia hexandra</i>	2	50%	2	3%	positive
<i>Marsilea mutica</i>	2	50%	2	0%	positive
<i>Persicaria decipiens</i>	2	50%	0	0%	positive
<i>Persicaria hydropiper</i>	2	100%	2	2%	positive
<i>Phragmites australis</i>	2	50%	2	8%	positive
<i>Zoysia macrantha</i>	4	50%	3	5%	positive

## Community 3 Broad-leaved Paperbark–Swamp Oak swamp sclerophyll Alluvial Plain Open Forest

**Scientific name:** Swamp Oak (*Casuarina glauca*), Broad-leaved Paperbark (*Melaleuca quinquenervia*) with Tall Sedge (*Carex appressa*) and Blue Couch (*Cynodon dactylon*) Swamp Sclerophyll Alluvial Plain Open Forest.

**Sites:** (5) GIB01ALLV, WOO10ALBK, WOO11ALBK, WOO12ALBK, WOO16alvf.

### Equivalent communities

Forested Wetlands–Coastal Floodplain Wetlands, Coastal Swamp Forests (Keith 2006); Qld Regional Ecosystem 12.3.5 *Melaleuca quinquenervia* on alluvium (Young and Dillewaard 1999); F8 *Melaleuca quinquenervia* tall to very tall open to closed forest and F10 *Casuarina glauca* tall to very tall open to closed forest (Pressey and Griffith 1992); 40031/2 *Melaleuca quinquenervia* swamp sclerophyll forest and woodland, 40051/2 *Casuarina glauca* forest and woodland, 40991/2 Mixed stands of *Melaleuca quinquenervia* – *Casuarina glauca* NPWS NSW Coastal Vegetation (Griffith & Wilson 2007); 402 – Broad-leaved Paperbark/Swamp She-Oak Closed Forest to Woodland (Kingston *et al.* 2004); Swamp Oak ± Paperbark (sOP) (Landmark Ecological Services 1999); Forest Ecosystem 112 and 143 (NPWS 1999).

### Description

The community is mostly an open forest structure, with Broad-leaved Paperbark (*Melaleuca quinquenervia*) and Swamp Oak (*Casuarina glauca*). Site GIB01allv, however, is an open shrubland of Narrow-leaved Paperbark (*Melaleuca alternifolia*) and *Leptospermum brachyandrum*. Rarely, a sparse mid-layer of Swamp Oak is present. There is always a lower layer of grasses, sedges, rushes and herbs, including *Carex appressa*, Blue Couch (*Cynodon dactylon*), *Elyda fluctuans* and River Buttercup (*Ranunculus inundatus*). Ground ferns (*Hypolepis muelleri* and Swamp Ferns (*Blechnum* spp.) are present but less abundant than in Communities 10 and 11, where they dominate.



### Distribution and Habitat

**Habitat:** Commonly found in large estuarine or alluvial backswamps of the Evans River and stagnant alluvial backswamps of Bungawalbin Creek. More rarely found on hinterland river levees where Narrow-leaved Paperbark is the dominant paperbark.

**Disturbance:** Moderate clearing, light to moderate grazing and weeds.

**Example locations:** Sites surveyed at Sandy Creek; Bungawalbyn; Boggy Creek, west of Woodburn; and on the Evans River.



## Conservation

**Threats:** Clearing and grazing.

**Conservation status:** Occurrences of this community on the alluvial plain are examples of Swamp Sclerophyll Forest of New South Wales coastal floodplains EEC. The surveyed sites for Community 3 were not reserved. Griffith (2005) states that floodplain occurrences of both Broad-leaved Paperbark and Swamp Oak Forests communities are poorly reserved. Floodplain occurrences of Broad-leaved Paperbark are reserved at Stotts Island NR, Tuckean NR, Bungawalbyn NR, Yarringly SCA and Broadwater NP.

**Significant taxa:** None recorded.



## Structure

Layer	Height (m)	Cover (%)
Tallest	5–25	15–40
Middle 1	2–12	10–20
Middle 2	1–3	10
Lower 1	0–1	10–50
Lower 2	0–0.3	5–50

## Floristics

**Trees:** *Melaleuca quinquenervia* (T), *Casuarina glauca* (T), *Melaleuca alternifolia* (T).

**Shrubs and small trees:** *Callistemon salignus*, *Cupaniopsis anacardioides*, *Leptospermum brachyandrum* (T), *Senna pendula* var. *glabrata*\*, *Myrsine howittiana*, *Maclura cochinchinensis*, *Duboisia myoporoides*, *Notelaea longifolia*, *Acacia disparrima* subsp. *disparrima*, *Ficus rubiginosa*, *Schefflera actinophylla*\*.

**Climbers:** *Ipomoea cairica*\*, *Parsonsia straminea*, *Marsdenia rostrata*, *Passiflora herbertiana*, *Passiflora suberosa*\*, *Solanum seafortianum*\*, *Stephania japonica* var. *discolor*

**Epiphytes:** *Platyserium superbum*, *Platyserium bifurcatum*, *Pyrrosia confluens* var. *confluens*.

**Mistletoes:** *Amyema congener* subsp. *congener*, *Benthamina alyxifolia*.

**Grasses:** *Ottocloa gracillima*, *Zoysia macrantha*, *Hemarthria uncinata*, *Lachnagrostis filiformis* (L2), *Paspalum wettsteinii*\*, *Cynodon dactylon* (L2), *Phragmites australis*, *Entolasia marginata*, *Oplismenus aemulus*, *Paspalum dilatatum*\*, *Eriochloa procerata*, *Panicum simile*, *Pseudoraphis paradoxa*.

**Ferns:** *Hypolepis muelleri*, *Pteridium esculentum*, *Histiopteris incisa*.

**Sedges/Rushes:** *Carex appressa* (L1), *Gahnia clarkei*, *Juncus mollis* (L1), *Cyperus trinervis*, *Eleocharis acuta*, *Fimbristylis ferruginea*, *Lomandra longifolia*, *Lomandra hystrix* (L1), *Cyperus gunnii* subsp. *gunnii* (L1), *Cyperus lucidus*, *Carex maculata*.

**Herbs and shrubs:** *Enydra fluctuans* (L2), *Centella asiatica* (L2), *Ranunculus inundatus*, *Persicaria strigosa* (L2), *Alternanthera denticulata* (L2), *Persicaria hydropiper*, *Soliva anthemifolia*\*, *Viola banksii*, *Lobelia anceps*, *Crassocephalum crepidioides*\*, *Solanum capsicoides*\*, *Cotula coronopifolia*\* (L2), *Epaltes australis*, *Goodenia paniculata*, *Centipeda*

*minima*, *Hydrocotyle acutiloba*, *Lycopus australis*, *Plectranthus parviflorus*, *Pratia purpurascens*, *Ranunculus repens*\*, *Senecio madagascariensis*\*, *Dianella caerulea*, *Eclipta platyglossa*, *Homalanthus populifolius*.

Number of native taxa: 76

Number of taxa per site: 12–38 (mean 22 ± 11)

Number of exotic taxa: 24

### Indicator native taxa

Species	Group score	Group frequency	Non-group score	Non-group frequency	Fidelity class
<i>Alternanthera denticulata</i>	2	60%	1	5%	positive
<i>Benthamina alyxifolia</i>	1	20%	0	0%	positive
<i>Callitriche muelleri</i>	1	20%	0	0%	positive
<i>Carex appressa</i>	3	100%	1	5%	positive
<i>Casuarina glauca</i>	3	80%	3	21%	positive
<i>Centella asiatica</i>	2	80%	2	12%	positive
<i>Cyperus gunnii</i>	1	20%	0	0%	positive
<i>Elydra fluctuans</i>	2	100%	2	6%	positive
<i>Epiltes australis</i>	1	40%	0	0%	positive
<i>Lachnagrostis filiformis</i>	2	80%	2	2%	positive
<i>Melaleuca quinquenervia</i>	3	80%	3	39%	positive
<i>Persicaria hydropiper</i>	2	60%	2	2%	positive
<i>Persicaria strigosa</i>	2	60%	2	6%	positive
<i>Ranunculus inundatus</i>	2	100%	1	2%	positive

## Community 4 Swamp Oak–Broad-leaved Paperbark Estuarine and Alluvial Plain Swamp Sclerophyll Forest

**Scientific name:** Swamp Oak (*Casuarina glauca*) and Broad-leaved Paperbark (*Melaleuca quinquenervia*) with Saw Sedge (*Gahnia clarkei*), Prickly Couch (*Zoysia macrantha*) and Common Reed (*Phragmites australis*) estuarine and alluvial plain swamp sclerophyll forest.

**Sites:** (9) BALL16estcbb, WOO15ALLV, BRU26ESTICD, BYR30estsswp, WAR14ALBK, WAR30CBRDG, WAR49albk, WAR50alun, WOO23estsswp.

### Equivalent communities

Forested Wetlands–Coastal Floodplain Wetlands, Coastal Swamp Forests (Keith 2006); Qld Regional Ecosystem 12.1.1 *Casuarina glauca* ± *Melaleuca quinquenervia* open forest (Young and Dillewaard 1999); F8 *Melaleuca quinquenervia* tall to very tall open to closed forest, and F10 *Casuarina glauca* tall to very tall open to closed forest (Pressey and Griffith 1992); 40031/2 *Melaleuca quinquenervia* swamp sclerophyll forest and woodland, 40051/2 *Casuarina glauca* forest and woodland, and 40991/2 Mixed stands of *Melaleuca quinquenervia* – *Casuarina glauca* NPWS NSW Coastal Vegetation (Griffith and Wilson 2007); 402 – Broad-leaved Paperbark/Swamp She-Oak Closed Forest to Woodland (Kingston *et al.* 2004); Swamp Oak ± Paperbark (sOP) (Byron Shire Council 1999); Forest Ecosystems 112 and 143 (NPWS 1999).



### Description

An open forest structure with Swamp Oak (*Casuarina glauca*) and Broad-leaved Paperbark (*Melaleuca quinquenervia*). The community has a well-developed open mid-layer of Tuckeroo (*Cupaniopsis anacardioides*), Milky Mangrove (*Excoecaria agallocha*) and Prickly Paperbark (*Melaleuca styphelioides*). The lower strata differ from community 3 in the presence of Saw Sedge (*Gahnia clarkei*), Prickly Couch (*Zoysia macrantha*) and Common Reed (*Phragmites australis*) as indicator taxa. River Lily (*Crinum pedunculatum*) is also abundant in some sites. A total of 20% of species recorded were exotic species.

### Distribution and Habitat

**Habitat:** Found on a range of low-lying waterlogged alluvial, estuarine plain and barrier sand substrates with considerable variation in tidal and saline influence at local scales.

**Disturbance:** Infestation of weeds ranges from light to severe; light grazing.

**Example locations:** Sites at Tuckean Broadwater, Jali lands at Wardell, Chickiba Creek at North Ballina, Belongil Creek, and west of Brunswick Heads.

### Conservation

**Threats:** Clearing, grazing and weed invasion.

**Conservation status:** Occurrences of this community on the alluvial plain are examples of Swamp Sclerophyll Forest of New South Wales coastal floodplain EEC. Griffith (2005) states that floodplain occurrences of both Broad-leaved Paperbark and Swamp Oak Forests communities are poorly reserved. Floodplain occurrences of Broad-leaved Paperbark are reserved at Stotts Island NR, Tuckean NR, Bungawalbyn NR, Yarringly SCA, Broadwater NP, Billinudgel NR, Marshalls Creek NR and Tyagarah NR. Estuarine occurrences of Broad-leaved Paperbark are better represented in reserves (e.g. Cudgen NR).

**Significant taxa:** None recorded.

## Structure

Layer	Height (m)	Cover (%)
Tallest	8–25	20–40
Middle 1	0–10	5–60
Middle 2	1–3	10–20
Lower 1	0–1	10–60
Lower 2	0–0.5	40–90

## Floristics

**Trees:** *Casuarina glauca* (T), *Melaleuca quinquenervia* (T), *Eucalyptus tereticornis* (T).

**Shrubs and small trees:** *Melaleuca quinquenervia* (M1), *Baccharis halimifolia*\* (M2), *Callistemon salignus* (T), (M1), *Excoecaria agallocha* (M1), *Cupaniopsis anacardioides* (M1), *Melaleuca styphelioides* (M1), *Lantana camara*\* (M1), *Maclura cochinchinensis*, *Duboisia myoporoides*, *Livistona australis* (M1), *Notelaea longifolia* (M1), *Cinnamomum camphora*\* (M1), *Melaleuca sieberi* (M1), *Myoporum acuminatum*, *Breynia oblongifolia*, *Schefflera actinophylla*\*, *Senna pendula* var. *glabrata*\*.

**Climbers:** *Parsonsia straminea*, *Ipomoea cairica*\*, *Marsdenia rostrata*, *Passiflora suberosa*\*, *Cardiospermum grandiflorum*\*, *Geitonoplesium cymosum*, *Passiflora herbertiana*, *Solanum seaforthianum*\*.

**Epiphytes:** *Platyserium bifurcatum*, *Platyserium superbum*, *Cymbidium madidum*.

**Grasses:** *Zoysia macrantha* (L1), *Hemarthria uncinata*, *Phragmites australis* (M1), *Paspalum wettsteinii*\* (L1), *Entolasia marginata*, *Ottochloa gracillima* (L2), *Lachnagrostis filiformis*, *Paspalum scrobiculatum*\*, *Ischaemum australe*, *Cynodon dactylon* (L2), *Eriochloa procerum*, *Paspalum dilatatum*\*, *Paspalidium distans*, *Diplachne fusca*, *Oplismenus aemulus*, *Paspalidium gracile*, *Paspalum vaginatum*.

**Ferns:** *Acrostichum speciosum*, *Pteridium esculentum*, *Hypolepis muelleri* (L1), *Cyclosorus interruptus*.

**Sedges and rushes:** *Juncus kraussii* subsp. *australiensis* (L1), *Gahnia clarkei* (L1), *Eleocharis equisetina* (L1), *Cyperus polystachyos*, *Triglochin striatum*, *Cladium procerum* (M1), *Fimbristylis ferruginea*, *Carex appressa*, *Lomandra longifolia*, *Triglochin procerum*, *Carex maculata* (L1), *Cyperus trinervis*, *Baumea articulata*, *Cyperus stradbrogensis*, *Fimbristylis tristachya*.

**Herbs and shrubs:** *Viola banksii* (L1), *Enydra fluctuans* (L1), *Asparagus aethiopicus*\* (L1), *Alternanthera denticulata*, *Bacopa monnieri* (L1), *Lobelia anceps*, *Crinum pedunculatum* (M1), *Commelina cyanea* (L1), *Leptinella longipes*, *Eclipta platyglossa*, *Goodenia paniculata*, *Hydrocotyle acutiloba*, *Oxalis radicata*\*, *Pratia purpurascens*, *Tetragonia tetragonioides*, *Apium prostratum* (L1), *Dianella caerulea*, *Emilia sonchifolia*, *Homalanthus populifolius*, *Rumex brownii*\*.

**Number of native species:** 82

**Number of taxa per site:** 16–45 (mean 23 ± 10)

**Number of exotic taxa:** 21

## Indicator native taxa

Species	Group score	Group freq	Non-group score	Non-group freq	Fidelity class
<i>Casuarina glauca</i>	3	100%	3	20%	positive
<i>Melaleuca quinquenervia</i>	3	89%	3	38%	positive
<i>Parsonsia straminea</i>	2	89%	1	43%	positive
<i>Phragmites australis</i>	2	67%	2	6%	positive
<i>Elydra fluctuans</i>	2	56%	2	6%	positive
<i>Juncus kraussii</i>	2	56%	4	5%	positive
<i>Viola banksii</i>	2	56%	2	18%	positive
<i>Zoysia macrantha</i>	3	56%	4	4%	positive
<i>Leptinella longipes</i>	2	22%	0	0%	positive
<i>Diplachne fusca</i>	1	11%	0	0%	positive
<i>Emilia sonchifolia</i>	1	11%	0	0%	positive
<i>Fimbristylis tristachya</i>	1	11%	0	0%	positive



## Community 5 Milky Mangrove–Swamp Oak–Grey Mangrove King-Tide Forest

**Scientific name:** Milky Mangrove (*Excoecaria agallocha*), Swamp Oak (*Casuarina glauca*), Grey Mangrove (*Avicennia marina* subsp. *australasica*) with Mangrove Fern (*Acrostichum speciosum*) and Common Reed (*Phragmites australis*) King-tide Forest.

**Sites:** (6) BIL03LSRH, TWE14estsswp, TWE26labk, MUR02allv, WAR16estch, MUR03albk.

### Equivalent communities

Saline Wetlands-Mangrove (Keith 2006); Qld Regional Ecosystem 12.1.3 Mangrove Shrubland to low closed forest (Young and Dillewaard 1999); 602 – Mangrove Low Closed Forest (Kingston *et al.* 2004); MSO – Grey Mangrove–River Mangrove–Swamp Oak (Landmark Ecological Services 1999); 40151 – *Casuarina glauca*–*Avicennia marina* subsp. *australasica* NPWS NSW Coastal Vegetation (Griffith and Wilson 2007); Forest Ecosystem 77 – Mangrove (NPWS 1999).

### Description

An open forest community dominated by Milky Mangrove (*Excoecaria agallocha*), Grey Mangrove (*Avicennia marina* subsp. *australasica*) and Swamp Oak (*Casuarina glauca*). River Mangrove (*Aegiceras corniculatum*) is an occasional associate. The mid-layer is an open to closed cover of Milky Mangrove, *Myoporum acuminatum*, and Mangrove Fern (*Acrostichum speciosum*). The lower layer is sparse to dense, and comprises Mangrove Fern, sedges (*Fimbristylis ferruginea*), Water Ribbons (*Triglochin striatum*), Common Reed (*Phragmites australis*) and herbs (*Apium prostratum*). *Sesuvium portulacastrum* was abundant in one site (TWE26albk), and was recorded at only one other site in the survey, with low cover abundance.



### Distribution and Habitat

**Habitat:** Alluvial backswamps and levees of the Tweed River, with an outlying site on a swampy estuarine channel on the Tuckean Broadwater. Occurs at the inland limit of tidal influence within the mangrove zone.

**Disturbance:** Light to severe infestation by weeds, and light grazing.

**Example locations:** Sites at Piggabeen Road, Cobaki Broadwater; Charles Bay, Terranora Broadwater; Stotts River; and a disjunct site at Tuckean Broadwater.

### Conservation

**Threats:** Clearing, grazing and weed invasion.

**Conservation status:** The conservation status of this community is poorly known. Milky Mangrove occurs sporadically in NSW (Keith 2006) and is uncommon on the north coast, occurring from about Warrell Creek

northwards. In Ballina Nature Reserve, Griffith (2005) recorded an association of Swamp Oak and Grey Mangrove, which included an undestorey of Milky Mangrove. The reservation status of this community is assessed as poor. Floodplain occurrences should be considered as an EEC. By broad definition, the community might be considered as a component of the Swamp Oak floodplain forest EEC.

**Significant taxa:** None recorded.

## Structure

Layer	Height (m)	Cover (%)
Emergent	5–22	20
Tallest	2–25	20–70
Middle 1	0–12	10–80
Middle 2	0.5–2	20
Lower 1	0–2	5–80

## Floristics

**Trees:** *Excoecaria agallocha* (T), *Casuarina glauca* (E), *Avicennia marina* subsp. *australasica* (E), *Aegiceras corniculatum* (T), *Bruguiera gymnorrhiza*.

**Shrubs and small trees:** *Myoporum acuminatum* (T), *Hibiscus tiliaceus* (M1), *Cupaniopsis anacardioides* (M1), *Baccharis halimifolia*\*, *Lantana camara*\* (M1), *Callistemon salignus*, *Ficus macrophylla*, *Ficus virens* var. *sublanceolata*, *Senna pendula* var. *glabrata*\*.

**Climbers:** *Ipomoea cairica*\*, *Cynanchum carnosum*, *Parsonsia straminea*, *Passiflora suberosa*\*, *Solanum seaforthianum*\*.

**Epiphytes:** *Dendrobium linguiforme*, *Psilotum nudum*, *Pyrrosia rupestris*.

**Mistletoes:** *Amyema cambagei*, *Notothixos subaureus*.

**Grasses:** *Phragmites australis* (M1), *Sporobolus virginicus* var. *minor* (L1), *Oplismenus aemulus*, *Ottlochloa gracillima* (L1), *Cynodon dactylon*.

**Ferns:** *Acrostichum speciosum*.

**Sedges and rushes:** *Fimbristylis ferruginea* (L1), *Triglochin striatum* (L1), *Bolboschoenus caldwellii*, *Eleocharis acuta*, *Carex appressa*, *Isolepis inundata*.

**Herbs and shrubs:** *Apium prostratum* (L1), *Triglochin striatum*, *Suaeda australis* (L1), *Einadia hastata* (L1), *Bacopa monnieri* (L1), *Enydra fluctuans*, *Tetragonia tetragonioides*, *Sesuvium portulacastrum* (L1), *Lilaeopsis polyantha* (L1), *Aster subulatus*\*, *Cotula coronopifolia*\*, *Commelina cyanea*, *Crinum pedunculatum*, *Dianella caerulea*.

**Number of native taxa:** 45

**Number of taxa per site:** 12–67 (mean 29 ± 20)

**Number of exotic taxa:** 9

## Indicator native taxa

Species	Group score	Group frequency	Non-group score	Non-group frequency	Fidelity class
<i>Acrostichum speciosum</i>	4	100%	2	5%	Positive
<i>Aegiceras corniculatum</i>	2	67%	4	5%	Positive
<i>Apium prostratum</i>	4	67%	2	1%	Positive
<i>Avicennia marina</i>	4	67%	4	5%	Positive
<i>Bacopa monnieri</i>	2	50%	2	2%	positive
<i>Casuarina glauca</i>	3	100%	3	21%	Positive
<i>Cynanchum carnosum</i>	2	50%	2	2%	positive
<i>Einadia hastata</i>	2	50%	2	1%	positive
<i>Excoecaria agallocha</i>	4	100%	3	3%	Positive
<i>Fimbristylis ferruginea</i>	3	83%	2	1%	Positive
<i>Lilaeopsis polyantha</i>	2	17%	0	0%	positive
<i>Myoporum acuminatum</i>	2	50%	2	2%	positive
<i>Phragmites australis</i>	2	67%	2	7%	positive
<i>Trigrochlin striatum</i>	2	67%	2	1%	positive

## Community 6 Swamp Oak–Hoop Pine–Tuckeroo Swamp Sclerophyll/ dry 'gallery' Floodplain Rainforest

**Scientific name:** Swamp Oak (*Casuarina glauca*), Hoop Pine (*Araucaria cunninghamii*) and Tuckeroo (*Cupaniopsis anacardioides*) Swamp Sclerophyll/Dry 'Gallery' Floodplain Rainforest.

**Sites:** (1) BIL09albk.

### Equivalent communities

Forested Wetlands-Coastal Floodplain Wetlands, and Rainforest-Dry 'Gallery' Rainforest (Keith 2006); 101 – Littoral Rainforest, 104 – Lowland Rainforest on floodplain, and 601 – Swamp She-oak Forest to Woodland (Kingston *et al.* 2004); Suballiance 3 – *Cryptocarya obovata*–*Dendrocnide excelsa*–*Ficus* spp. *Araucaria*, and Suballiance 17 – *Cupaniopsis anacardioides* (Floyd 1990); FE168 – Rainforest (NPWS 1999).

### Description

This is a mesic community occurring on the upper edge of Community 5. It is an open forest community dominated by Swamp Oak (*Casuarina glauca*), Hoop Pine (*Araucaria cunninghamii*) and Tuckeroo (*Cupaniopsis anacardioides*), with a closed mid-storey including Tuckeroo, Cottonwood Hibiscus (*Hibiscus tiliaceus*) and *Myoporum acuminatum*. Associated small trees include Small-leaved Tuckeroo (*Cupaniopsis parvifolia*), Rusty Fig (*Ficus rubiginosa*) and Foambark Tree (*Jagera pseudorhus* var. *pseudorhus* forma *pseudorhus*). The lower layer consists of *Emadia hastata* and the exotic species *Asparagus plumosus* and Rhode's Grass (*Chloris gayana*).

### Distribution and Habitat

**Habitat:** A lower slope site with a mixture sedimentary derived and estuarine soil characteristics. The presence of Swamp Oak suggests a saline soil influence.

**Disturbance:** The site is disturbed by weeds and had been lightly burnt 20–50 years previously.

**Location:** Recorded at mouth of Cobaki Creek, Cobaki Broadwater.

### Conservation

**Threats:** Weed infestation and land clearing.

**Conservation status:** Contains components of both Swamp Oak Floodplain Forest and Dry 'Gallery' Rainforest/Subtropical coastal floodplain forest EECs. Probably poorly reserved and under considerable threat on the alluvial plain.

**Significant taxa:** None recorded.

### Structure

Layer	Height (m)	Cover (%)
Tallest	15–20	60
Middle 1	2–8	70
Lower 1	0–1	50

### Floristics

**Trees:** *Araucaria cunninghamii* (T), *Casuarina glauca* (T).

**Shrubs and small trees:** *Cupaniopsis anacardioides* (M1), *Hibiscus tiliaceus* (M1), *Cupaniopsis parvifolia*, *Myoporum acuminatum* (M1), *Ficus rubiginosa*, *Jagera pseudorhus* var. *pseudorhus* forma *pseudorhus*, *Lantana camara*\*, *Sida rhombifolia*\*.

**Climbers:** *Parsonsia straminea*, *Passiflora suberosa*\*, *Cynanchum carnosum*, *Ipomoea cairica*\*.

**Epiphytes:** *Pyrrosia rupestris*, *Platynerium superbum*.

**Grasses** *Chloris gayana*\* (L1), *Sporobolus virginicus*.

**Herbs and shrubs:** *Einadia hastata* (L1), *Asparagus plumosus*\* (L1), *Sonchus oleraceus*\*, *Tetragonia tetragonioides*.

**Number of native species:** 17                      **Number of taxa per site:** 17

**Number of exotic taxa:** 6

### Indicator native taxa

Species	Group score	Group frequency	Non-group score	Non-group frequency	Fidelity class
<i>Araucaria cunninghamii</i>	3	100%	2	6%	positive
<i>Casuarina glauca</i>	3	100%	3	22%	positive
<i>Cupaniopsis anacardioides</i>	4	100%	1	34%	positive
<i>Cupaniopsis parvifolia</i>	2	100%	1	5%	positive
<i>Cynanchum carnosum</i>	2	100%	2	3%	positive
<i>Einadia hastata</i>	3	100%	2	1%	positive
<i>Ficus rubiginosa</i>	2	100%	1	1%	positive
<i>Hibiscus tiliaceus</i>	4	100%	2	3%	positive
<i>Myoporum acuminatum</i>	2	100%	2	2%	positive
<i>Parsonsia straminea</i>	2	100%	1	44%	positive
<i>Pyrrosia rupestris</i>	2	100%	2	3%	positive
<i>Tetragonia tetragonioides</i>	2	100%	2	1%	positive



## Community 7 Prickly Couch–Sea Rush–*Schoenoplectus subulatus* saltmarsh

**Scientific name:** Prickly Couch (*Zoysia macrantha*), Sea Rush (*Juncus kraussii* subsp. *australiensis*) and *Schoenoplectus subulatus* Open to Closed Tussock Grassland/Sedgeland/Rushland

**Sites:** (5) BALL14estcbb, WOO20estcbb, WOO02estss, WOO25estch, WOO14estss.

### Equivalent communities

Saline Wetlands-Saltmarshes (Keith 2006); Qld Regional Ecosystem 12.1.2 Saltpan Vegetation (Young and Dillewaard 1999); S2 – *Juncus kraussii* tall to very tall closed Rushland (Pressey and Griffith 1992); 603 – Saltmarsh Communities (Kingston *et al.* 2004); Sedgeland (S) *Schoenoplectus subulatus* (Griffith 2007); *Zoysia macrantha* tussock grassland (Adam *et al.* 1988). Combinations of *Juncus kraussii*, *Zoysia macrantha* with *Schoenoplectus subulatus* are rarely documented in the literature.

### Description

Four of the five sites of this community (WOO02estss, WOO14estss, WOO20estcbb, WOO25estch) are low grassland–sedgeland communities with trees absent or emergent; *Schoenoplectus subulatus* is abundant and Prickly Couch (*Zoysia macrantha*) is always present. These sites are geographically separated from the remaining site (BALL14estcbb), which may be more appropriately classified into Community 62. This site has a tall, emergent layer of River Mangrove (*Aegiceras corniculatum*), Black Mangrove (*Bruguiera gymnorrhiza*) and Grey Mangrove (*Avicennia marina* subsp. *australasica*).



### Distribution and Habitat

**Habitat:** Very low-lying sites subject to saline tidal influences in estuarine channels and saline swamps on the floodplain of Evans River and North Creek. Griffith (2007) records a sedgeland unit with a component dominated by *Schoenoplectus subulatus* in the Wallis Lake Catchment.

**Disturbance:** Light to moderate grazing.

**Example locations:** Tuckombil, South Bank on the Evans River, and Sawpit Creek on the Evans River.

### Conservation

**Conservation status:** The reservation status of *Zoysia macrantha* tussock grasslands and *Juncus kraussii* subsp. *australiensis* rushland on the north coast of NSW has been assessed as fair (Griffith 2005). The reservation status of *Schoenoplectus littoralis* (= *s. subulatus*) sedgeland was assessed as poor (Griffith 2005). *Juncus kraussii* rushlands are reserved in Broadwater NP, Bundjalung NP and Yuraygir NP.

**Threats:** Grazing, draining, clearing.

**Significant taxa:** None recorded.

## Structure

Layer	Height (m)	Cover (%)
Emergent	1–2	2
Tallest	3–5	3
Lower 1	0–1	40–75
Lower 2	0–0.3	25–40

## Floristics

**Trees:** *Casuarina glauca* (E), *Aegiceras corniculatum* (E), *Bruguiera gymnorrhiza* (T).

**Shrubs and small trees:**

**Climbers:** *Cynanchum carnosum*

**Mistletoes:** *Amyema cambagei*.

**Ground Cover:**

**Grasses** *Zoysia macrantha* (L1).

**Sedges and rushes:** *Juncus kraussii* subsp. *australiensis* (L1), *Schoenoplectus subulatus*.

**Herbs and shrubs:** None recorded.

**Number of native species:** 9      **Number of taxa per plot:** 2–4 (mean  $3 \pm 1$ )

**Number of exotic taxa:** 0

## Indicator native taxa

Species	Group score	Group frequency	Non-group score	Non-group frequency	Fidelity class
<i>Juncus kraussii</i>	6	100%	3	5%	positive
<i>Samolus repens</i>	2	20%	0	0%	positive

## Community 8 Swamp Oak king-tide swamp sclerophyll forest

**Scientific name:** Swamp Oak (*Casuarina glauca*) with Sea Rush (*Juncus kraussii*), Prickly Couch (*Zoysia macrantha*) and Mat Grass (*Hemarthria uncinata*) Swamp Sclerophyll King Tide Forest.

**Sites:** (4) BYR03cbrdg, BYR39cbdne, BYR26estsswp, TWE09estsswp.

### Equivalent communities

Forested Wetlands-Coastal Swamp Forests, and Saline Wetlands-Mangroves (Keith 2006); Qld Regional Ecosystem 12.1.1 *Casuarina glauca* ± *Melaleuca quinquenervia* open forest on estuarine deposits (Young and Dillewaard 1999); 601 – Swamp She-oak Closed Forest to Woodland (Kingston *et al.* 2004); F10 – *Casuarina glauca* tall to very tall open to closed forest (Pressey and Griffith 1992); 4005 – *Casuarina glauca* Swamp Sclerophyll Forest and Woodland (Griffith & Wilson 2007); Grey Mangrove–River Mangrove–Swamp Oak (MSO) (Landmark Ecological Services 1999); North-east NSW Forest Ecosystem 143 – Swamp Oak (NPWS 1999).

### Description

An open to closed forest of Swamp Oak (*Casuarina glauca*), with a mid- to lower layer of Common Reed (*Phragmites australis*), Sea Rush (*Juncus kraussii* subsp. *australiensis*), Mangrove Fern (*Acrostichum speciosum*) and Prickly Couch (*Sporobolus virginicus*) and Matgrass (*Hemarthria uncinata*).

### Distribution and Habitat

**Habitat:** The littoral zone inland of the mangrove and saltmarsh zone on saline inter-barrier creek deposits mixed with adjoining Pleistocene sands.

**Disturbance:** Little evidence of disturbance, though one site had been lightly burnt and some weeds were present.

**Locations:** Sites at Skinners Shoot; Belongil Swamp in Tyagarah NR; Brunswick Heads; and Ukerebagh NR.

### Conservation

**Conservation status:** Reserved in Tweed Estuary NR, Ukerebagh NR, Cudgen NR, Billinudgel NR, Brunswick Heads NR, Cumbebin Swamp NR, Ballina NR and Richmond River NR.

**Threats:** Burning, grazing and clearing.

**Significant taxa:** None recorded.



## Structure

Layer	Height (m)	Cover (%)
Tallest	5–40	30–70
Middle 1	0.5–2	30
Lower 1	0–1	90–100
Lower 2	0–0.5	20

## Floristics

**Trees:** *Casuarina glauca* (T), *Aegiceras corniculatum* (T).

**Shrubs and small trees:** *Senna pendula* var. *glabrata*\* (M1).

**Climbers:** *Parsonsia straminea*, *Cynanchum carnosum*, *Marsdenia rostrata*.

**Mistletoes:** *Notothixos subaureus*.

**Grasses:** *Hemarthria uncinata* (L1), *Phragmites australis* (M1), *Ischaemum australe*.

**Ferns:** *Acrostichum speciosum* (L1).

**Sedges and rushes:** *Juncus kraussii* subsp. *australiensis* (L1), *Baumea juncea* (L1).

**Herbs and shrubs:** *Sarcocornia quinqueflora* subsp. *quinqueflora* (L1), *Bacopa monnieri*, *Mitrasacme alsinoides*.

**Number of native species:** 21      **No of taxa per plot:** 9–13 (mean 9 ± 3)

**Number of exotic taxa:** 2

## Indicator native taxa

Species	Group score	Group frequency	Non-group score	Non-group frequency	Fidelity class
<i>Acrostichum speciosum</i>	3	80%	2	5%	positive
<i>Casuarina glauca</i>	4	100%	3	21%	positive
<i>Hemarthria uncinata</i>	3	100%	2	3%	positive
<i>Juncus kraussii</i>	6	100%	3	5%	positive
<i>Mitrasacme alsinoides</i>	1	20%	0	0%	positive
<i>Samolus repens</i>	2	20%	0	0%	positive

## Community 9 Sea Rush–Mat Grass Saltmarsh

**Scientific Name:** Sea Rush (*Juncus kraussii*) and Mat Grass (*Hemarthria uncinata*) Saltmarsh.

**Sites:** (3) BYR27estsswp, BYR28estsswp, TWE20esttdf.

### Equivalent communities

Saline Wetlands-Saltmarshes (Keith 2006); Qld Regional Ecosystem 12.1.2 Saltpan Vegetation (Young and Dillewaard 1999); S2 – *Juncus kraussii* tall to very tall closed Rushland (Pressey and Griffith 1992); 603 – Saltmarsh Communities (Kingston *et al.* 2004); *Juncus kraussii*–*Sporobolus virginicus* community (Adam *et al.* 1988). An association between *Juncus kraussii* and *Hemarthria uncinata* was recorded in a *Baumea juncea*–*Juncus kraussii* community from the Lane Cove River (Adam *et al.* 1988).

### Description

A community with a dense ground layer of Sea Rush (*Juncus kraussii*), Mat Grass (*Hemarthria uncinata*) and saltmarsh species such as *Sarcocornia quinqueflora* subsp. *quinqueflora* and Saltwater Couch (*Sporobolus virginicus*).

### Distribution and Habitat

**Habitat:** Low-lying estuarine saline swamps fringing a tidal delta flat adjacent to mangroves on the Tweed River.

**Disturbance:** There was no evidence of disturbance at these sites.

**Example Locations:** Belongil Creek and Ukerebagh NR.



### Conservation

**Conservation status:** Reserved in Ukerebagh NR. Saline grasslands and saltmarshes are often of restricted occurrence and have been heavily affected by filling and coastal development.

**Threats:** Clearing, sedimentation and grazing.

**Significant taxa:** None recorded.

### Structure

Layer	Height (m)	Cover (%)
Emergent	2–8	5
Lower 1	0–1.5	100

### Floristics

**Trees:** *Casuarina glauca* (E), *Aegiceras corniculatum* (E).

**Grasses** *Sporobolus virginicus* (L1), *Hemarthria uncinata* (L1).

**Sedges and rushes:** *Juncus kraussii* subsp. *australiensis*.



Herbs and shrubs: *Sarcocornia quinqueflora* subsp. *quinqueflora* (L1).

Number of native species: 20      No of taxa per plot: 2–8 (mean  $5 \pm 3$ )

Number of exotic taxa: 0

### Indicator native taxa

Species	Group score	Group frequency	Non-group score	Non-group frequency	Fidelity class
<i>Acrostichum specoosum</i>	3	80%	2	5%	positive
<i>Casuarina glauca</i>	4	100%	3	21%	positive
<i>Hemarthria uncinata</i>	3	100%	2	3%	positive
<i>Juncus kraussii</i>	6	100%	3	5%	positive
<i>Mitrasacme alsinoides</i>	1	20%	0	0%	positive
<i>Samolus repens</i>	2	20%	0	0%	positive

## Group 2–Freshwater, seasonally/permanently inundated soils

### Community 10 Broad-leaved Paperbark–Swamp Oak–fern/sedge Swamp Sclerophyll Forest

**Scientific name:** Broad-leaved Paperbark (*Melaleuca quinquenervia*) and Swamp Oak (*Casuarina glauca*) with Swamp Water Fern (*Blechnum indicum*) and *Carex apressa* Swamp Sclerophyll Forest.

**Sites:** (5) BALL03ESBB, BALL04ESTSS, BALL05ESTB, WOO06albk, WAR37cbrdg.

#### Equivalent communities

Forested Wetlands-Coastal Swamp Forests, and Coastal Floodplain Wetlands (Keith 2006); Qld Regional Ecosystem 12.1.1 *Casuarina glauca* ± *Melaleuca quinquenervia* open forest on estuarine deposits (Young and Dillewaard 1999); F8 – *Melaleuca quinquenervia* tall to very tall open to closed forest, and F10 – *Casuarina glauca* tall to very tall open to closed forest (Pressey and Griffith 1992); NPWS Coastal Vegetation 40031/2 *Melaleuca quinquenervia* swamp sclerophyll forest and woodland, 40051/2 *Casuarina glauca* forest and woodland, and 40991/2 Mixed stands of *Melaleuca quinquenervia*–*Casuarina glauca* NPWS NSW Coastal Vegetation (Griffith and Wilson 2007); 402 – Broad-leaved Paperbark/Swamp She-Oak Closed Forest to Woodland (Kingston *et al.* 2004); North-east NSW Forest Ecosystems 112 Paperbark, and 143 Swamp Oak (NPWS 1999).

#### Description

A tall open forest dominated by Broad-leaved Paperbark (*Melaleuca quinquenervia*) and Swamp Oak (*Casuarina glauca*). A sparse middle layer of small trees, including Blue Lilly Pilly (*Syzygium oleosum*), Camphor Laurel (*Cinnamomum camphora*) and *Guioa semiglauc*a was present at only one site (BALL04ESTSS). The lower layer consists of an open to dense layer of Swamp Water Fern (*Blechnum indicum*) and River Lily (*Crinum pedunculatum*). Sites BALL03ESSW and BALL05ESTB had a dense cover of *Azolla filiculoides*.



#### Distribution and Habitat

**Habitat:** Located on the estuarine plain in low-lying, very wet saline sites around Ballina; one site was located on an alluvial backswamp.

**Disturbance:** Light disturbance from weeds in all sites and from fire at one (BALL05ESTB).

**Example locations:** Tuckombil, Ballina Airport, Ballina sewage treatment plant, and south of Lennox Head.

## Conservation

**Threats:** Clearing, grazing and weed invasion.

**Conservation status:** Occurrences of this community on the alluvial plain are examples of the 'Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions' EEC. The surveyed sites for Community 10 were not reserved. Floodplain occurrences of both Broad-leaved Paperbark and Swamp Oak Forests communities are poorly reserved (Griffith 2005). In the study area, floodplain occurrences of Broad-leaved Paperbark are reserved at Stotts Island NR, Tuckean NR, Bungawalbyn NR, Yarringly SCA and Broadwater NP. Estuarine occurrences of Broad-leaved Paperbark are better represented in reserves, for example at Ballina NR, Bundjalung NP, Iluka NR, and Cudgen NR.



**Significant taxa:** *Cladium procerum*.

## Structure

Layer	Height (m)	Cover (%)
Tallest	18–35	20–40
Middle 1	0.5–10	5–15
Lower 1	0–1	15–70
Lower 2	0–0.3	20

## Floristics

**Trees:** *Melaleuca quinquenervia* (T), *Casuarina glauca* (T), *Archontophoenix cunninghamiana*, *Lophostemon suaveolens*, *Melaleuca alternifolia*, *Ficus macrophylla*, *Ficus watkinsiana*, *Litsea australis*.

**Shrubs and small trees:** *Cinnamomum camphora*\* (M1), *Glochidion ferdinandi*, *Callistemon salignus* (T), *Cupaniopsis anacardioides*, *Elaeocarpus obovatus*, *Guioa semiglaucata* (M1), *Acacia melanoxylon*, *Syzygium oleosum* (M1), *Baccharis halimifolia*\*, *Commersonia bartramia*, *Duboisia myoporoides*, *Glochidion sumatranum*, *Jagera pseudorhus* var. *pseudorhus* forma *pseudorhus*, *Lantana camara*\*, *Myrsine howittiana*.

**Climbers:** *Parsonsia straminea* (T), *Ipomoea cairica*\*, *Lygodium microphyllum*, *Smilax australis*, *Hibbertia scandens*, *Marsdenia rostrata*, *Morinda jasminoides*.

**Epiphytes:** *Platycerium superbum*, *Platycerium bifurcatum*, *Psilotum nudum*, *Pyrrosia confluens* var. *confluens*.

**Grasses:** *Phragmites australis* (M1), *Paspalum conjugatum*\* (M1), *Cynodon dactylon*, *Imperata cylindrica* var. *major*, *Panicum bisulcatum*.

**Ferns:** *Blechnum indicum* (M1), *Azolla filiculoides* (L1), *Hypolepis muelleri*, *Asplenium australasicum* f. *australasicum*.

**Sedges and rushes:** *Carex appressa* (M1), *Baumea articulata*, *Cyperus lucidus* (L1), *Schoenoplectus subulatus*, *Bolboschoenus fluviatilis*, *Cladium procerum*, *Cyperus trinervis*, *Schoenoplectus mucronatus*.

**Herbs and shrubs:** *Enydra fluctuans*, *Persicaria dichotoma*, *Persicaria strigosa* (L1), *Crinum pedunculatum* (L1), *Commelina benghalensis*\*, *Commelina cyanea*, *Dianella caerulea*, *Hydrocotyle verticillata*, *Eclipta prostrata*, *Persicaria orientalis*, *Triglochin multifructum*.

Number of native taxa: 59

Number of taxa per site: 13–31 (mean 24 ± 8)

Number of exotic taxa: 8

### Indicator native taxa

Species	Group score	Group frequency	Non-group score	Non-group frequency	Fidelity class
<i>Azolla filiculoides</i>	4	50%	0	0%	positive
<i>Baumea articulata</i>	2	50%	1	3%	positive
<i>Blechnum indicum</i>	4	100%	2	16%	positive
<i>Bolboschoenus fluviatilis</i>	1	25%	0	0%	positive
<i>Carex appressa</i>	2	100%	2	5%	positive
<i>Casuarina glauca</i>	3	50%	3	22%	positive
<i>Enydra fluctuans</i>	3	100%	2	6%	positive
<i>Hypolepis muelleri</i>	2	50%	2	16%	positive
<i>Lygodium microphyllum</i>	2	50%	2	6%	positive
<i>Melaleuca quinquenervia</i>	3	100%	3	39%	positive
<i>Parsonsia straminea</i>	3	100%	1	44%	positive
<i>Persicaria dichotoma</i>	2	100%	2	3%	positive
<i>Persicaria strigosa</i>	2	75%	2	6%	positive
<i>Phragmites australis</i>	3	50%	2	7%	positive
<i>Platynerium superbum</i>	2	50%	1	8%	positive
<i>Schoenus mucronatus</i>	1	25%	0	0%	positive
<i>Triglochin multifructum</i>	1	25%	0	0%	positive



## Community 11 Broad-leaved Paperbark–Pink-flowered Doughwood Swamp Sclerophyll Open Forest

**Scientific name:** Broad-leaved Paperbark (*Melaleuca quinquenervia*), Pink-flowered Doughwood (*Melicope elleryana*) and Harsh Ground Fern (*Hypolepis muelleri*) Swamp Sclerophyll Open forest.

**Sites:** (6) BRU33cbbbf, BRU34cbbbf, POT12alfan, CUD15esttdf, WAR01ALFL, WAR04alsw.

### Equivalent communities

Wetlands-Coastal Swamp Forests, and Coastal Floodplain Wetlands (Keith 2006); Qld Regional Ecosystems 12.2.7 *Melaleuca quinquenervia* open forest to woodland on Quaternary sands, and 12.3.5 *Melaleuca quinquenervia* on alluvium (Young and Dillewaard 1999); 401 – Broad-leaved Paperbark Closed Forest to Woodland (Kingston *et al.* 2004); F8 – *Melaleuca quinquenervia* tall to very tall open to closed forest (Pressey and Griffith 1992); 40031/2 *Melaleuca quinquenervia* forest and woodland (Griffith and Wilson 2007); Paperbark(PB) (Landmark Ecological Services, 1999); North-east NSW Forest Ecosystem 112 Paperbark (NPWS 1999).

### Description

A tall, open to closed forest structure dominated by Broad-leaved Paperbark (*Melaleuca quinquenervia*). The community has an open to dense mid-layer with Pink-flowered Doughwood (*Melicope elleryana*) being particularly abundant; associated trees include Cabbage Tree Palm (*Livistonia australis*), Lilly Pilly (*Acmena smithii*), Bangalow Palm (*Archontophoenix cunninghamiana*) and Willow Bottlebrush (*Callistemon salignus*). The open lower layer comprises a dense cover of Rough Ground Fern (*Hypolepis muelleri*), Swamp Water Fern (*Blechnum indicum*), River Lily (*Crinum pedunculatum*), *Cyperus lucidus* and *Viola banksii*. The climber Common Silkpod (*Parsonsia straminea*) is present and common in most sites. Smart Weed (*Persicaria strigosa*) is also frequent in the ground layer. In the overstorey, Community 11 differs from the closely related Community 12 in the high cover abundance of Pink-flowered Doughwood (*Melicope elleryana*), the presence of Cabbage Tree Palm and the low cover abundance of Swamp Oak (*Casuarina glauca*). Other differences between these two communities include the presence or higher cover abundances of the shrub *Acmena smithii*, the sedge *Cyperus lucidus*, Swamp Rice Grass (*Leersia hexandra*), the grass *Ischaemum australe* and species of climbing plants.



### Distribution and Habitat

**Habitat:** A group of slightly more elevated sites with limited tidal influence, located on the alluvial floodplain of the Evans River and Bingal Creek and waterlogged sandy backbarrier flats on Simpsons Creek, at Tyagarah. The community is also found on the upper limit of the alluvial plain immediately downslope of sedimentary parent material. This community often occurs in association with Community 10 at slightly higher elevations with respect to the water table, enabling colonisation by rainforest species, such as Pink-flowered Doughwood and *Acmena smithii*.

**Disturbance:** There was no evidence of disturbance at three sites (BRU33cbbbf, BRU34cbbbf, WAR04alsw). One



site (WAR01ALFL) had been lightly grazed, and another two (POT12alfan, CUD15esttdf) had been subject to moderate levels of clearing and had a moderate degree of weed invasion.

**Example locations:** Simpsons Creek at Tyagarah, Bagotville, Lumleys Lane at Wardell, Cudgen NR and Billinudgel NR.

## Conservation

**Threats:** Clearing, grazing and weed invasion.

**Conservation status:** Occurrences of this community on the alluvial plain are examples of 'Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions' EEC. Two of the sample sites were within Cudgen NR and Billinudgel NR. Floodplain occurrences of Broad-leaved Paperbark are poorly reserved (Griffith 2005). In the study area, floodplain occurrences of Broad-leaved Paperbark are reserved at Stotts Island NR, Tuckean NR, Bungawalbyn NR, Yarringlyully SCA, and Broadwater NP. Estuarine and coastal barrier sand occurrences of Broad-leaved Paperbark are better represented in reserves.

**Significant taxa:** *Cladium procerum*, *Cordyline congesta* (ROTAP: 2RC-).

## Structure

Layer	Height (m)	Cover (%)
Tallest	15–35	30–70
Middle 1	2–15	5–80
Lower 1	0–2	20–50
Lower 2	0–0.5	20–30

## Floristics

**Trees:** *Melaleuca quinquenervia* (T), *Melicope elleryana* (T), *Livistona australis* (T), *Archontophoenix cunninghamiana*, *Eucalyptus propinqua* (T), *Lophostemon suaveolens*, *Glochidion sumatranum* (T), *Casuarina glauca* (T), *Symplocos thwaitesii* (M1), *Ficus watkinsiana*.

**Shrubs and small trees:** *Acmena smithii* (M1), *Callistemon salignus*, *Cupaniopsis anacardioides*, *Ficus coronata* (M1), *Myrsine howittiana* (M1), *Maclura cochinchinensis*, *Cinnamomum camphora*\*, *Glochidion ferdinandi*, *Acacia melanoxylon*, *Elaeocarpus reticulatus*, *Endiandra discolor*, *Glochidion sumatranum*, *Pittosporum revolutum*, *Senna pendula* var. *glabrata*\*, *Diploglottis cunninghamii*, *Psychotria loniceroides*, *Rhodamnia rubescens*, *Rhodomyrtus psidioides*, *Cryptocarya microneura*.

**Climbers:** *Parsonsia straminea*, *Morinda jasminoides*, *Marsdenia rostrata*, *Geitonoplesium cymosum*, *Lygodium microphyllum*, *Stephania japonica* var. *discolor*, *Passiflora suberosa*\*, *Smilax australis*, *Mucuna gigantea*, *Ipomoea cairica*\*.

**Epiphytes:** *Dendrobium linguiforme*.

**Grasses:** *Leersia hexandra* (L1), *Ottochloa gracillima*, *Phragmites australis*, *Axonopus compressus*\*, *Entolasia marginata*, *Oplismenus aemulus*, *Oplismenus undulatifolius* var. *mollis*.

**Ferns:** *Hypolepis muelleri* (L1), *Blechnum indicum* (L1), *Christella dentata*, *Calochlaena dubia*.

**Sedges and rushes:** *Cyperus lucidus* (L1), *Gahnia clarkei* (L1), *Carex breviculmis* (L1), *Lomandra hystrix* (L1), *Lomandra longifolia*, *Carex appressa* (L1), *Baumea articulata*, *Cladium procerum*, *Carex maculata*.

**Herbs and shrubs:** *Crinum pedunculatum* (L1), *Viola banksii* (L2), *Persicaria strigosa*, *Cordyline congesta*, *Alocasia brisbanensis*, *Dianella caerulea*, *Drymaria cordata* subsp. *cordata*, *Alternanthera denticulata*, *Commelina cyanea*, *Philydrum lanuginosum*, *Persicaria dichotoma*, *Cordyline rubra*, *Erechtites valerianifolia*\*.

**Number of native taxa:** 29

**Number of taxa per site:** 27–47 (mean 34 ± 10)

**Number of exotic taxa:** 7

## Indicator native taxa

Species	Group score	Group frequency	Non-group score	Non-group frequency	Fidelity class
<i>Archontophoenix cunninghamiana</i>	2	50%	2	25%	positive
<i>Blechnum indicum</i>	2	83%	2	16%	positive
<i>Cordyline congesta</i>	2	50%	1	13%	positive
<i>Crinum pedunculatum</i>	3	83%	1	4%	positive
<i>Cyperus lucidus</i>	4	50%	1	1%	positive
<i>Ficus coronata</i>	2	67%	2	13%	positive
<i>Hypolepis muelleri</i>	4	100%	2	15%	positive
<i>Melaleuca quinquenervia</i>	5	100%	3	38%	positive
<i>Melicope elleryana</i>	3	100%	2	18%	positive
<i>Morinda jasminoides</i>	3	50%	2	26%	positive
<i>Parsonsia straminea</i>	2	100%	1	44%	positive
<i>Persicaria strigosa</i>	2	67%	2	6%	positive
<i>Viola banksii</i>	3	67%	2	19%	positive

## Community 12 Broad-leaved Paperbark–Swamp Oak Ferny Swamp Sclerophyll Forest

**Scientific Name:** Broad-leaved Paperbark (*Melaleuca quinquenervia*) and Swamp Oak (*Casuarina glauca*) with Swamp Water Fern (*Blechnum indicum*) and Harsh Ground Fern (*Hypolepis muelleri*) Swamp Sclerophyll Open to Closed Forest.

**Sites:** (11) BALL07cbrdg, BALL08estsswp, BRU12cbdne, BYR23cbdne, BYR04estcl, BYR14lsrh, BYR22lsrh, BYR21alfan, BYR25estsswp, TWE31esttdf, BYR10estcl.

### Equivalent communities

Forested Wetlands-Coastal Swamp Forests, and Coastal Floodplain Wetlands (Keith 2006); Qld Regional Ecosystems 12.3.5 *Melaleuca quinquenervia* open forest on alluvium, and 12.2.7 *Melaleuca quinquenervia* open forest to woodland on Quaternary sands (Young and Dillewaard 1999); 401 – Broad-leaved Paperbark Closed Forest to Woodland, and 402 – Broad-leaved Paperbark/Swamp Sheoak Closed Forest to Woodland (Kingston *et al.* 2004); F8 – *Melaleuca quinquenervia* tall to very tall open to closed forest, and F10 *Casuarina glauca* tall to very tall open to closed forest (Pressey and Griffith 1992); 40031/2 *Melaleuca quinquenervia* forest and woodland, 40051/2 *Casuarina glauca* forest and woodland, and 40991/2 Mixed stands of *Melaleuca quinquenervia*–*Casuarina glauca* NPWS NSW Coastal Vegetation (Griffith and Wilson 2007); North-east NSW Forest Ecosystems 112 Paperbark and 143 Swamp Oak (NPWS 1999).

### Description

An open to closed forest structure in which Broad-leaved Paperbark (*Melaleuca quinquenervia*) clearly dominates but is frequently associated with Swamp Oak (*Casuarina glauca*) and occasionally associated with Swamp Mahogany (*Eucalyptus robusta*). A middle layer is characterised by Blackwood (*Acacia melanoxylon*), Pink-flowered Doughwood (*Melicope elleryana*) and Blueberry Ash (*Elaeocarpus reticulatus*). The climber *Parsonsia straminea* is very abundant in this community, as is the climbing fern *Lygodium microphyllum*. The lower layer has a high proportion of cover attributed to Swamp Water Fern (*Blechnum indicum*) and Harsh Ground Fern



(*Hypolepis muelleri*), and a number of common sedges and rushes including Twig Rush (*Baumea juncea*), *Baumea rubiginosa*, saw sedges (*Gahnia sieberiana*, *G. clarkei*), *Lepironia articulata* and Common Reed (*Phragmites australis*) and the grass *Entolasia marginata*. *Cladium procerum* was very abundant in the lower layer in site BYR10estcl. This community is closely related to Community 11. Overstorey differences between Communities 11 and 12 include the very high cover abundance of Broad-leaved Paperbark, the presence of Swamp Mahogany and the higher cover abundance of Swamp Oak in this community. Other differences include the presence or higher abundance of Blueberry Ash, Common Reed, the saw sedge *Gahnia sieberiana*, *Lepironia articulata*, *Entolasia marginata*, Swamp Millet (*Ischaemum australe*) and Climbing Fern (*Lygodium microphyllum*).

## Distribution and Habitat

**Habitat:** Located on waterlogged dune swales, backbarrier flats on Pleistocene dunes, estuarine tidal flats, and an alluvial channel adjacent to the Wardell Sandplain. This community is less elevated than Community 11, with estuarine and Pleistocene barrier sand influences.

**Disturbance:** There is light to moderate weed disturbance at most sites, and moderate to light fire disturbance at TWE31esttd and BALL07cbrdg. There is no evidence of disturbance at sites BYR10estcl and BYR04estcl.

**Example locations:** Piggabeen Road, Tweed Heads; New Brighton; Cumbebin NR; Ti Tree Cemetery Road; Bangalow Road; and Tandys Lane, Newybar.

## Conservation

**Threats:** Clearing, burning, grazing and weed infestation.

**Conservation status:** Occurrences of this community on the alluvial plain are examples of 'Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions' EEC. Site BRU12cbdne was within Marshalls Creek NR, and site BYR23cbdne was in Cumbebin Swamp NR. Floodplain occurrences of both Broad-leaved Paperbark and Swamp Oak Forests communities are poorly reserved (Griffith 2005). In the study area, floodplain occurrences of Broad-leaved Paperbark are reserved at Stotts Island NR, Tuckean NR, Bungawalbyn NR, Yarringly SCA and Broadwater NP.

**Significant taxa:** *Cordyline congesta* (ROTAP: 2RC-).

## Structure

Layer	Height (m)	Cover (%)
Tallest	6–30	50–80
Middle 1	1–20	15–50
Middle 2	0.5–2	40–60
Lower 1	0–2	10–90
Lower 2	0–1	40–70

## Floristics

**Trees:** *Melaleuca quinquenervia* (T), *Melicope elleryana* (M1), *Casuarina glauca* (T), *Glochidion sumatranum* (T), *Eucalyptus robusta* (T), *Archontophoenix cunninghamiana* (M1).

**Sub canopy trees:** *Glochidion sumatranum*, *Elaeocarpus reticulatus* (M1), *Acacia melanoxylon* (M1), *Cupaniopsis anacardioides*, *Guioa semiglaucula*, *Cinnamomum camphora*\*, *Elaeocarpus obovatus*, *Ficus macrophylla*, *Acmena smithii*.

**Shrubs:** *Senna pendula* var. *glabrata*\*, *Hibiscus diversifolius*, *Lantana camara*\*, *Leptospermum polygalifolium* (M1), \**Urena lobata*.

**Climbers:** *Parsonsia straminea* (T), *Lygodium microphyllum* (M1), *Marsdenia rostrata*, *Hibbertia scandens*, *Ipomoea cairica*\*, *Stephania japonica* var. *discolor*, *Eustrephus latifolius*.

**Mistletoes:** *Amyema congener* subsp. *congener*.

**Grasses:** *Entolasia marginata* (L1), *Phragmites australis* (L1), *Ischaemum australe* (L1), \**Paspalum conjugatum* (L1), *Imperata cylindrica* var. *major* (L1), \**Andropogon virginicus*, *Hemarthria uncinata*, *Ottocloa gracillima*.

**Ferns:** *Blechnum indicum* (L1), *Hypolepis muelleri* (L1), *Pteridium esculentum* (M2), *Cyclosorus interruptus*, *Histiopteris incisa*, *Christella dentata*, *Gleichenia dicarpa*.

**Sedges and rushes:** *Gahnia sieberiana* (M2), *Lepironia articulata*, *Gahnia clarkei* (M2), *Baumea teretifolia* (L1), *Baumea juncea*, *Baumea rubiginosa* (L1), *Cladium procerum* (L1), *Baloskion tetraphyllum* (L2), *Typha orientalis*, *Cyperus lucidus*.

**Herbs and shrubs:** *Viola banksii*, *Melastoma affine*, *Persicaria dichotoma*, *Persicaria strigosa*, *Centella asiatica*, *Persicaria hydropiper*, *Alternanthera denticulata*, *Enydra fluctuans*, *Goodenia paniculata*, *Lobelia anceps*.

Number of native species: 66                      Number of taxa per site: 9–54 (mean 22 ± 11)

Number of exotic taxa: 11

### Indicator native taxa

Species	Group score	Group frequency	Non-group score	Non-group frequency	Fidelity class
<i>Blechnum indicum</i>	3	100%	2	14%	positive
<i>Entolasia marginata</i>	2	64%	2	10%	positive
<i>Entolasia stricta</i>	3	9%	0	0%	positive
<i>Gahnia sieberiana</i>	2	73%	3	4%	positive
<i>Hibiscus diversifolia</i>	1	36%	0	0%	positive
<i>Hypolepis muelleri</i>	3	55%	2	15%	positive
<i>Lepironia articulata</i>	2	55%	4	3%	positive
<i>Lygophyllum microphyllum</i>	3	64%	1	4%	positive
<i>Melaleuca quinquenervia</i>	5	100%	3	37%	positive
<i>Parsonsia straminea</i>	3	100%	1	43%	positive



## Community 13 Alluvial plain Broad-leaved Paperbark–Swamp Mahogany–Saw Sedge/Swamp Water Fern Swamp Sclerophyll Forest

**Scientific name:** Broad-leaved Paperbark (*Melaleuca quinquenervia*), Swamp Mahogany (*Eucalyptus robusta*) and with Saw Sedge (*Gahnia clarkei*) and Swamp Water Fern (*Blechnum indicum*) Swamp Sclerophyll Low to Open Forest.

**Sites:** (5) WAR19albk, WAR45albk, WAR25albk, WAR44albk, WAR31cbrdg

### Equivalent communities

Forested Wetlands-Coastal Floodplain Wetlands (Keith 2006); Qld Regional Ecosystems 12.3.5 *Melaleuca quinquenervia* open forest on alluvium, and 12.2.7 *Melaleuca quinquenervia* open forest to woodland on Quaternary sands (Young and Dillewaard 1999); 401 – Broad-leaved Paperbark Closed Forest to Woodland (Kingston *et al.* 2004); F8 – *Melaleuca quinquenervia* tall to very tall open to closed forest (Pressey and Griffith 1992); 40031/2 *Melaleuca quinquenervia* forest and woodland, 40981/2 Mixed stand of *Eucalyptus robusta*–*Melaleuca quinquenervia*, 64051 *Lepironia articulata* Sedgeland, and 64131 *Eleocharis equisetina* Sedgeland (Griffith and Wilson 2007); Swamp Mahogany/Swamp Box (SMB) (Landmark Ecological Services 1999); Forest Ecosystem 112 Paperbark (NPWS 1999).

### Description

A low open forest dominated by Broad-leaved Paperbark (*Melaleuca quinquenervia*) and which, in one site, is associated with Swamp Mahogany (*Eucalyptus robusta*). A sparse middle layer comprises Pink-flowered Doughwood (*Melicope elleryana*), Umbrella Cheese Tree (*Glochidion sumatranum*), *Duboisia myoporoides* and Black Wattle (*Callicoma serratifolia*). An open to dense lower layer is present, including *Entolasia marginata*, Rough Ground Fern (*Hypolepis muelleri*), Swamp Water Fern (*Blechnum indicum*), Bat's Wing Fern (*Histiopteris incisa*), *Eleocharis equisetina*, Ditch Millet (*Paspalum orbiculare*), *Lepironia articulata*, Saltwater Couch (*Paspalum vaginatum*) and *Isolepis inundata*.



Site WAR25albk consists of a *Lepironia articulata*–*Eleocharis equisetina* sedgeland with emergent Broad-leaved Paperbark. Site WAR31cbrdg was an association of Broad-leaved Paperbark–Swamp Mahogany growing on coastal barrier sands with a sparse mid-story of Wallum Bottlebrush (*Callistemon pachyphyllus*) and a ground layer of sedges, including the vulnerable *Persicaria elatior*.

### Distribution and Habitat

**Habitat:** Found in the stagnant alluvial backswamp of Tuckean Swamp and on watellogged sites on the Wardell Pleistocene barrier sand mass.

**Disturbance:** Site WAR25albk was severely burnt, and all other sites had been recently burnt. Weed disturbance was light to moderate. WAR19albk and WAR45albk were lightly grazed.

**Example locations:** Tuckean (four sites on alluvium), Jali Lands at Wardell (one site on coastal barrier sands).

## Conservation

**Threats:** Clearing, burning, grazing and weed infestation.

**Conservation status:** Occurrences of this community on the alluvial plain are probably examples of 'Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions' EEC. Floodplain occurrences of Broad-leaved Paperbark are poorly reserved (Griffith 2005). Floodplain occurrences of Broad-leaved Paperbark are reserved at Tuckean NR, Bungawalbyn NR, Yarringly SCA, and Broadwater NP.

**Significant taxa:** *Persicaria elatior* (TSC: Vulnerable).

## Structure

Layer	Height (m)	Cover (%)
Tallest	10–25	5–35
Middle 1	1.5–6	10–20
Lower 1	0.2–1.5	20–90
Lower 2	0–0.3	10

## Floristics

**Trees:** *Melaleuca quinquenervia* (T), *Eucalyptus robusta* (T), *Lophostemon suaveolens*.

**Sub-canopy trees:** *Glochidion sumatranum* (M1), *Callicoma serratifolia* (M1), *Melicope elleryana* (M1), *Duboisia myoporoides* (T).

**Shrubs:** *Callistemon pachyphyllus* (M1), *Acacia elongata*, *Baccharis halimifolia*\*, *Leptospermum speciosum*.

**Climbers:** *Marsdenia rostrata*, *Parsonsia straminea*, *Cassytha pubescens*, *Hibbertia scandens*.

**Grasses:** *Axonopus compressus*\*, *Paspalum orbiculare* (L1), *Pseudoraphis spinescens*, *Paspalum vaginatum* (L1), *Entolasia marginata* (L1), *Leersia hexandra*, *Lachnagrostis billardierei* subsp. *billardierei*.

**Ferns:** *Blechnum indicum* (L1), *Histiopteris incisa*, *Hypolepis muelleri* (L1), *Pteridium esculentum*.

**Sedges and rushes:** *Isolepis inundata* (L1), *Eleocharis equisetina* (L1), *Lepironia articulata* (L1), *Cyperus polystachyos*, *Baloskion tetraphyllum*, *Baumea rubiginosa*, *Carex appressa*, *Cyperus haspan* subsp. *juncoides*, *Gahnia clarkei*, *Juncus mollis*, *Baumea articulata*, *Carex maculata*.

**Herbs and shrubs:** *Alternanthera denticulata*, *Persicaria dichotoma*, *Persicaria elatior*, *Persicaria strigosa*, *Philydrum lanuginosum*, *Viminaria juncea*.

**Number of native taxa:** 61

**Number of taxa per site:** 9–43 (mean 28 ± 17)

**Number of exotic taxa:** 10

## Indicator native taxa

Species	Group score	Group frequency	Non-group score	Non-group frequency	Fidelity class
<i>Blechnum indicum</i>	3	80%	2	16%	positive
<i>Histiopteris incisa</i>	2	60%	1	4%	positive
<i>Hypolepis muelleri</i>	3	60%	2	16%	positive
<i>Isolepis inundata</i>	2	100%	1	1%	positive
<i>Leptospermum speciosum</i>	1	20%	0	0%	positive
<i>Melaleuca quinquenervia</i>	4	100%	3	38%	positive
<i>Persicaria elatior</i>	2	20%	0	0%	positive
<i>Persicaria strigosa</i>	2	80%	2	6%	positive
<i>Pseudoraphis spinescens</i>	2	40%	0	0%	positive
<i>Pteridium esculentum</i>	2	60%	2	20%	positive

## Community 14 Swamp Mahogany–Broad-leaved Paperbark–Bangalow Palm–sedge/fern Swamp Sclerophyll Forest

**Scientific name:** Swamp Mahogany (*Eucalyptus robusta*), Broad-leaved Paperbark (*Melaleuca quinquenervia*) and Bangalow Palm (*Archontophoenix cunninghamiana*) with Saw Sedge (*Gahnia clarkei*) and Swamp Water Fern (*Blechnum indicum*) Swamp Sclerophyll Open to Closed Forest.

**Sites:** (12) BRU18cbbbf, WAR47alfan, WAR07alilsw, WAR08cbr, WAR17alfan, WAR32albk, BRU25estchf, BRU45cbrdg, BYR05cbsw, BYR19alfan, BYR16hsrh, WAR23alfan.

### Equivalent communities

Forested Wetlands-Coastal Swamp Forests, and Coastal Floodplain Wetlands (Keith 2006); Qld Regional Ecosystem 12.3.5 *Melaleuca quinquenervia* on alluvium (Young and Dillewaard 1999); 305 – Coastal Swamp Mahogany Open Forest to Woodland (Kingston *et al.* 2004); F7 – *Eucalyptus robusta* mid high to very tall open forest (Pressey and Griffith 1992); 40021/2 *Eucalyptus robusta* forest and woodland, 40981/2 Mixed stand of *Eucalyptus robusta*–*Melaleuca quinquenervia*, NSW NPWS coastal vegetation (Griffith & Wilson 2007); Swamp Mahogany/Swamp Box (SMB) (Landmark Ecological Services 1999); North-East NSW Forest Ecosystem 112 Paperbark, and 142 Swamp Mahogany (NPWS 1999).

### Description

An open to closed swamp sclerophyll forest dominated by Swamp Mahogany (*Eucalyptus robusta*) and Broad-leaved Paperbark (*Melaleuca quinquenervia*), with Swamp Box (*Lophostemon suaveolens*) occasionally present. An open middle layer of trees includes Bangalow Palm (*Archontophoenix cunninghamiana*), Pink-flowered Doughwood (*Melicope elleryana*), Blueberry Ash (*Elaeocarpus reticulatus*), Cabbage Tree Palm (*Livistona australis*), Lilly Pilly (*Acmena smithii*) and Maiden's Wattle (*Acacia maidenii*). An open to dense lower layer includes Swamp Water Fern (*Blechnum indicum*), Saw Sedge (*Gahnia clarkei*), *Baloskion tetraphyllum*, Palm Lily (*Cordylina congesta*), Bat's Wing Fern (*Histiopteris incisa*), Harsh Ground Fern (*Hypolepis mulleri*) and King Fern (*Todea barbara*). The climber *Parsonsia straminea* is common in a number of sites. This community differs from Communities 10–13 by the co-dominance of Swamp Mahogany, its association with Swamp Box and the absence of Swamp Oak (*Casuarina glauca*).

### Distribution and Habitat

**Habitat:** Alluvial and colluvial fans and channels in narrow valleys and the along the tributaries of coastal creeks.

**Disturbance:** There is light to moderate disturbance by weeds and fire; site WAR17alfan has been severely logged.

**Example locations:** Brunswick Heads Bypass, Bangalow Road, Taylor's Lake Road, Coolgardie Road, Lumleys Lane at Wardell, Thurgates Lane at Wardell, Bagtoville–Alstonville Road, Jali Lands at Wardell, and Tuckean Broadwater.





## Conservation

**Threats:** Clearing, burning, logging, grazing and weed infestation.

**Conservation status:** This community is a component of the 'Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions' EEC. The overall reservation status of Swamp Mahogany Forest in NSW is assessed as probably poor (Griffith 2005). Swamp Mahogany is listed as a rare forest ecosystem (NPWS1999). Equivalent communities are reserved in Broadwater NP, Bundjalung NP and Yuraygir NP (Griffith and Wilson 2007). One sample site was located in Brunswick Heads NR.

**Significant taxa:** *Trichosanthes subvelutina* (TSC: Vulnerable).

## Structure

Layer	Height (m)	Cover (%)
Tallest	10–30	20–80
Middle 1	2–20	10–60
Middle 2	1–5	20–70
Lower 1	0–2	5–90

## Floristics

**Trees:** *Lophostemon suaveolens* (T), *Melaleuca quinquenervia* (T), *Eucalyptus robusta* (T), *Eucalyptus pilularis* (T), *Eucalyptus microcorys*.

**Sub-canopy trees:** *Acacia maidenii* (T), *Elaeocarpus reticulatus* (T), *Melicope elleryana* (T), *Glochidion sumatranum* (T), *Archontophoenix cunninghamiana* (M1), *Acmena smithii* (M1), *Livistona australis* (M1), *Endiandra sieberi* (M1), *Cinnamomum camphora*\* (M1), *Allocasuarina torulosa* (M1), *Callicoma serratifolia* (M1), *Pittosporum undulatum* (M1), *Archirhodomyrtus beckleri*, *Cupaniopsis anacardioides*, *Duboisia myoporoides*, *Elaeocarpus obovatus*, *Endiandra sieberi*, *Endiandra virens*, *Ficus coronata*, *Guioa semiglaucula*, *Jagera pseudorhus* var. *pseudorhus* forma *pseudorhus*, *Litsea australis*.

**Shrubs:** *Lantana camara*\* (M1), *Myrsine howittiana* (M1), *Psychotria loniceroides* (M2), *Trochocarpa laurina* (M2), *Acacia longissima*, *Acacia melanoxylon*, *Alyxia ruscifolia*, *Callistemon salignus*, *Drypetes deplanchei*, *Embelia australiana*, *Ptilidostigma glabrum*, *Pittosporum multiflorum*, *Pittosporum undulatum*, *Rhodamnia rubescens*, *Sarcopteryx stipitata*, *Syzygium oleosum*, *Trophis scandens*, *Wilkiea huegeliana*.

**Climbers:** *Calamus muelleri*, *Cissus hypoglauca*, *Desmodium gunnii*, *Desmodium nemorosum*, *Dioscorea transversa*, *Echinostephia aculeata*, *Flagellaria indica*, *Geitonoplesium cymosum*, *Hibbertia dentata*, *Hibbertia scandens*, *Lygodium microphyllum*, *Marsdenia rostrata*, *Mucuna gigantea*, *Pandorea pandorana*, *Ripogonum elseyanum*, *Ripogonum fawcettianum*, *Smilax australis*, *Smilax glycyphylla*, *Stephania japonica* var. *discolor*, *Tylophora paniculata*, *Trichosanthes subvelutina*.

**Epiphytes:** *Cymbidium madidum*, *Cymbidium suave*, *Platyserium bifurcatum*, *Platyserium superbum*, *Asplenium australasicum* f. *australasicum*.

**Mistletoes:** *Muellerina celastroides*.

**Grasses:** *Ottocloa gracillima* (L1), *Entolasia stricta*, *Oplismenus aemulus*.

**Ferns:** *Todea barbara* (M2), *Histiopteris incisa* (M2), *Pteridium esculentum* (L1), *Blechnum indicum* (L1), *Blechnum camfieldii* (L1), *Adiantum hispidulum*, *Asplenium australasicum* f. *australasicum*, *Calochlaena dubia*, *Davallia solida* var. *pyxidata*.

**Sedges and rushes:** *Gahnia clarkei* (M2), *Baloskion tetraphyllum* (L1), *Cyperus enervis*, *Gahnia sieberiana*.

**Herbs and shrubs:** *Ochna serrulata*\* (L1), *Cordyline congesta*, *Ageratina adenophora*\*, *Alocasia brisbanensis*, *Alpinia arundelliana*, *Alpinia caerulea*, *Breynia oblongifolia*, *Brunoniella australis*, *Commelina cyanea*, *Cordyline rubra*, *Crinum pedunculatum*, *Cryptostylis erecta*, *Homalanthus populifolius*, *Hydrocotyle peduncularis*, *Pomax umbellata*.



Number of native taxa: 141

Number of taxa per site: 15–90 (mean  $37 \pm 22$ )

Number of exotic taxa: 10

### Indicator native taxa

Species	Group	Group frequency	Non-group	Non-group frequency	class
<i>Archontophoenix cunninghamiana</i>	2	94%	2	22%	positive
<i>Blechnum camfieldii</i>	2	6%	0	0%	positive
<i>Blechnum indicum</i>	2	88%	2	13%	positive
<i>Cordyline congesta</i>	2	71%	1	11%	positive
<i>Elaeocarpus reticulatus</i>	3	65%	1	16%	positive
<i>Eucalyptus robusta</i>	3	59%	3	5%	positive
<i>Ficus superba</i> var. <i>henneana</i>	1	6%	0	0%	positive
<i>Gahnia clarkei</i>	3	82%	2	14%	positive
<i>Hypolepis muelleri</i>	3	59%	2	14%	positive
<i>Lophostemon suaveolens</i>	3	53%	2	21%	positive
<i>Marsdenia rostrata</i>	2	82%	1	20%	positive
<i>Melaleuca quinquenervia</i>	3	88%	3	37%	positive
<i>Melicope elleryana</i>	3	100%	2	16%	positive
<i>Parsonsia straminea</i>	2	53%	1	44%	positive
<i>Trichosanthes subvelutina</i>	1	6%	0	0%	positive

## Community 15 Bangalow Palm–Swamp Box–Cabbage Tree Palm–Weeping Myrtle Alluvial Riparian Forest

**Scientific name:** Bangalow Palm (*Archontophoenix cunninghamiana*), Swamp Box (*Lophostemon suaveolens*), Cabbage Tree Palm (*Livistona australis*), Weeping Myrtle (*Waterhousea floribunda*) alluvial riparian forest

**Sites:** (5) WAR09cbbbf, WAR33alch, WAR26albk, WAR27alfan, WAR43alfan.

### Equivalent communities

Forested Wetlands-Coastal Floodplain Wetlands (Keith 2006); F9 – *Archontophoenix cunninghamiana*–*Melaleuca quinquenervia* very tall feather palm swamp forest (Pressey and Griffith 1992); possibly 40141 *Melaleuca quinquenervia*–*Livistona australis* Swamp sclerophyll forest & woodland (Griffith and Wilson 2007); 401 – Broad-leaved Paperbark Closed Forest to Woodland (Kingston *et al.* 2004); Suballiance 6 –*Archontophoenix*–*Livistonia* (Floyd 1990).

### Description

An open to closed palm forest, with an overstory of abundant Bangalow Palm (*Archontophoenix cunninghamiana*), Weeping Lilly Pilly (*Waterhousea floribunda*), Swamp Box (*Lophostemon suaveolens*), and frequent Cabbage Tree Palms (*Livistona australis*) and Broad-leaved Paperbarks (*Melaleuca quinquenervia*). There is a middle layer of Pink-flowered Doughwood (*Melicope elleryana*) and a sparse lower layer of sedges, including *Carex maculata*, and Rough Ground Fern (*Hypolepis muelleri*).



### Distribution and Habitat

**Habitat:** Alluvial channels of flat lowland plains at Tuckean and Wardell, on deep soils formed by the input of basalt sediments from the nearby Blackwall Range and also the Pleistocene sand beds of the Wardell Sandplain.

**Disturbance:** Light fire and light weed disturbance, though there is no evidence of disturbance at site. WAR26albk.

**Example locations:** Between Tuckean NR and Bagotville–Alstonville Road, at Tuckean, on Jali Lands at Wardell, and Thurgates Lane.

### Conservation

**Threats:** Clearing, burning, grazing and weed infestation.

**Conservation status:** This community is a component of the ‘Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions’ EEC or the ‘Sub-tropical Coastal Floodplain Forest of the NSW North Coast bioregion’ EEC. Occurrences of communities dominated by Weeping Lilly Pilly on the floodplain are very rare.

**Significant taxa:** *Cordyline congesta* (ROTAP: 2RC-).

## Structure

Layer	Height (m)	Cover (%)
Tallest	25–35	25–75
Middle 1	2–20	15–40
Middle 2	1–5	10–20
Lower 1	0–1	2–30

## Floristics

**Trees:** *Archontophoenix cunninghamiana* (T), *Waterhousea floribunda* (T), *Lophostemon suaveolens* (T), *Melicope elleryana* (T), *Melaleuca quinquenervia* (T), *Livistona australis*, *Eucalyptus robusta*, *Ficus watkinsiana*.

**Sub-canopy trees:** *Livistona australis* (M1), *Callicoma serratifolia* (M1), *Glochidion sumatranum* (T), *Syzygium oleosum* (T), *Sarcopteryx stipata* (M1), *Croton verreauxii* (M1), *Alphitonia excelsa*, *Cinnamomum camphora*\*, *Acmena smithii*, *Cryptocarya glaucescens*, *Glochidion ferdinandi*, *Jagera pseudorhus* var. *pseudorhus* forma *pseudorhus*, *Symplocos thwaitesii*, *Cryptocarya microneura*, *Cryptocarya obovata*, *Diploglottis cunninghamii*, *Synoum glandulosum* subsp. *glandulosum*, *Syzygium luehmannii*.

**Shrubs:** *Syzygium oleosum*, *Croton verreauxii*, *Pilidiostigma glabrum*, *Endiandra sieberi*, *Lantana camara*\*, *Ochna serrulata*\*, *Solanum mauritianum*\*, *Duboisia myoporoides*, *Dysoxylum mollissimum* subsp. *molle*, *Myrsine variabilis*, *Elaeocarpus reticulatus*, *Pittosporum revolutum*, *Trochocarpa laurina*.

**Climbers:** *Marsdenia rostrata*, *Morinda jasminoides*, *Smilax australis*, *Flagellaria indica*, *Geitonoplesium cymosum*, *Ripogonum elseyanum* (M2), *Desmodium nemorosum*, *Cissus hypoglauca*, *Dioscorea transversa*, *Echinostephia aculeata*, *Pandorea pandorana*, *Parsonsia straminea*, *Passiflora edulis*\*, *Rubus moluccanus* var. *trilobus*, *Smilax glyciphylla*, *Stephania japonica* var. *discolor*.

**Epiphytes:** *Asplenium australasicum* f. *australasicum*, *Cymbidium madidum*, *Platyterium bifurcatum*.

**Grasses:** *Ottophloa gracillima* (L1), *Oplismenus aemulus*.

**Ferns:** *Hypolepis muelleri* (L1), *Blechnum indicum* (L1), *Todea barbara*, *Asplenium australasicum* f. *australasicum*, *Nephrolepis cordifolia*\*, *Calochlaena dubia*, *Cyathea australis*, *Cyathea leichhardtiana*, *Davallia solida* var. *pyxidata*, *Lastreopsis decomposita*, *Platyterium bifurcatum*

**Sedges and rushes:** *Carex maculata*-L1, *Gahnia clarkei*-L1.

**Herbs and shrubs:** *Cordyline congesta* (M2), *Alpinia arundelliana*, *Alocasia brisbanensis*, *Cryptostylis subulata*, *Centella asiatica*, *Persicaria dichotoma*, *Commelina cyanea*, *Dianella caerulea*, *Hedychium gardnerianum*\*, *Viola banksii*, *Zieria smithii*.

Number of native taxa: 90

Number of taxa per site: 24–48 (mean 36 ± 12)

Number of exotic taxa: 6

## Indicator native taxa

The indicator native taxa for Community 15 are a sub-group of those listed for Community 14, and no table is given here.

## Community 16 Tea-tree (*Leptospermum* spp.)–*Sporodanthus interruptus* Wet Heath

**Scientific name:** Tooton Tea-tree (*Leptospermum polygalifolium*), Slender Tea-tree (*Leptospermum liversidgei*), *Leptospermum whitei* and *Sporodanthus interruptus* Wallum Wet Heath.

**Sites:** (2) BALL09CBRDG, BRU38unfswp.

### Equivalent communities

Freshwater Wetlands-Coastal Heath Swamps (Keith 2006); Qld Regional Ecosystem 12.2.12 Closed or wet heath on Quaternary sands (Young and Dillewaard 1990); H2 – *Banksia oblongifolia*–*Leptospermum liversidgei*–*Lepyrodia interrupta*–*Sprengelia sprengelioides*–*Xanthorrhoea fulva* (Pressey and Griffith 1992); 502 – Wet heathland to Shrubland (Kingston *et al.* 2004); 55111 *Leptospermum whitei*–*L. polygalifolium* Swamp Sclerophyll Shrubland, 60021 *Banksia oblongifolia*–*Leptospermum liversidgei*–*Lepyrodia interrupta*–*Sprengelia sprengelioides*–*Xanthorrhoea fulva* NPWS NSW coastal vegetation (Griffith & Wilson 2007); Community No. 24: *Sporodanthus interruptus*–*Xanthorrhoea fulva*–*Banksia ericifolia* subsp. *macrantha*–*Leptospermum liversidgei*–*Baeckea frutescens* wet heathland, Community No. 25: *Sporodanthus interruptus*–*Xanthorrhoea fulva* wet heathland, Community No. 26: *Banksia oblongifolia*–*Xanthorrhoea fulva* wet heathland, Community No. 27: *Xanthorrhoea fulva*–*Schoenus paludosus*–*Banksia ericifolia* subsp. *macrantha* wet heathland, Community No 28 : *Leptospermum liversidgei*–*Sporodanthus interruptus*–*Empodisma minus* wet heathland, and Community No. 34: *Banksia ericifolia* subsp. *macrantha* ± *Leptospermum whitei*–*L. polygalifolium* subsp. *cismontanum* swamp sclerophyll shrubland (Griffith *et al.* 2003); Teatree (TT) (Landmark Ecological Services 1999); North-east NSW Forest Ecosystem 64 Heath (NPWS 1999).

### Description

A heathland community with a dense cover of tea-tree. *Leptospermum liversidgei* dominates one site (BALL09CBRDG) and either *Leptospermum whitei* or *Leptospermum polygalifolium* dominate the other (BRU38unfswp). *Baeckea frutescens* is common at both sites. A diversity of wet-heath shrubs are present at BALL09CBRDG, including *Boronia falcifolia*, *Banksia oblongifolia*, Heath-leaved Banksia (*Banksia ericifolia* subsp. *macrantha*), *Sprengelia sprengelioides* and Grass Tree (*Xanthorrhoea fulva*). A dense lower layer of the sedge *Sporodanthus interruptus* is present at both sites.



### Distribution and Habitat

**Habitat:** The sites are located within swales and open freshwater depressions on Pleistocene barrier sands. Griffith *et al.* (2003) suggest that variation in distribution in these sites may be attributed to fire, particularly in areas where recruitment of obligate seeders is inhibited by fire.

**Disturbance:** There is no evidence of disturbance in site BRU38unfswp, but site BALL09CBRDG has been subject to an intense fire within the last 10–15 years.

**Locations:** Lennox Head, Belongil Swamp.

## Conservation

**Threats:** Under limited threat

**Conservation status:** Similar wet heaths are well represented in a number of reserves on the north coast. In the study area this community is reserved in Tyagarah NR, Broadwater NP and Bundjalung NP. Site BRU38unfswp was located in Tyagarah NR.

**Significant taxa:** None recorded.

## Structure

Layer	Height (m)	Cover (%)
Tallest	1–4	60–100
Middle 1	0.5–1.5	30
Lower 1	0–0.5	80

## Floristics

**Trees:** *Eucalyptus robusta*.

**Shrubs:** *Leptospermum liversidgei* (T), *Boronia falcifolia* (T), *Xanthorrhoea johnsonii*-M1, *Leptospermum whitei* (T), *Banksia aemula* (T), *Leptospermum polygalifolium* (T), *Banksia oblongifolia* (M1), *Aotus ericoides*, *Banksia ericifolia* subsp. *macrantha*, *Sprengelia sprengelioides*, *Xanthorrhoea fulva*, *Baeckea frutescens* (M1), *Adrastaea salicifolia*, *Brachyloma scortechinii*, *Acacia elongata*, *Dillwynia floribunda*, *Epacris obtusifolia*, *Leptospermum juniperinum*, *Leucopogon leptospermoides*, *Melaleuca nodosa*, *Persoonia virgata*, *Pimelea linifolia*.

**Climbers:** *Cassytha pubescens*, *Cassytha glabella*.

**Sedges and rushes:** *Sporadanthus interruptus* (T), *Baumea muelleri*, *Caustis recurvata* (L1), *Ptilothrix deusta*

**Herbs and shrubs:** *Xyris gracilis*.

**Number of native taxa:** 31

**Number of taxa per site:** 14–21 (mean  $18 \pm 5$ )

**Number of exotic taxa:** 0



## Indicator native taxa

Species	Group score	Group frequency	Non-group score	Non-group frequency	Fidelity class
<i>Baekkea frutescens</i>	3	100%	3	4%	positive
<i>Boronia falcifolia</i>	4	100%	2	1%	positive
<i>Sporadanthus interruptus</i>	6	100%	1	1%	positive
<i>Adrastaea salicifolia</i>	2	50%	1	1%	positive
<i>Aotus ericoides</i>	3	50%	1	2%	positive
<i>Banksia aemula</i>	3	50%	4	3%	positive
<i>Banksia ericifolia</i>	3	50%	3	2%	positive
<i>Banksia oblongifolia</i>	3	50%	2	3%	positive
<i>Baumea muelleri</i>	1	50%	0	0%	positive
<i>Brachyloma scortechinii</i>	2	50%	0	0%	positive
<i>Cassutha glabella</i>	2	50%	1	2%	positive
<i>Cassutha pubescens</i>	3	50%	2	4%	positive
<i>Caustis recurvata</i>	2	50%	2	3%	positive
<i>Dillwynia floribunda</i>	1	50%	0	0%	positive
<i>Epacris obtusifolia</i>	1	50%	0	0%	positive
<i>Leptospermum juniperinum</i>	1	50%	0	0%	positive
<i>Leptospermum liversidgei</i>	5	50%	3	2%	positive
<i>Leptospermum polygalifolium</i> subsp. <i>polygalifolium</i>	3	50%	3	2%	positive
<i>Leptospermum whitei</i>	4	50%	2	2%	positive
<i>Ptilothrix deusta</i>	2	50%	0	0%	positive
<i>Sprengelia sprengelioides</i>	3	50%	1	0%	positive
<i>Xanthorrhoea fulva</i>	3	50%	2	3%	positive
<i>Xanthorrhoea johnsonii</i>	4	50%	3	2%	positive
<i>Xyris gracilis</i>	2	50%	2	1%	positive

## Community 17 *Leptospermum liversidgei*–Wallum Bottlebrush–Grass Tree–Heath-leaved Banksia Wallum Wet Heath Complex

**Scientific name:** *Leptospermum liversidgei*, Wallum Bottlebrush (*Callistemon pachyphyllus*), Grass Tree (*Xanthorrhoea fulva*) and Heath-leaved Banksia (*Banksia ericifolia* subsp. *macrantha*) Coastal Sand Barrier Wet Heath Complex.

**Sites:** (5) BRU39unfswp, BYR37unfswp, WOO09unfswp, WAR36cbrdg, WAR38cbrdg.

### Equivalent communities

Freshwater Wetlands-Coastal Heath Swamps (Keith 2006); Qld Regional Ecosystem 12.2.12 Closed or wet heath on Quaternary sands (Young and Dillewaard 1999); 5503 – *Banksia ericifolia* subsp. *macrantha* ± *Leptospermum whitei*, *Leptospermum polygalifolium* subsp. *cismontanum*, and 5506 – *Melaleuca quinquenervia* Swamp sclerophyll shrubland (Griffith 2002); 502 – Wet Heathland to Shrubland (Kingston et al. 2004); Community No. 34: *Banksia ericifolia* subsp. *macrantha* ± *Leptospermum whitei*–*L. polygalifolium* subsp. *cismontanum* swamp sclerophyll shrubland (Griffith et al. 2003); Teatree (TT) (Landmark Ecological 1999).

### Description

A variable grouping of wet heath and shrubland sites. Sites BRU39unfswp, WOO09unfswp, WAR36cbrdg are shrubland sites dominated by Heath-leaved Banksia (*Banksia ericifolia* subsp. *macrantha*). BYR37unfswp is a Broad-leaved Paperbark (*Melaleuca quinquenervia*) swamp sclerophyll shrubland. WAR38cbrdg is a shrubland of *Baeckea frutescens* and *Leptospermum liversidgei* with emergent Broad-leaved Paperbark (*Melaleuca quinquenervia*). Wallum Bottlebrush (*Callistemon pachyphyllus*) is a frequent species in the middle layer, and the lower layer is characterised by sedges and shrubs but with Grass Tree (*Xanthorrhoea fulva*) the most frequent lower layer taxa. *Schoenus brevifolius*, *Leptocarpus tenax* and *Baloskion pallens* are dominant in the ground strata.



### Distribution and Habitat

**Habitat:** Wet sites on backbarrier flats and freshwater swamps in low-lying sites on Pleistocene barrier sands at Tygarah, Wardell and Evans River.

**Disturbance:** There was no evidence of disturbance at most sites, though WAR38cbrdg had been subject to a moderately intense fire.

**Example locations:** Between Tuckean NR and Bagotville, Alstonville Road, Tuckean, Jali Lands at Wardell, and Thurgates Lane.

### Conservation

**Threats:** Too-frequent fire, clearing.

**Conservation status:** In the study area it is reserved in Tyagarah NR, Broadwater NP and Bundjalung NP

**Significant taxa:** None recorded.

### Structure

Layer	Height (m)	Cover (%)
Emergent	6–8	5
Tallest	3–18	10–50
Middle 1	1–10	40–50
Middle 2	2–5	20
Lower 1	0–1	5–90

### Floristics

**Trees:** *Melaleuca quinquenervia* (T), *Eucalyptus robusta*

**Shrubs:** *Leptospermum liversidgei* (T), *Callistemon pachyphyllus* (M1), *Xanthorrhoea fulva* (L1), *Baeckea frutescens* (T), *Banksia ericifolia* subsp. *macrantha* (T), *Leucopogon lanceolatus* var. *gracilis* (M1), *Banksia oblongifolia* (M1), *Aotus ericoides* (M1), *Leptospermum trinervium* (T), *Melaleuca squamea*, *Ochrosperma lineare*, *Austromyrtus dulcis*, *Nematolepis squamea* subsp. *squamea*, *Boronia falcifolia*, *Elaeocarpus reticulatus*, *Adrastaea salicifolia*, *Leptospermum polygalifolium* subsp. *cismontanum*, *Leptospermum whitei*, *Melaleuca nodosa*, *Melaleuca sieberi*, *Monotoca elliptica*, *Persoonia linearis*.

**Climbers:** *Parsonsia straminea*, *Cassytha glabella*, *Cassytha pubescens*.

**Mistletoes:** *Dendrophthoe vitellina*.

**Grasses:** *Phragmites australis*, *Imperata cylindrica* var. *major*.

**Ferns:** *Blechnum indicum*, *Pteridium esculentum*, *Acrostichum speciosum*, *Gleichenia dicarpa*.

**Sedges and rushes:** *Gahnia sieberiana* (M1), *Schoenus brevifolius* (L1), *Leptocarpus tenax* (L1), *Baloskion tetraphyllum* (M1), *Baumea juncea* (L1), *Baumea rubiginosa* (L1), *Sporadanthus interruptus* (L1), *Caustis recurvata*, *Empodisma minus*, *Baloskion pallens* (L1), *Baumea articulata*.

**Herbs and shrubs:** *Burchardia umbellata*, *Cryptostylis subulata*, *Dianella caerulea*, *Epacris microphylla*, *Ottelia ovalifolia* subsp. *ovalifolia*.

**Number of native taxa:** 55

**Number of taxa per site:** 10–37 (mean 20 ± 9.6)

**Number of exotic taxa:** 0

## Indicator native taxa

Species	Group score	Group frequency	Non-group score	Non-group frequency	Fidelity class
<i>Baekkea frutescens</i>	2	50%	3	4%	positive
<i>Baloskion pallens</i>	2	50%	2	1%	positive
<i>Baloskion tetraphyllum</i>	2	50%	2	6%	positive
<i>Banksia ericifolia</i>	3	83%	3	1%	positive
<i>Blechnum indicum</i>	2	50%	2	16%	positive
<i>Burchardia umbellata</i>	1	17%	0	0%	positive
<i>Callistemon pachyphyllum</i>	2	83%	1	2%	positive
<i>Epacris microphylla</i>	1	17%	0	0%	positive
<i>Gahnia siebieriana</i>	3	100%	2	5%	positive
<i>Leptocarpus tenax</i>	3	50%	2	1%	positive
<i>Leptospermum liversidgei</i>	3	83%	5	1%	positive
<i>Melaleuca quinquenervia</i>	3	83%	3	39%	positive
<i>Melaleuca squamea</i>	1	17%	0	0%	positive
<i>Ottelia ovalifolia</i> subsp. <i>ovalifolia</i>	1	17%	0	0%	positive
<i>Persoonia linearis</i>	1	17%	0	0%	positive
<i>Xantorrhoea fulva</i>	2	83%	2	2%	positive

## Community 18 Coral Fern (*Gleichenia dicarpa*) Fernland

**Scientific name:** Coral Fern (*Gleichenia dicarpa*) Fernland.

**Sites:** (2) BYR08cbsw, BYR36estcd.

### Equivalent communities

Freshwater Wetlands-Coastal Heath Swamps (Keith 2006); Qld Regional Ecosystem 12.2.12 Closed or wet heath on Quaternary sands (Young and Dillewaard 1999); 6418 – *Gahnia sieberiana*–*Gleichenia dicarpa* NPWS NSW Coastal vegetation (Griffith and Wilson 2007); 702 – Fernland/Forbland (Kingston *et al.* 2004); Sedgeland-Fernland/Grassland (SFG) (Landmark Ecological Services 1999).

### Description

BYR08cbsw comprises a very dense layer of Coral Fern (*Gleichenia dicarpa*) in association with the saw sedge *Gahnia sieberiana*. *Empodisma minus* is common in the lower layer. BYR36estcd has an upper layer comprising an open shrubland of Broad-leaved Paperbark (*Melaleuca quinquenervia*) and a lower layer of dense Coral Fern.



### Distribution and Habitat

**Habitat:** Dune scarps and narrow drainage lines in deep acid peat soils kept moist by groundwater seepage (Griffith Undated).

**Disturbance:** There was no evidence of disturbance.

**Locations:** Taylors Lake Road, Tallow Creek.

### Conservation

**Threats:** Too frequent fire, clearing.

**Conservation status:** In the study area, the only known reserved occurrence of this community is in Arakwal NR (site BYR36estcd). The Conservation status of *Gahnia sieberiana* on the north coast is assessed as good (Griffith 2005).

**Significant taxa:** None recorded.

### Structure

Layer	Height (m)	Cover (%)
Tallest	1–10	30–40
Lower 1	0–2	90–100



## Floristics

**Trees:** *Melaleuca quinquenervia* (T).

**Shrubs:** *Leptospermum liversidgei* (T), *Elaeocarpus reticulatus*, *Austromyrtus dulcis*, *Banksia integrifolia* subsp. *integrifolia*, *Callistemon pachyphyllus*.

**Climbers:** *Parsonsia straminea* (T), *Cassytha pubescens*.

**Ferns:** *Gleichenia dicarpa* (T).

**Sedges and rushes:** *Gahnia sieberiana* (T), *Empodisma minus* (L1), *Schoenus brevifolius*.

**Herbs and shrubs:** *Villarsia exaltata*, *Drosera spatulata*, *Boronia falcifolia*, *Adrastaea salicifolia*, *Aotus ericoides*, *Sprengelia sprengelioides*.

**Number of native taxa:** 18

**Number of taxa per site:** 9–10 (mean  $9.5 \pm 1$ )

**Number of exotic taxa:** 0

## Indicator native taxa

Species	Group score	Group frequency	Non-group score	Non-group frequency	Fidelity class
<i>Cassytha pubescens</i>	2	50%	2	4%	positive
<i>Drosera spatulata</i>	1	50%	0	0%	positive
<i>Empodisma minus</i>	3	50%	2	0%	positive
<i>Gahnia sieberiana</i>	3	50%	2	6%	positive
<i>Gleichenia dicarpa</i>	6	100%	1	1%	positive
<i>Leptospermum liversidgei</i>	2	50%	3	2%	positive
<i>Melaleuca quinquenervia</i>	4	50%	3	39%	positive
<i>Parsonsia straminea</i>	3	50%	1	44%	positive

## Community 19 Broad-leaved Paperbark–Coast Banksia–Red Ash Dunal Scrubland

**Scientific name:** Broad-leaved Paperbark (*Melaleuca quinquenervia*), Coast Banksia (*Banksia integrifolia* subsp. *integrifolia*) and Red Ash (*Alphitona excelsa*) dunal scrubland

**Sites:** (7) BYR01cbrdg, BYR15cbbbf, BYR38cbdne, BYR32estsswp, BYR33esticd, POT23cbdne, POT02cbrdg.

### Equivalent communities

Qld Regional Ecosystem 12.2.14 Strand and foredune complex (Young and Dillewaard 1999); 310 – Banksia Dry Sclerophyll Open Forest to Shrubland (Kingston *et al.* 2004); 3523 – *Banksia integrifolia* subsp. *integrifolia* Dry sclerophyll forest and woodland (Griffith *et al.* 2000); Coast Banksia (CB1) (Landmark Ecological Services 1999).

### Description

This community is a shrubland to open forest structure in which Broad-leaved Paperbark (*Melaleuca quinquenervia*) is sometimes associated with Coast Banksia (*Banksia integrifolia* subsp. *integrifolia*) and Red Ash (*Alphitona excelsa*); Sites POT23cbdne and POT02cbrdg are an open shrubland structure. A shrubby middle layer is usually present, consisting of Coast Wattle (*Acacia longifolia* subsp. *sophorae*), Lantana (*Lantana camara*) and Tree Broom Heath (*Monotoca elliptica*). The lower layer consists of Midgen Berry (*Austromyrtus dulcis*), Climbing Guinea Flower (*Hibbertia scandens*), Spiny-headed Mat Rush (*Lomandra longifolia*) and Black Bog-rush (*Schoenus brevifolius*). Weeds are prevalent in this community, and Whisky Grass (*Andropogon virginicus*) is an abundant weed species of the lower layer.



### Distribution and Habitat

**Habitat:** Located in tidally influenced coastal parts of Cudgera, Tallow and Belongil Creeks, in swampy sites within the transition from the estuarine plain to Pleistocene coastal sandplains.

**Disturbance:** There are moderate levels of weed invasion, and sites have been subject to light to moderate fires. There is also evidence of moderate levels of clearing at site POT23cbdne.

**Example locations:** Koala Beach at Pottsville, Byron Bay, Ti Tree, Belongil Creek, Tallow Creek and North Pottsville.

### Conservation

**Threats:** Too-frequent fire, clearing, weed infestation.

**Conservation status:** Sites BYR32estsswp and BYR33esticd were in Arakwal NP. The Conservation status of this community is probably fair.

**Significant taxa:** *Acronychia littoralis* (TSC: Endangered).

## Structure

Layer	Height (m)	Cover (%)
Tallest	4–20	20–60
Middle 1	2–8	20–70
Lower 1	0.5–1.5	30–90
Lower 2	0–0.5	10–45

## Floristics

**Trees:** *Melaleuca quinquenervia* (T), *Banksia integrifolia* subsp. *integrifolia* (T), *Lophostemon suaveolens* (T), *Casuarina glauca* (T), *Archontophoenix cunninghamiana*, *Eucalyptus robusta*.

**Sub-canopy trees:** *Cupaniopsis anacardioides*, *Melicope elleryana* (M1), *Glochidion sumatranum* (M1), *Duboisia myoporoides* (T), *Alphitonia excelsa* (T), *Acronychia imperforata* (T), *Cinnamomum camphora*\*, *Schefflera actinophylla*\*, *Acronychia littoralis*, *Glochidion ferdinandi*, *Guioa semiglaucula*, *Litsea australis*, *Rhodamnia rubescens*, *Syagrus romanoffiana*\*.

**Shrubs:** *Lantana camara*\* (M1), *Acacia longifolia* subsp. *sophorae* (M1), *Senna pendula* var. *glabrata*\*, *Monotoca elliptica* (M1), *Persoonia cornifolia* (M1), *Elaeocarpus reticulatus* (M1), *Notelaea longifolia*, *Banksia oblongifolia* (L1), *Chrysanthemoides monilifera* subsp. *rotundata*\*, *Platysace ericoides*, *Acacia concurrens* (T), *Leptospermum whitei* (L1), *Persoonia virgata*, *Leucopogon leptospermoides*, *Persoonia stradbrokeensis* (M1), *Pultenaea villosa*, *Xanthorrhoea fulva*, *Acacia ulicifolia*, *Aotus ericoides*, *Ardisia crenata*\*, *Baccharis halimifolia*\*, *Exocarpos cupressiformis*, *Homoranthus virgatus*, *Leptospermum semibaccatum*, *Leucopogon margarodes*, *Ligustrum sinense*\*, *Murraya paniculata*\*, *Myrsine variabilis*, *Pittosporum revolutum*, *Pittosporum undulatum*, *Psidium cattleianum* var. *cattleianum*\*, *Psychotria loniceroides*, *Solanum nigrum*\*.

**Climbers:** *Hibbertia scandens*, *Smilax australis*, *Geitonoplesium cymosum*, *Parsonia straminea* (M1), *Cassytha filiformis*, *Cassytha pubescens*, *Lygodium microphyllum*, *Marsdenia rostrata*, *Stephania japonica* var. *discolor*, *Rubus moluccanus* var. *trilobus*.

**Grasses** *Andropogon virginicus*\* (L1), *Paspalidium distans*\* (L2), *Paspalum wettsteinii*\* (L1), *Axonopus fissifolius*\*, *Ischaemum australe* (L1), *Imperata cylindrica* var. *major* (L1), *Eragrostis interrupta* (L1), *Hemarthria uncinata*, *Cynodon dactylon* (L1), *Entolasia marginata*, *Oplismenus imbecillis* (L2), *Digitaria ramularis*, *Microlaena stipoides* var. *stipoides*, *Ottocloa gracillima*, *Themeda australis*, *Zoysia macrantha*, *Cymbopogon refractus*, *Digitaria parviflora*, *Sacciolepis indica*.

**Ferns:** *Hypolepis muelleri* (L1), *Pteridium esculentum* (L1), *Blechnum indicum*, *Calochlaena dubia*, *Cyathea australis*, *Gleichenia dicarpa*, *Lygodium microphyllum*.

**Sedges and rushes:** *Schoenus brevifolius*, *Lomandra longifolia* (L2), *Baumea juncea* (L1), *Caustis recurvata*, *Baloskion pallens*, *Baloskion tenuiculme*, *Cyperus stradbrokeensis*, *Gahnia aspera*, *Gahnia clarkei*, *Gahnia sieberiana*.

**Herbs and shrubs:** *Austromyrtus dulcis* (L1), *Dianella caerulea*, *Pomax umbellata* (L1), *Monotoca elliptica*, *Viola banksii* (L2), *Breynia oblongifolia*, *Centella asiatica*, *Asparagus aethiopicus*\*, *Cryptostylis subulata*, *Hypericum japonicum*, *Hydrocotyle bonariensis*\*, *Selaginella uliginosa*, *Cuphea carthagenensis*\*, *Dampiera stricta*, *Epacris pulchella*, *Gonocarpus humilis*, *Goodenia paniculata*, *Hovea acutifolia*, *Hydrocotyle acutiloba*, *Melastoma affine*, *Stellaria flaccida*, *Xyris complanata*.

Number of native taxa: 109

Number of taxa per site: 21–51 (mean 31 ± 11)

Number of exotic taxa: 18

## Indicator native taxa

Species	Group score	Group frequency	Non-group score	Non-group frequency	Fidelity class
<i>Acacia longifolia</i>	3	57%	2	3%	positive
<i>Austromyrtus dulcis</i>	3	100%	2	14%	positive
<i>Banksia integrifolia</i>	3	86%	2	6%	positive
<i>Exocarpos cupressiformis</i>	1	14%	0	0%	positive
<i>Glochidion ferdinandi</i>	2	57%	1	24%	positive
<i>Gonocarpus humilis</i>	1	14%	0	0%	positive
<i>Melaleuca quinquenervia</i>	4	100%	3	38%	positive
<i>Pasaplidium distans</i>	2	57%	2	5%	positive
<i>Senna pendula</i> var. <i>glabrata</i>	2	71%	1	22%	positive
<i>Stellaria flaccida</i>	1	14%	0	0%	positive

## Community 20 Swamp Box–Broad-leaved Paperbark–rush/fern Swamp Sclerophyll Forest

**Scientific name:** Swamp Box (*Lophostemon suaveolens*) and Broad-leaved Paperbark (*Melaleuca quinquenervia*) with Twig rush (*Baumea juncea*), Black Bog-rush (*Schoenoplectus brevifolius*) and Swamp Water Fern (*Blechnum indicum*) Swamp Sclerophyll Open to Closed Forest.

**Sites:** (5) CUD20cbdne, POT04estch, POT01estcd, POT05estch, POT06cbbbf.

### Equivalent communities

Forested Wetlands-Coastal Swamp Forests (Keith 2006); Qld Regional Ecosystem 12.2.7 *Melaleuca quinquenervia* open forest to woodland on Quaternary sands, and 12.1.1 *Casuarina glauca* ± *Melaleuca quinquenervia* (Young and Dillewaard 1999); 309 – Coastal Swamp Box Open Forest to Woodland (Kingston *et al.* 2004); 4013 – *Melaleuca quinquenervia*–*Lophostemon suaveolens*/*Eucalyptus tereticornis* mid-high to very tall, open woodland to closed forest NPWS NSW Coastal Vegetation (Griffith and Wilson 2007); Swamp Mahogany/Swamp Box (SMB) (Landmark Ecological Services 1999).

### Description

Most commonly a low, open to closed, swamp sclerophyll forest with Swamp Box (*Lophostemon suaveolens*) and Broad-leaved Paperbark (*Melaleuca quinquenervia*), occasionally associated with Pink Bloodwood (*Corymbia intermedia*) and, rarely, Swamp Oak (*Casuarina glauca*). Site CUD20cbdne is a very tall, open swamp sclerophyll forest. The community has an open mid-layer of Swamp Box and Broad-leaved Paperbark, occasionally with Willow Bottlebrush (*Callistemon salignus*). There is often a dense lower layer of sedges or rushes (including *Baumea juncea*, *Schoenus brevifolius*, *Baloskion pallens*), grasses (including *Imperata cylindrica* var. *major*, *Zoysia macrantha*, *Entolasia stricta* and *Ischaemum australe*), ferns (including *Blechnum indicum*) and shrubs (including *Melastoma affine*). Swamp Banksia (*Banksia robur*) was abundant in the lower strata of site POT05estch.

### Distribution and Habitat

**Habitat:** Sites were located on coast barrier sands and estuarine plain. The community is also known from the alluvial plain.

**Disturbance:** There was evidence of light to moderate fire at all sites; site POT04estch showed evidence of severe past clearing, and site CUD20cbdne had been lightly logged and had moderate disturbance by weeds.

**Example locations:** Near Round Mountain at Cudgen, at Pottsville, Pottsville Environmental Park and Coronation Avenue in Pottsville.

### Conservation

**Threats:** Clearing and logging.

**Conservation status:** The species composition of this community is consistent with that of the 'Sub-tropical Coastal Floodplain Forest of the NSW North Coast bioregion' EEC. Site CUD20cbdne was located in Cudgen NR.





The related NPWS NSW Coastal Vegetation Community 4013 – *Melaleuca quinquenervia*–*Lophostemon suaveolens*/*Eucalyptus tereticornis* mid-high to very tall, open woodland to closed forest (Griffith & Wilson 2007) is reserved in Broadwater NP and Bundjalung NP.

**Significant taxa:** *Arthrochilus prolixus* (ROTAP: -3K), *Scleria levis*.

## Structure

Layer	Height (m)	Cover (%)
Tallest	5–27	10–65
Middle 1	1–8	10–60
Middle 2	1–2	50
Lower 1	0–1	40–90
Lower 2	0–0.5	90

## Floristics

**Trees:** *Lophostemon suaveolens* (T), *Melaleuca quinquenervia* (T), *Corymbia intermedia* (T), *Callistemon salignus* (T), *Casuarina glauca* (T), *Cupaniopsis anacardioides*, *Lophostemon confertus*, *Melicope elleryana*.

**Sub-canopy trees:** *Acronychia imperforata*, *Alphitonia excelsa*, *Archontophoenix cunninghamiana*, *Glochidion sumatranum*, *Glochidion ferdinandi*.

**Shrubs:** *Leptospermum polygalifolium* subsp. *polygalifolium* (M1), *Melastoma affine* (M1), *Banksia robur* (M1), *Xanthorrhoea fulva*, *Leucopogon lanceolatus* var. *gracilis*, *Elaeocarpus reticulatus*, *Allocasuarina littoralis*, *Dodonaea triquetra* (M2), *Leptomeria drupacea* (M1), *Acacia ulicifolia*, *Banksia integrifolia* subsp. *integrifolia* (M1), *Duboisia myoporoides*, *Leptospermum whitei*, *Persoonia stradbrokeensis*, *Acacia concurrens*, *Acacia maidenii*, *Commersonia bartramia*, *Lantana camara*\*, *Leucopogon margarodes*, *Notelaea longifolia*, *Pittosporum revolutum*.

**Climbers:** *Cassytha pubescens*, *Stephania japonica* var. *discolor*, *Hibbertia scandens*, *Cassytha filiformis*, *Passiflora suberosa*\*, *Smilax australis*, *Parsonsia straminea*.

**Grasses:** *Imperata cylindrica* var. *major* (L1), *Ischaemum australe* (L2), *Entolasia stricta* (L2), *Zoysia macrantha* (L1), *Paspalidium distans*\*, *Panicum simile*, *Sacciolepis indica*\*, *Andropogon virginicus*\*, *Oplismenus imbecillis*, *Ottocloa gracillima*, *Themeda australis*, *Digitaria parviflora*, *Entolasia marginata*, *Leersia hexandra*, *Paspalum dilatatum*\*, *Phragmites australis*, *Eragrostis brownii*, *Eragrostis curvula*\*, *Eragrostis interrupta*, *Paspalum scrobiculatum*\*, *Setaria sphacelata*\*.

**Ferns:** *Pteridium esculentum* (M1), *Blechnum indicum* (L1), *Schizaea dichotoma*, *Lindsaea linearis*.

**Sedges and rushes:** *Schoenus brevifolius* (L1), *Lomandra longifolia* (L1), *Leptocarpus tenax*, *Baloskion pallens* (L1), *Cyperus haspan* subsp. *juncooides*, *Gahnia clarkei*, *Abildgaardia ovata*, *Carex breviculmis*, *Cyperus polystachyos*, *Gahnia sieberiana*, *Lomandra laxa*, *Scleria levis*, *Chorizandra cymbaria*, *Fimbristylis dichotoma*, *Gahnia aspera*.

**Herbs and shrubs** *Pultenaea villosa* (L1), *Austromyrtus dulcis* (L1), *Goodenia paniculata*, *Hovea acutifolia*, *Pratia purpurascens*, *Villarsia exaltata*, *Dodonaea triquetra*, *Chrysanthemoides monilifera* subsp. *rotundata*\* (L1), *Gonocarpus tetragynus*, *Xyris gracilis*, *Breynia oblongifolia*, *Callistemon pachyphyllus*, *Centella asiatica*, *Corybas aconitiflorus*, *Cryptostylis subulata*, *Dampiera stricta*, *Dianella caerulea*, *Hibbertia aspera*, *Hibbertia riparia*, *Hypericum gramineum*, *Murdannia graminea*, *Pultenaea retusa*, *Rhynchospora rubra*, *Selaginella uliginosa*, *Vernonia cinerea*, *Philydrum lanuginosum*, *Pimelea linifolia*, *Trachymene incisa*, *Arthrochilus prolixus*, *Banksia oblongifolia*, *Dianella longifolia* var. *longifolia*, *Gonocarpus chinensis* subsp. *verrucosus*, *Lobelia anceps*.

**Number of native taxa:** 116

**Number of taxa per site:** 29–65 (mean 41 ± 15)

**Number of exotic taxa:** 9

## Indicator native taxa

Species	Group score	Group frequency	Non-group score	Non-group frequency	Fidelity class
<i>Abildgaardia ovata</i>	2	20%	0	0%	positive
<i>Austromyrtus dulcis</i>	2	80%	2	14%	positive
<i>Banksia robur</i>	5	40%	0	0%	positive
<i>Baumea juncea</i>	4	80%	3	6%	positive
<i>Corybas aconitiflorus</i>	2	20%	0	0%	positive
<i>Entolasia stricta</i>	2	80%	2	12%	positive
<i>Eragrostis brownii</i>	1	20%	0	0%	positive
<i>Goodenia paniculata</i>	2	60%	2	4%	positive
<i>Imperata cylindrica</i>	5	80%	2	20%	positive
<i>Ischaemum australe</i>	2	100%	2	5%	positive
<i>Leptocarpus tenax</i>	2	60%	3	1%	positive
<i>Leptomeria drupacea</i>	2	40%	0	0%	positive
<i>Leptospermum polygalifolium</i> subsp. <i>polygalifolium</i>	3	80%	2	2%	positive
<i>Lindsaea linearis</i>	1	20%	0	0%	positive
<i>Lomandra laxa</i>	2	20%	0	0%	positive
<i>Lomandra longifolia</i>	3	60%	2	29%	positive
<i>Lophostemon suaveolens</i>	3	100%	2	22%	positive
<i>Melaleuca quinquenervia</i>	3	100%	3	38%	positive
<i>Melastoma affine</i>	2	100%	1	3%	positive
<i>Panicum simile</i>	2	60%	2	2%	positive
<i>Paspalidium distans</i>	2	80%	2	5%	positive
<i>Pteridium esculentum</i>	3	80%	2	20%	positive
<i>Pultenaea villosa</i>	2	100%	2	1%	positive
<i>Rhynchospora rubra</i>	2	20%	0	0%	positive
<i>Schoenus brevifolius</i>	3	80%	3	3%	positive
<i>Scleria levis</i>	2	20%	0	0%	positive
<i>Trachymene incisa</i>	1	20%	0	0%	positive
<i>Xanthorrhoea fulva</i>	2	60%	2	2%	positive
<i>Zoysia macrantha</i>	2	100%	4	4%	positive

## Community 21 Broad-leaved Paperbark–Swamp Oak–Rush Saline Swamp Sclerophyll Open Forest

**Scientific name:** Broad-leaved Paperbark (*Melaleuca quinquenervia*), Swamp Oak (*Casuarina glauca*), Twig Rush (*Baumea juncea*) and Black Bog-rush (*Schoenus brevifolius*) Saline Swamp Sclerophyll Open Forest.

**Sites:** (5) BYR02estsswp, CUD05esticd, BYR29estsswp, BYR37estsswp, CUD07CBSW.

### Equivalent communities

Forested Wetlands-Coastal Swamp Forests (Keith 2006); Qld Regional Ecosystems 12.2.7 *Melaleuca quinquenervia* open forest to woodland on Quaternary sands, and 12.1.1 *Casuarina glauca* ± *Melaleuca quinquenervia* (Young and Dillewaard 1999); F8 – *Melaleuca quinquenervia* tall to very tall open to closed forest, and F10 – *Casuarina glauca* tall to very tall open to closed forest (Pressey and Griffith 1992); 40031/2 *Melaleuca quinquenervia* swamp sclerophyll forest and woodland, 40051/2 *Casuarina glauca* forest and woodland, and 40991/2 Mixed stands of *Melaleuca quinquenervia*–*Casuarina glauca* NPWS NSW Coastal Vegetation (Griffith and Wilson 2007); 402 – Broad-leaved Paperbark/Swamp Sheoak Closed Forest to Woodland (Kingston *et al.* 2004); North-east NSW Forest Ecosystems 112 Paperbark and 143 Swamp Oak (NPWS 1999).

### Description

A low, open swamp sclerophyll community with a dense ground layer of sedges and rushes, including Twig Rush (*Baumea juncea*), Sea Rush (*Juncus kraussii* subsp. *australiensis*) and Black Bog-rush (*Schoenus brevifolius*), and an overstorey dominated by Broad-leaved Paperbark (*Melaleuca quinquenervia*) and Swamp Oak (*Casuarina glauca*). A shrubby mid-layer comprises sedges (including *Gahnia sieberiana*), shrubs (including *Leptospermum liversidgei*) and Wallum Bottlebrush (*Callistemon pachyphyllus*). Prickly Couch (*Zoysia macrantha*) and *Lepidosperma laterale* were abundant in site CUD07cbsw and Prickly Couch (*Sporobolus virginicus*) is common in site CUD05esticd.



### Distribution and Habitat

**Habitat:** A group of saline sites adjoining coastal barrier sand dunes and backbarrier flats. Some wallum shrubs influence the floristic composition of this group.

**Disturbance:** Includes moderate fire, and light infestation by weeds, and there is evidence of clearing at sites CUD05esticd and CUD07CBSW. There is no evidence of disturbance at BYR37estsswp.

**Example locations:** Belongil Creek, Cudgen Creek, Tallow Creek, and Cudgen.

### Conservation

**Threats:** Clearing, grazing and fire.

**Conservation status:** Site BYR37estsswp was located in Arakwal NP; Estuarine occurrences of Broad-leaved

Paperbark are represented in reserves of the study area, for example Cudgen NR and Arakwal NP.

**Significant taxa:** None recorded.

## Structure

Layer	Height (m)	Cover (%)
Tallest	2–15	20–60
Middle 1	1–2.5	20–50
Lower 1	0–1.5	90–100
Lower 2	0–0.4	20–95

## Floristics

**Trees:** *Melaleuca quinquenervia* (T), *Casuarina glauca* (T).

**Sub-canopy trees:** *Cupaniopsis anacardioides*.

**Shrubs:** *Callistemon pachyphyllus* (M1), *Xanthorrhoea fulva* (L1), *Leptospermum polygalifolium* subsp. *polygalifolium*, *Leptospermum liversidgei* (M1), *Banksia ericifolia* subsp. *macrantha*, *Banksia integrifolia* subsp. *integrifolia*, *Exocarpos latifolius*, *Homoranthus virgatus*, *Leptospermum whitei*, *Persoonia stradbokensis*, *Senna pendula* var. *glabrata*\*.

**Climbers:** *Cynanchum carnosum*, *Parsonsia straminea*.

**Mistletoes:** *Dendrophthoe vitellina*.

**Grasses** *Ischaemum australe*, *Zoysia macrantha* (L1), *Sporobolus virginicus* (L1), *Cynodon dactylon* (L1), *Hemarthria uncinata*.

**Ferns:** *Blechnum indicum* (M1), *Acrostichum speciosum*, *Azolla pinnata*, *Pteridium esculentum*, *Gleichenia dicarpa*.

**Sedges and rushes:** *Baumea juncea* (L1), *Schoenus brevifolius* (L1), *Juncus kraussii* subsp. *australiensis* (L1), *Gahnia sieberiana* (M1), *Lepidosperma laterale* (M1), *Leptocarpus tenax* (L1), *Baumea articulata*, *Phragmites australis*, *Schoenus nitens*

**Herbs and shrubs:** *Dampiera stricta*, *Leucopogon lanceolatus* var. *gracilis*, *Lobelia anceps*, *Aotus ericoides*, *Austromyrtus dulcis*, *Baccharis halimifolia*\*, *Banksia oblongifolia*, *Dianella caerulea*, *Epacris pulchella*, *Goodenia paniculata*, *Pimelea linifolia*.

**Number of native taxa:** 45

**Number of taxa per site:** 8–22 (mean 15 ± 6)

**Number of exotic taxa:** 2

## Indicator native taxa

Species	Group score	Group frequency	Non-group score	Non-group frequency	Fidelity class
<i>Casuarina glauca</i>	3	60%	3	21%	positive
<i>Dendrophthoe vitellina</i>	2	20%	0	0%	positive
<i>Ischaemum australe</i>	2	60%	2	6%	positive
<i>Melaleuca quinquenervia</i>	4	100%	3	38%	positive
<i>Schoenus brevifolius</i>	3	80%	3	3%	positive
<i>Schoenus nitens</i>	1	20%	0	0%	positive

## Community 22 Common Reed–Black Bog-Rush Reedland/Rushland of Coastal Lagoons and Saline Swamps

**Scientific name:** Common Reed (*Phragmites australis*) and Black Bog-rush (*Schoenoplectus brevifolius*)  
Reedland/Rushland of Coastal Lagoons and Saline Swamps.

**Sites:** (2) BYR09cbcl, BYR31estsswp.

### Equivalent communities

Freshwater Wetlands-Coastal Freshwater Lagoons (Keith 2006); Qld Regional Ecosystem 12.2.15 Coastal sedgeland wetland on Quaternary sands (Young and Dillewaard 1990); 65031 – *Phragmites australis* NPWS NSW Coastal Vegetation (Griffith and Wilson 2007); 703 – Freshwater Wetlands (Kingston *et al.* 2004).

### Description

A reedland with a dense cover of Common Reed (*Phragmites australis*) and Black Bog-rush (*Schoenus brevifolius*). Associated species include Mangrove Fern (*Acrostichum speciosum*), Twig Rush (*Baumea juncea*) and *Schoenoplectus subulatus*.

### Distribution and Habitat

**Habitat:** Fringing channels and the edges of coastal lagoons with an estuarine tidal or subaqueous influence.

**Disturbance:** Light infestation of weeds.

**Locations:** Taylors Lake and Tallow Creek.



### Conservation

**Threats:** Clearing, draining and weed invasion.

**Conservation status:** The reservation status of *Phragmites australis* Rushland has been assessed as fair on the NSW north coast (Griffith 2005). The community is known to occur in reserves from Hat Head NP, Lake Innes NR and Limeburners Creek NR. No occurrences were mapped by Griffith and Wilson (2007) on the FNC. The sites sampled in the present study were outside reserves.

**Significant taxa:** None recorded.

### Structure

Layer	Height (m)	Cover (%)
Lower 1	0–2	80–100



## Floristics

**Shrubs:** *Baccharis halimifolia*\*, *Hibiscus tiliaceus*.

**Climbers:** *Cynanchum carnosum*.

**Grasses** *Phragmites australis* (L1).

**Ferns:** *Acrostichum speciosum*.

**Sedges and rushes:** *Baumea juncea* (L1), *Schoenoplectus subulatus* (L1), *Schoenus brevifolius* (L1), *Typha domingensis*, *Cyperus polystachyos*, *Juncus kraussii* subsp. *australiensis*.

**Herbs and shrubs:** *Alternanthera denticulata*, *Apium prostratum*, *Aster subulatus*\*, *Bacopa monnieri*, *Crinum pedunculatum*, *Hydrocotyle bonariensis*\*, *Rhagodia candolleana* subsp. *candolleana*, *Sesuvium portulacastrum*, *Tetragonia tetragonioides*.



**Number of native taxa:** 18

**Number of taxa per site:** 10–16(mean 13 ± 4)

**Number of exotic taxa:** 3

## Indicator native taxa

Species name	Group score	Group frequency	Non-group score	Non-group frequency	Fidelity class
<i>Phragmites australis</i>	6	100%	2	7%	positive
<i>Baumea juncea</i>	4	100%	3	6%	positive
<i>Acrostichum speciosum</i>	3	100%	2	6%	positive
<i>Alternanthera denticulata</i>	2	50%	1	6%	positive
<i>Schoenus brevifolius</i>	3	50%	3	4%	positive
<i>Cyperus polystachyos</i>	2	50%	1	3%	positive
<i>Cynanchum carnosum</i>	2	50%	2	3%	positive
<i>Schoenoplectus subulatus</i>	3	50%	4	1%	positive
<i>Rhagodia candolleana</i> subsp. <i>candolleana</i>	1	50%	0	0%	positive
<i>Typha domingensis</i>	3	50%	0	0%	positive

## Community 23 Swamp Box–Broad-leaved Paperbark–Swamp Mahogany Swamp Sclerophyll Forest

**Scientific name:** Swamp Box (*Lophostemon suaveolens*), Broad-leaved Paperbark (*Melaleuca quinquenervia*) and Swamp Mahogany (*Eucalyptus robusta*) Swamp Sclerophyll Forest.

**Sites:** (2) BIL13cbrdg, CUD19alfan.

### Equivalent communities

Forested Wetlands-Coastal Swamp Forests, and Coastal Floodplain Wetlands (Keith 2006); Qld Regional Ecosystems 12.3.5 *Melaleuca quinquenervia* open forest on alluvium, and 12.2.7 *Melaleuca quinquenervia* open forest to woodland on Quaternary sands (Young and Dillewaard 1999); 309 – Coastal Swamp Box Open Forest to Woodland (Kingston *et al.* 2004); 4013 – *Melaleuca quinquenervia*–*Lophostemon suaveolens*/*Eucalyptus tereticornis* mid-high to very tall, open woodland to closed forest NPWS NSW Coastal Vegetation (Griffith and Wilson 2007); North-east NSW Forest Ecosystems 142 and 143 (NPWS 1999).

### Description

This community consists of two anomalous swamp sclerophyll forest sites linked by the presence of lower strata species. The community is a closed swamp sclerophyll forest with Swamp Box (*Lophostemon suaveolens*), Broad-leaved Paperbark (*Melaleuca quinquenervia*) and Swamp Mahogany (*Eucalyptus robusta*). Site CUD19alfan is an association of Broad-leaved Paperbark and Swamp Box, whereas site BIL13cbrdg is an association of Swamp Mahogany. The mid-layer of shrubs and small trees includes Swamp Mahogany, Broad-leaved Paperbark, Umbrella Cheese Tree (*Glochidion sumatranum*) and Willow Bottlebrush (*Callistemon salignus*). The sites have in common a dense lower layer of Swamp Ricegrass (*Leersia hexandra*) and *Persicaria strigosa*. Narrow-leaved Cumbungi (*Typha orientalis*) is abundant at site BIL13cbrdg; *Rhynchospora corymbosa* and Swamp Millet (*Isachne globosa*) are abundant in site CUD19alfan.

### Distribution and Habitat

**Habitat:** Swamp sclerophyll forests with coastal sandplain and alluvial influences. Site BIL13cbrdg had ecotonal coastal barrier sand species recorded in the site. Site CUD19 was located on an alluvial fan and may be more appropriately reallocated to Community 11.

**Disturbance:** BIL13cbrdg had been severely burnt, and CUD19alfan had been moderately burnt and lightly cleared and grazed.

**Locations:** Cobaki Broadwater, and Cudgen Road

### Conservation

**Threats:** Clearing, grazing, fire and logging.

**Conservation status:** Site CUD19alfan, on the alluvial floodplain, is an example of 'Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions' EEC. Neither survey site was reserved. Floodplain occurrences of this community are considered poorly reserved (Griffith 2005). Equivalent communities recorded in Bundjalung NP and Yuraygir NP (Griffith and Wilson 2007).

**Significant taxa:** *Eleocharis tetraquetra* (TSC: Endangered).

## Structure

Layer	Height (m)	Cover (%)
Tallest	10–22	60–70
Middle 1	3–10	30–50
Middle 2	2–3	60
Lower 1	0–1	60

## Floristics

**Trees:** *Eucalyptus robusta* (T), *Glochidion sumatranum* (T), *Melaleuca quinquenervia* (T), *Lophostemon suaveolens* (T).

**Sub-canopy trees:** *Callistemon salignus* (M1), *Cinnamomum camphora*\* (M1).

**Climbers:** *Parsonsia straminea*, *Lygodium microphyllum*.

**Grasses:** *Isachne globosa*, *Leersia hexandra*, *Axonopus fissifolius*\*, *Echinochloa crusgalli*\*, *Entolasia marginata*, *Paspalum wettsteinii*\*, *Sacciolepis indica*.

**Ferns:** *Blechnum cartilagineum*, *Blechnum indicum*, *Hypolepis muelleri*, *Lygodium microphyllum*.

**Sedges and rushes:** *Typha orientalis* (M2), *Rhynchospora corymbosa*, *Baumea rubiginosa*, *Cyperus pilosus*, *Schoenoplectus validus*, *Eleocharis acuta*, *Eleocharis tetraquetra*, *Sparganium subglobosum*, *Carex appressa*, *Cyperus haspan*, *Isolepis inundata*.

**Herbs and shrubs:** *Persicaria strigosa*, *Ranunculus inundatus*, *Enydra fluctuans*, *Philydrum lanuginosum*.

Number of native taxa: 28

Number of taxa per site: 14 (mean 14)

Number of exotic taxa: 3

## Indicator native taxa

Species	Group score	Group frequency	Non-group score	Non-group frequency	Fidelity class
<i>Baumea rubiginosa</i>	3	50%	2	3%	positive
<i>Blechnum cartilagineum</i>	3	50%	3	13%	positive
<i>Blechnum indicum</i>	2	50%	2	17%	positive
<i>Cyperus haspan</i>	2	100%	0	0%	positive
<i>Cyperus pilolus</i>	3	50%	0	0%	positive
<i>Eleocharis acuta</i>	2	50%	3	1%	positive
<i>Eleocharis tetraquetra</i>	2	50%	0	0%	positive
<i>Entolasia marginata</i>	2	50%	2	11%	positive
<i>Eucalyptus robusta</i>	5	50%	3	8%	positive
<i>Glochidion sumatranum</i>	3	100%	1	21%	positive
<i>Hypolepis muelleri</i>	3	100%	2	16%	positive
<i>Isachne globosa</i>	4	50%	0	0%	positive
<i>Leersia hexandra</i>	4	100%	2	3%	positive
<i>Melaleuca quinquenervia</i>	3	50%	3	39%	positive
<i>Parsonsia straminea</i>	2	50%	1	44%	positive
<i>Persicaria strigosa</i>	4	100%	2	7%	positive
<i>Ranunculus inundatus</i>	2	50%	2	3%	positive
<i>Rhynchospora corymbosa</i>	4	50%	3	0%	positive
<i>Sacciolepis indica</i>	2	50%	1	1%	positive
<i>Schoenoplectus validus</i>	3	50%	4	0%	positive
<i>Sparganium subglobosum</i>	2	50%	0	0%	positive
<i>Typha orientalis</i>	5	50%	2	0%	positive

## Community 24 Swamp Ricegrass (*Leersia hexandra*), *Lepironia articulata* – Smartweed–*Juncus usitatus* Swampy Meadow

**Scientific name:** Swamp Ricegrass (*Leersia hexandra*) *Lepironia articulata*, Smartweed (*Persicaria strigosa*) and *Juncus usitatus* Swampy Meadow.

**Sites:** (2) CUD13unfswp, CUD16estbb.

### Equivalent communities

Freshwater Wetlands-Coastal Freshwater Lagoons (Keith 2006); Qld Regional Ecosystem 12.2.15 Coastal Sedgeland Wetland (Young and Dillewaard 1999); 64051 – *Lepironia articulata* sedgeland (Griffith and Wilson, 2007); *Persicaria strigosa* forbland, *Juncus usitatus* rushland (Griffith 2005); 703 – Freshwater Wetlands (Kingston *et al.* 2004).

### Description

A derived wetland community dominated by *Lepironia articulata*, *Juncus usitatus* and Smartweed (*Persicaria strigosa*). Other associated species include Swamp Ricegrass (*Leersia hexandra*), *Eleocharis acuta* and Blue Couch (*Cynodon dactylon*).

### Distribution and Habitat

**Habitat:** Low-lying sites on freshwater swamp and estuarine sedimentary muds, in areas where the existing swamp sclerophyll vegetation has been cleared.

**Disturbance:** Sites had been lightly to moderately grazed, and there is moderate infestation by weeds.

**Locations:** West of Cudgen Lake, in the catchments of Clothiers and Reserve Creeks.

### Conservation

**Threats:** The community is an artefact of clearing (A. Benwell, pers. obs.). Other threats include draining, grazing and infestation by weeds.

**Conservation status:** This combination of species is not well recorded in the literature. Griffith (2005) assessed the reservation status of *Lepironia articulata* sedgeland community on the north coast of NSW as fair, and of *Juncus usitatus* rushlands and *Persicaria strigosa* forblands as poor. Survey sites were not in reserves.

**Significant taxa:** None recorded.

### Structure

Layer	Height (m)	Cover (%)
Tallest	0.5–2.5	40–60
Lower 1	0–0.5	90–95





## Floristics

**Grasses:** *Setaria sphacelata*\* (T), *Leersia hexandra* (L1), *Cynodon dactylon* (L1).

**Sedges and rushes:** *Lepironia articulata* (T), *Juncus usitatus* (T), *Eleocharis acuta* (L1), *Cyperus polystachyos*, *Juncus prismatocarpus*.

**Herbs and shrubs:** *Persicaria strigosa* (L1), *Ludwigia octovalvis*, *Persicaria dichotoma*, *Persicaria orientalis*\*, *Philydrum lanuginosum*, *Crassocephalum crepidioides*\*.

Number of native taxa: 13

Number of taxa per site: 8–11 (mean  $10 \pm 2$ )

Number of exotic taxa: 2

## Indicator native taxa

Species	Group score	Group frequency	Non-group score	Non-group frequency	Fidelity class
<i>Cynodon dactylon</i>	5	50%	3	5%	Positive
<i>Cyperus polystachyos</i>	2	50%	1	3%	Positive
<i>Eleocharis acuta</i>	5	50%	2	1%	Positive
<i>Juncus prismatocarpus</i>	2	50%	0	0%	Positive
<i>Juncus usitatus</i>	3	100%	1	3%	Positive
<i>Leersia hexandra</i>	4	100%	2	3%	Positive
<i>Lepironia articulata</i>	5	100%	2	4%	Positive
<i>Ludwigia octovalvis</i>	2	50%	1	0%	Positive
<i>Persicaria dichotoma</i>	2	50%	2	4%	Positive
<i>Persicaria orientalis</i>	2	50%	1	0%	Positive
<i>Persicaria strigosa</i>	4	100%	2	7%	Positive
<i>Philydrum lanuginosum</i>	2	50%	1	2%	Positive

## Community 25 Swamp Ricegrass–*Bolboschoenus caldwellii*–*Schoenoplectus validus*–*Cyperus exaltatus* Freshwater Wetland

**Scientific name:** Swamp Ricegrass (*Leersia hexandra*), *Bolboschoenus caldwellii*, *Schoenoplectus validus* and *Cyperus exaltatus* Freshwater Wetland.

**Sites:** (1) CUD14alf.

### Equivalent communities

Freshwater Wetlands-Coastal Freshwater Lagoons (Keith 2006); Qld Regional Ecosystem 12.2.15 Coastal Sedgeland Wetland (Young and Dillewaard 1999); 703 – Freshwater Wetlands (Kingston *et al.* 2004).

### Description

A freshwater wetland site dominated by Swamp Ricegrass (*Leersia hexandra*), *Bolboschoenus caldwellii*, *Schoenoplectus validus* and *Cyperus exaltatus*. This community is a floristic variation of Community 24 and is restricted to channels.

### Distribution and Habitat

**Habitat:** Located on the alluvial floodplain in fluvial sands and mud. A freshwater wetland community that has colonised drains and channels (A. Benwell, pers. comm.).

**Disturbance:** The site has been lightly cleared and moderately grazed, and the water weed *Nymphaea caerulea* subsp. *zanzibarensis* was present in the site.

**Location:** Clothiers Creek Bridge.

### Conservation

**Threats:** Clearing, draining and weeds.

**Conservation status:** Poor. The community is part of the 'Freshwater wetlands on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner' bioregions' EEC. Freshwater wetlands like this may have been more widespread on the floodplain in the past, but are now restricted to channels and drains over large areas of the alluvial plain owing to clearing and draining.

**Significant taxa:** None recorded.

### Structure

Layer	Height (m)	Cover (%)
Tallest	0.7–2.3	40
Middle 1	0.1–0.7	50
Lower 1	0–0.1	60



## Floristics

**Grasses:** *Leersia hexandra* (M1).

**Sedges and rushes:** *Schoenoplectus validus* (T), *Bolboschoenus caldwellii* (T), *Cyperus exaltatus*.

**Herbs and shrubs:** *Persicaria strigosa* (M1), *Ludwigia peploides* subsp. *montevidensis* (M1), *Nymphaea caerulea* subsp. *zanzibarensis*\* (L1).

**Number of native taxa:** 7

**Number of taxa per site:** 8

**Number of exotic taxa:** 1



## Indicator native taxa

Species	Group score	Group frequency	Non-group score	Non-group frequency	Fidelity class
<i>Bolboschoenus caldwellii</i>	4	100%	3	0%	positive
<i>Cyperus exaltatus</i>	2	100%	0	0%	positive
<i>Juncus usitatus</i>	2	100%	1	4%	positive
<i>Leersia hexandra</i>	5	100%	2	3%	positive

## Community 26 Hinterland Narrow-leaved Paperbark–Tea-tree Backswamp Shrublands–Sedgeland of Alluvial Backswamps

**Scientific name:** *Lepironia articulata* Sedgeland and Associated Narrow-leaved Paperbark (*Melaleuca alternifolia*) and Tea-tree (*Leptospermum brachyandrum*) Shrublands of Alluvial Backswamps.

**Sites:** (5) ELL04albk, ELL05albk, ELL11albk, ELL06albk, WOO17albk.

### Equivalent communities

Freshwater Wetlands-Coastal Freshwater Lagoons, and Forested Wetlands-Coastal Floodplain Wetlands (Keith 2006); Qld Regional Ecosystem 12.2.15 Coastal Sedgeland Wetland (Young and Dillewaard 1999); in part 64051 – *Lepironia articulata* sedgelands, NPWS NSW Coastal Vegetation (Griffith & Wilson 2007) and *Melaleuca alternifolia* swamp sclerophyll forests (Griffith, 2005)

### Description

A structurally variable freshwater wetland and swamp sclerophyll vegetation community. Sites ELL05albk, ELL11albk and WOO17albk are *Lepironia articulata* sedgeland communities with emergent Narrow-leaved Paperbark (*Melaleuca alternifolia*), Broad-leaved Paperbark (*Melaleuca quinquenervia*) and Swamp Box (*Lophostemon suaveolens*). Site ELL04albk is a low closed shrubland of *Leptospermum brachyandrum* and Narrow-leaved Paperbark, with a dense ground cover of *Lepironia articulata*, and emergent Swamp Box. Site ELL06albk is an open swamp sclerophyll forest of Broad-leaved Paperbark and *Leptospermum brachyandrum*.

### Distribution and Habitat

**Habitat:** These sites occur on heavily waterlogged backswamps and levees of the drainage plain of Bungawalbin Creek and are influenced by the input of sediment from the erosion of the Kangaroo Creek Sandstones.

**Disturbance:** No disturbance was recorded at sites ELL04albk and ELL05albk. Site WOO17albk was being logged. There was evidence ELL11albk had been lightly cleared in the past.

**Example locations:** Yarringgully Nature Reserve, Boggy Creek Road, and Reardon's Lane.

### Conservation

**Threats:** Clearing, logging and weeds.

**Conservation status:** Four sample sites were located in Yarringgully NR. This community qualifies as 'Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions' EEC. The reservation status of *Lepironia articulata* sedgelands is considered fair on the north coast (Griffith 2005). The reservation status of Narrow-leaved Paperbark (*Melaleuca alternifolia*)–*Leptospermum brachyandrum* shrublands is poorly known. Sedgeland sites dominated by *Lepironia articulata* equate to 'Freshwater wetlands on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions' EEC.

**Significant taxa:** None recorded.



## Structure

Layer	Height (m)	Cover (%)
Emergent	10–15	5
Tallest	4–25	3–35
Middle 1	2–6	10–60
Lower 1	0–2	40–80
Lower 2	0–0.3	5–10

## Floristics

**Trees:** *Melaleuca alternifolia*, *Lophostemon suaveolens* (E, T), *Melaleuca quinquenervia* (T), *Eucalyptus tereticornis*.

**Shrubs:** *Leptospermum brachyandrum* (M1), *Melaleuca alternifolia* (M1), *Callistemon pachyphyllus*.

**Climbers:** *Parsonsia straminea*.

**Grasses:** *Pseudoraphis paradoxa*, *Lachnagrostis filiformis*, *Panicum bisulcatum* (L1), *Cynodon dactylon*.

**Sedges and rushes:** *Lepironia articulata* (L1), *Baumea articulata* (L1), *Baumea rubiginosa* (L1), *Isolepis cernua*.

**Herbs and shrubs:** *Pseudoraphis paradoxa* (L1), *Lycopus australis* (L2), *Lycopus australis*, *Stylidium debile* var. *debile* (L2), *Centella asiatica* (L2), *Centipeda minima* var. *minima* (L2), *Persicaria strigosa* (L2), *Persicaria hydropiper*, *Hydrocotyle peduncularis*, *Hypericum japonicum*, *Ranunculus inundatus*, *Senecio madagascariensis*\*, *Viola banksii*.

Number of native taxa: 23

Number of taxa per site: 2–18 (mean 9 ± 6)

Number of exotic taxa: 6

## Indicator native taxa

Species	Group score	Group frequency	Non-group score	Non-group frequency	Fidelity class
<i>Lepironia articulata</i>	5	100%	2	3%	positive
<i>Pseudoraphis paradoxa</i>	2	80%	2	1%	positive
<i>Lachnagrostis filiformis</i>	2	80%	2	2%	positive
<i>Melaleuca alternifolia</i>	3	60%	1	3%	positive
<i>Centipeda minima</i>	2	20%	0	0%	positive



## Community 27 Weeping Myrtle–Water Gum Floodplain Riparian Forest

**Scientific name:** Weeping Myrtle (*Waterhousea floribunda*) and Water Gum (*Tristaniopsis laurina*) Floodplain Riparian Forest.

**Sites:** (1) GIB04alfl.

### Equivalent communities

Rainforest-Dry 'Gallery' Rainforests (Keith 2006); Qld Regional Ecosystems 12.3.1 Rainforest on alluvium (Young and Dillewaard 1999); Suballiance 26 – *Waterhousea floribunda*–*Tristaniopsis laurina* (Floyd 1990).

**Description:** A riparian open forest with emergent Swamp Box (*Lophostemon suaveolens*) and tallest layer of Weeping Myrtle (*Waterhousea floribunda*) and Water Gum (*Tristaniopsis laurina*). There is no mid-layer. The lower layer comprises a species depauperate cover of *Lomandra hystrix* and Palm Lily (*Cordlyne conegsta*).

### Distribution and Habitat

**Habitat:** A riparian creekline site on the Sandy Creek floodplain.

**Disturbance:** There was no evidence of disturbance at this site.

**Location:** Sandy Crossing Travelling Stock Route (TSR), Bungawalbyn.

### Conservation

**Threats:** Clearing, fragmentation and weed infestation.

**Conservation status:** This is a restricted and poorly reserved riparian rainforest community. Keith (2006) states that Gallery Dry Rainforests 'have suffered severely from the effects of clearing, fragmentation and weed invasion and that few of the remaining fragments are protected'. Floyd (1990) suggests that Suballiance 26 – *Waterhousea floribunda*–*Tristaniopsis laurina* is restricted to riparian strips and is unconserved. Occurrences of this community on the alluvial floodplain may qualify as Lowland Rainforest on floodplain of the NSW North Coast bioregion EEC.

**Significant taxa:** None recorded.

### Structure

Layer	Height (m)	Cover (%)
Emergent	30–35	15
Tallest	15–25	40
Lower 1	0–1	60

### Floristics

**Trees:** *Waterhousea floribunda* (T), *Lophostemon suaveolens* (E, T), *Tristaniopsis laurina* (T).

**Sub-canopy trees:** *Symplocos stawellii*.

**Shrubs:** *Acacia disparrima* subsp. *disparrima*, *Acmena smithii*, *Callistemon salignus*, *Myrsine variabilis*.

**Climbers:** *Morinda jasminoides*, *Parsonsia straminea*.

**Grasses:** *Otochloa gracillima*.

**Ferns:** *Pyrrosia confluens* var. *confluens*.

**Sedges and rushes:** *Lomandra hystrix* (L1), *Chorizandra cymbaria*.

**Herbs and shrubs:** *Cordyline stricta*, *Centella asiatica*.

Number of native taxa: 18

Number of taxa per site: 18

Number of exotic taxa: 0

### Indicator native taxa

Species	Group score	Group frequency	Non-group score	Non-group frequency	Fidelity class
<i>Lomandra hystrix</i>	5	100%	2	1%	positive
<i>Lophostemon suaveolens</i>	3	100%	2	23%	positive
<i>Morinda jasminoides</i>	2	100%	2	27%	positive
<i>Tristania laurina</i>	1	100%	0	0%	positive
<i>Watehousea floribunda</i>	4	100%	3	1%	positive

## Community 28 Narrow-leaved Paperbark–Wallum Bottlebrush Swamp Sclerophyll Shrubland

**Scientific name:** Narrow-leaved Paperbark (*Melaleuca alternifolia*), *Melaleuca sieberi* and Wallum Bottlebrush (*Callistemon pachyphyllus*) Swamp Sclerophyll Shrubland of Alluvial Backswamps.

**Sites:** (1) GIB06albk.

### Equivalent communities

Qld Regional Ecosystem 12.3.5 *Melaleuca quinquenervia* on alluvium (Young and Dillewaard 1999); Group 1 Swamp Sclerophyll Forest on coastal floodplains (Keith and Scott 2005). Possibly related to 4009 – *Melaleuca sieberi* swamp sclerophyll forest & woodland, and 5508 – *Melaleuca sieberi* tall sparse to closed shrubland NPWS NSW Coastal Vegetation (Griffith *et al.* 2000).

### Description

An open shrubland characterised by an upper layer of Narrow-leaved Paperbark (*Melaleuca alternifolia*), *Melaleuca sieberi* and Wallum Bottlebrush (*Callistemon pachyphyllus*). The lower layer comprises a dense cover of *Chorizandra cymbaria*. Only four species of plant were recorded in the only site surveyed.

### Distribution and Habitat

**Habitat:** An impeded drainage site found on stagnant alluvial backswamps of the meander plain of Bungawalbin Creek, with a possible influence of sandy soils.

**Disturbance:** The site has been subject to moderate levels of recent logging.

**Location:** Doubleduke State Forest (SF).

### Conservation

**Threats:** Logging and weeds.

**Conservation status:** Griffith (2005) records a *Melaleuca sieberi* shrubland community and a *Melaleuca sieberi* forest and woodland community and assessed the reservation status of these as fair. Community 28 of the present survey occurs on alluvial soils and although limited by sites sampling is structurally and floristic different from known similar swamp sclerophyll shrublands and needs further survey investigation. The Conservation status of the community is probably poor.

**Significant taxa:** None recorded.



## Structure

Layer	Height (m)	Cover (%)
Tallest	2–5	40
Lower 1	0–1	60

## Floristics

**Shrubs:** *Melaleuca alternifolia* (T), *Callistemon pachyphyllus* (T), *Melaleuca sieberi* (T).

**Herbs and shrubs:** *Chorizandra cymbaria* (L1).

Number of native taxa: 4

Number of taxa per site: 4

Number of exotic taxa: 0

## Indicator native taxa

Species	Group score	Group frequency	Non-group score	Non-group frequency	Fidelity class
<i>Callistemon pachyphyllus</i>	3	100%	2	3%	positive
<i>Chorizandra cymbaria</i>	5	100%	1	1%	positive
<i>Melaleuca alternifolia</i>	4	100%	2	3%	positive
<i>Melaleuca sieberi</i>	2	100%	1	2%	positive

## Community 29 Swamp Box–Narrow-leaved Paperbark–Broad-leaved Paperbark Alluvial Swamp Sclerophyll Forest

**Scientific name:** Swamp Box (*Lophostemon suaveolens*), Narrow-leaved Paperbark (*Melaleuca alternifolia*) and Broad-leaved Paperbark (*Melaleuca quinquenervia*) Swamp Sclerophyll Forest of Alluvial Backswamps.

**Sites:** (2) GIB08albk, GIB09albk.

### Equivalent communities

Forested Wetlands-Coastal Floodplain Wetlands (Keith 2006); Qld Regional Ecosystem 12.3.5 *Melaleuca quinquenervia* on alluvium (Young and Dillewaard 1999); possibly related to 309 – Coastal Swamp Box Open Forest to Woodland (Kingston *et al.* 2004); 4013 – *Melaleuca quinquenervia*–*Lophostemon suaveolens*/*Eucalyptus tereticornis* mid-high to very tall, open woodland to closed forest NPWS NSW Coastal Vegetation (Griffith *et al.* 2000).

Note, however, that these equivalent communities do not record *Melaleuca alternifolia* as an associate taxon.

### Description

An open, swamp sclerophyll forest of Swamp Box (*Lophostemon suaveolens*), Narrow-leaved Paperbark (*Melaleuca alternifolia*) and Broad-leaved Paperbark (*Melaleuca quinquenervia*), with an open mid-storey of Narrow-leaved Paperbark and Broad-leaved Paperbark. The lower layer consists of Spiny-headed Mat-rush (*Lomandra longifolia*), *Carex gaudichaudiana*, Woolly Waterlily (*Philydrum lanuginosum*) and Jointed Twig-rush (*Baumea articulata*).



### Distribution and Habitat

**Habitat:** Both sites are found on stagnant alluvial backswamps of the meander plain of the Bungawalbin Creek, and derived from sediments from the adjoining Grafton Formation and Kangaroo Creek Sandstones.

**Disturbance:** Moderate to light fire effects, and moderate to light clearing.

**Example locations:** Bungawalbyn SCA.

### Conservation

**Threats:** Clearing.

**Conservation status:** Both survey sites were in Bungawalbyn SCA. This community is a component of the 'Sub-tropical Coastal Floodplain Forest of the NSW North Coast bioregion' EEC. The NPWS NSW Coastal Vegetation Community 4013 – *Melaleuca quinquenervia*–*Lophostemon suaveolens*/*Eucalyptus tereticornis* mid-high to very tall, open woodland to closed forest (Griffith & Wilson 2007) is reserved in Broadwater NP and Bundjalung NP. The present community is possibly a sub-coastal variant of community 4013 in association with Narrow-leaved Paperbark.



**Significant taxa:** None recorded.

## Structure

Layer	Height (m)	Cover (%)
Tallest	15–25	20–30
Middle 1	2–10	10–20
Lower 1	0–1	20–30
Lower 2	0–0.5	40

## Floristics

**Trees:** *Lophostemon suaveolens* (T), *Melaleuca quinquenervia* (T), *Eucalyptus tereticornis* (T).

**Shrubs:** *Melaleuca alternifolia* (M1), *Baccharis halimifolia*\*, *Callistemon pachyphyllus*.

**Climbers:** *Parsonsia straminea*.

**Grasses:** *Imperata cylindrica* var. *major*, *Lachnagrostis filiformis*, *Entolasia marginata*.

**Sedges and rushes:** *Lomandra longifolia* (L1), *Baumea articulata* (L2), *Carex gaudichaudiana* (L1), *Baumea rubiginosa*, *Eleocharis dietricchiana*, *Baumea teretifolia*.

**Herbs and shrubs:** *Philydrum lanuginosum* (L1), *Alternanthera denticulata*, *Gonocarpus tetragynus*, *Goodenia paniculata*, *Philydrum lanuginosum*, *Stylidium debile* var. *debile*, *Triglochin procerum*, *Villarsia exaltata*, *Centella asiatica*, *Dianella longifolia*, *Enydra fluctuans*, *Haloragis heterophylla*, *Lobelia anceps*, *Ranunculus inundatus*.

**Number of native taxa:** 31

**Number of taxa per site:** 21–23 (mean 22 ± 1)

**Number of exotic taxa:** 1

## Indicator native taxa

Species	Group score	Group frequency	Non-group score	Non-group frequency	Fidelity class
<i>Alternanthera denticulata</i>	2	100%	1	6%	positive
<i>Baumea articulata</i>	2	100%	1	3%	positive
<i>Baumea rubiginosa</i>	2	100%	3	3%	positive
<i>Carex gaudichaudiana</i>	3	100%	0	0%	positive
<i>Eleocharis dietrichiana</i>	2	100%	0	0%	positive
<i>Goodenia paniculata</i>	2	100%	2	4%	positive
<i>Lophostemon suaveolens</i>	3	100%	2	22%	positive
<i>Melaleuca alternifolia</i>	3	100%	2	3%	positive
<i>Philydrum lanuginosum</i>	2	100%	1	2%	positive
<i>Stylidium debile</i>	2	100%	2	1%	positive
<i>Triglochin procerum</i>	2	100%	2	1%	positive
<i>Gonocarpus tetragynus</i>	2	50%	1	1%	positive
<i>Imperata cylindrica</i>	2	50%	2	21%	positive
<i>Lomandra longifolia</i>	3	50%	2	29%	positive
<i>Melaleuca quinquenervia</i>	3	50%	3	39%	positive
<i>Parsonsia straminea</i>	2	50%	1	44%	positive
<i>Villarsia exaltata</i>	2	50%	2	1%	positive
<i>Viola betonicifolia</i>	2	50%	1	1%	positive

## Community 30 Middle Richmond Freshwater Wetlands

**Scientific name:** *Azolla pinnata*, *Ludwigia peploides* subsp. *montevidensis*, *Phalaris minor*, *Hygrophila angustifolia* and *Juncus mollis* Freshwater Wetland.

**Sites:** (3) CAS01albk, CAS02albk, CAS03albk.

### Equivalent communities

Freshwater Wetlands-Coastal Freshwater Lagoons (Keith 2006); Qld Regional Ecosystems 12.3.8. Freshwater swamps (Young and Dillewaard 1999).

### Description

A freshwater wetland with *Azolla pinnata*, *Ludwigia peploides* subsp. *montevidensis*, *Phalaris minor*, *Hygrophila angustifolia* and *Juncus mollis*. The invasive weed Chinese Tallow (*Triadica sebifera*) occurs as a common emergent tree, with up to 40% cover. Water weeds are prevalent in the lower strata, including *Phalaris minor* and *Myriophyllum aquaticum*.



### Distribution and Habitat

**Habitat:** A backswamp on the fringe of a broad drainage depression on Barlings Creek, derived from fine-grained sediments from the deposition low sedimentary quartz soils of the Namoon Beds.

**Disturbance:** Light to severe weed infestation.

**Example locations:** Jabiru Geneenbinga wetland Casino.

### Conservation

**Threats:** Weed infestation by Chinese Tallow.

**Conservation status:** Poor. The community is part of the 'Freshwater wetlands on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions' EEC. Griffith and Wilson (2007) record a *Ludwigia peploides* ssp. *montevidensis*–*Nymphaea capensis*–*Persicaria attenuata* low to tall closed forland in the Newybar Embayment.

**Significant taxa:** None recorded.

### Structure

Layer	Height (m)	Cover (%)
Tallest	1–10	5–40
Middle 1	0.5–1.5	30
Lower 1	0.5–1	5–80
Lower 2	0–0.2	20–70

## Group 3–Coastal barrier sand sites and headland sites

### Community 31 Scribbly Gum–Red Mahogany–Brush Box dry sclerophyll Open to Closed Forest on Coastal Barrier Sands

**Scientific name:** Scribbly Gum (*Eucalyptus signata*), Red Mahogany (*Eucalyptus resinifera*) and Brush Box (*Lophostemon confertus*) Dry Sclerophyll Open to Closed Forest on Coastal Barrier Sands.

**Sites:** (9) BALL10cbrdg, BRU44cbrdg, BRU36esticd, BRU37estisw, BRU46estsswp, BIL12cbrdg, BRU41cbrdg, WAR10cbrdg, WAR46hsrlh.

#### Equivalent communities

Dry Sclerophyll Forests-Coastal Dune Dry Sclerophyll Forests (Keith 2006); Scribbly Gum (sG) (Landmark Ecological Services 1999); 306 – Coastal Scribbly Gum Open Forest to Woodland (Kingston *et al.* 2004); 3516: *Eucalyptus signata* tall to very tall, open woodland NPWS NSW Coastal Vegetation (Griffith *et al.* 2000); North-east NSW Forest Ecosystem 74 – Lowlands Scribbly Gum (NPWS 1999).

#### Description

An open to closed forest, with dominant overstorey trees including Scribbly Gum (*Eucalyptus signata*), Red Mahogany (*Eucalyptus resinifera* subsp. *hemilampra*) and Brush Box (*Lophostemon confertus*).

A mid-layer of shrubs is present, including *Baeckea frutescens*, Tree

Broom-heath (*Monotoca elliptica*), Wallum Banksia (*Banksia aemula*), Tooton (*Leptospermum polygalifolium*), Satinwood (*Nematolepis squamea* subsp. *squamea*) and Slender Tea-tree (*Leptospermum trinervium*). The most frequently occurring lower strata species are Spiny-headed Mat-rush (*Lomandra longifolia*), Bracken Fern (*Pteridium esculentum*), Midgen Berry (*Austromyrtus dulcis*), Plume Rush (*Baloskion tetraphyllum*) and *Leucopogon lanceolatus* var. *gracilis*.

#### Distribution and Habitat

**Habitat:** Found on Pleistocene barrier strandplains and backbarrier flats and high sedimentary quartz substrates.

**Disturbance:** There is some evidence of moderate to severe fire (15–80 years previously) at several sites. There was no evidence of disturbance at sites BRU36esticd and BRU37estisw.

**Example locations:** Lennox Head, Tandys Lane, Tyagarah Airfield, Tallow Creek, Brunswick Road, Boyd Street Tugun, and Pine Street at Wardell.



## Conservation

**Threats:** Not threatened.

**Conservation status:** In Byron Shire, a Scribbly Gum community was reported as being reserved in Mt Jerusalem NP and at Tyagarah NR (Landmark Ecological Services 1999). In the study area, small areas of Scribbly Gum forests are reserved in Ukerebagh NR, Broadwater NP, Billinudgel NR, Cudgen NR, Nightcap NP and Bundjalung NP. North-east NSW Forest Ecosystem 74 – Lowlands Scribbly Gum Forest was considered vulnerable (NPWS 1999).

**Significant taxa:** *Corokia whiteana* (TSC: Vulnerable).

## Structure

Layer	Height (m)	Cover (%)
Tallest	4–18	15–80
Middle 1	2–10	20–100
Lower 1	0–1	30–80
Lower 2	0–0.2	100

## Floristics

**Trees:** *Eucalyptus signata* (T), *Banksia aemula* (T), *Eucalyptus resinifera* subsp. *hemilampra* (T), *Lophostemon confertus* (T), *Melaleuca quinquenervia* (T), *Eucalyptus robusta*, *Cupaniopsis anacardioides*, *Callitris columellaris*, *Cinnamomum camphora*\*, *Corymbia gummifera*.

**Shrubs:** *Monotoca elliptica* (M1), *Leptospermum polygalifolium* (T), *Baekkea frutescens* (M1), *Leucopogon lanceolatus* var. *gracilis* (M1), *Nematolepis squamea* subsp. *squamea* (M1), *Leptospermum trinervium* (M1), *Leucopogon margarodes* (M1), *Elaeocarpus reticulatus*, *Xanthorrhoea macronema* (L1), *Leucopogon leptospermoides*, *Acrotriche aggregata* (M1), *Banksia serrata*, *Dodonaea triquetra*, *Endiandra sieberi*, *Leptospermum whitei*, *Acacia disparrima* subsp. *disparrima*, *Corokia whiteana*, *Melaleuca nodosa*, *Xanthorrhoea fulva*, *Acmena smithii*, *Aotus lanigera*, *Banksia oblongifolia*, *Duboisia myoporoides*, *Homoranthus virgatus*, *Agiortia pedicellata*, *Ochrosperma citriodorum*, *Ochrosperma lineare*, *Xanthorrhoea johnsonii*.

**Climbers:** *Hibbertia scandens*, *Pandorea pandorana*, *Cassytha filiformis*, *Kennedia rubicunda*, *Smilax glyciphylla*, *Stephania japonica*, *Cassytha glabella*, *Marsdenia rostrata*, *Smilax australis*.

**Epiphytes:** *Platyserium bifurcatum*.

**Grasses:** *Imperata cylindrica* var. *major*.

**Ferns:** *Pteridium esculentum* (L1), *Schizaea bifida*.

**Sedges and rushes:** *Baloskion tetraphyllum* (L1), *Lomandra longifolia* (L1), *Gahnia clarkei* (L1), *Caustis recurvata* (L1), *Hypolaena fastigiata*, *Lomandra elongata*, *Baloskion tenuiculme*.

**Herbs and shrubs:** *Austromyrtus dulcis* (L1), *Pomax umbellata* (L1), *Acacia ulicifolia* (L1), *Cryptostylis subulata*, *Dianella caerulea*, *Persoonia stradbrogensis*, *Acianthus pusillus*, *Boronia rosmarinifolia*, *Bossiaea heterophylla*, *Patersonia sericea*, *Platysace ericoides*, *Pseudanthus orientalis*, *Dampiera stricta*, *Caleana major*, *Dipodium punctatum*, *Drosera auriculata*, *Epacris pulchella*, *Gonocarpus micranthus*, *Mitrasacme polymorpha*, *Patersonia fragilis*, *Pimelea linifolia*, *Strangea linearis*, *Styphelia viridis* subsp. *breviflora*, *Viminaria juncea*, *Xyris complanata*.

**Number of native taxa:** 84

**Number of taxa per site:** 17–40 (mean 24 ± 8)

**Number of exotic taxa:** 2



## Indicator native taxa

Species	Group score	Group frequency	Non-group score	Non-group frequency	Fidelity class
<i>Pteridium esculentum</i>	3	100%	2	19%	positive
<i>Austromyrtus dulcis</i>	3	88%	2	14%	positive
<i>Pomax umbellata</i>	2	88%	2	7%	positive
<i>Baeckea frutescens</i>	3	63%	2	4%	positive
<i>Eucalyptus signata</i>	5	63%	2	1%	positive
<i>Monotoca elliptica</i>	3	63%	2	4%	positive
<i>Acacia ulicifolia</i>	2	50%	1	4%	positive
<i>Baloskion tetraphyllum</i>	5	50%	2	6%	positive
<i>Banksia aemula</i>	3	50%	4	2%	positive
<i>Elaeocarpus reticulatus</i>	2	50%	2	18%	positive
<i>Leptospermum trinervium</i>	2	50%	3	2%	positive
<i>Lomandra longifolia</i>	4	50%	2	29%	positive
<i>Lophostemon confertus</i>	3	50%	3	18%	positive
<i>Melaleuca quinquenervia</i>	3	50%	3	39%	positive
<i>Nematolepis squamea</i> subsp. <i>squamea</i>	3	50%	1	3%	positive
<i>Hypolaena fastigiata</i>	2	25%	0	0%	positive
<i>Acianthus pusillus</i>	2	13%	0	0%	positive
<i>Aotus lanigera</i>	1	13%	0	0%	positive
<i>Boronia rosmarinifolia</i>	2	13%	0	0%	positive
<i>Caleana major</i>	1	13%	0	0%	positive
<i>Corokia whiteana</i>	2	13%	0	0%	positive
<i>Dipodium punctatum</i>	1	13%	0	0%	positive
<i>Mitrasacme polymorpha</i>	1	13%	0	0%	positive
<i>Ochrosperma citriodorum</i>	1	13%	0	0%	positive
<i>Patersonia fragilis</i>	1	13%	0	0%	positive

## Community 32 Blackbutt–Turpentine Open Forest Complex

**Scientific name:** Blackbutt (*Eucalyptus pilularis*), Broad-leaved Paperbark (*Melaleuca quinquenervia*), Swamp Mahogany (*Eucalyptus robusta*) and Turpentine (*Syncarpia glomulifera*) Open Forest Complex.

**Sites:** (6) BRU15cbbbf, BRU16cbbbf, BRU23estchf, WAR13esttdf, WAR05cbrdg, WAR06cbr.

### Equivalent communities

Dry Sclerophyll Forests-Coastal Dune Dry Sclerophyll Forests (Keith 2006); Qld Regional Ecosystem 12.2.8 *Eucalyptus pilularis*, *E. microcorys*, *E. resinifera* & *Syncarpia hillii* Tall Open Forest (Young and Dillewaard 1999); 206 – Flooded Gum Open Forest, 211 – Turpentine ± Pink Bloodwood Open Forest, 307 – Coastal Blackbutt Open Forest to Woodland, 303 – Coastal Brush Box Open Forest to Woodland, and 305 – Coastal Swamp Mahogany Open Forest to Woodland (Kingston *et al.* 2004); Wet Sclerophyll Forests: 30041 – *Eucalyptus grandis*, 30051 – *Corymbia intermedia*, 30031 – *Lophostemon suaveolens*, 30181 – *Eucalyptus pilularis* - *Corymbia intermedia* Swamp Sclerophyll Forests & Woodlands: 40021 – *Eucalyptus robusta* Swamp Sclerophyll Forest and Woodland. Dry Sclerophyll Forests and Woodlands: 35051 – *Eucalyptus pilularis* - *Corymbia gummifera*, 35061 – *Eucalyptus pilularis* - *Angophora costata*/*Corymbia gummifera*/*E. planchoniana*, 35281 – *Corymbia intermedia*, 35291 – *Eucalyptus pilularis* - *Corymbia intermedia*, 35501 – *Eucalyptus pilularis* - *Corymbia gummifera*/*E. planchoniana*, 35581 – *Eucalyptus pilularis* - *Corymbia intermedia*/*Angophora costata*, 35561 – *Syncarpia glomulifera*, 35711 – *Syncarpia glomulifera* subsp. *glomulifera* – *Corymbia intermedia* (Griffith and Wilson 2007); Flooded Gum (fG), Blackbutt (BB), Swamp Mahogany/Swamp Box (SMB) (Landmark Ecological Services 1999); North-east NSW Forest Ecosystem 32 – Dry Foothills Blackbutt–Turpentine (NPWS 1999).

### Description

A complex mosaic of tall, moist open forest overstorey species. There is considerable variation in the tallest strata, which are recognised within several mapping classifications.

(1) Site WAR05cbrdg is a tall open forest of Flooded Gum (*Eucalyptus grandis*) and Pink Bloodwood (*Corymbia intermedia*). (2) Sites BRU16cbbbf and WAR13esttdf are swamp sclerophyll open forests with Swamp Mahogany (*Eucalyptus robusta*) and Swamp Box (*Lophostemon suaveolens*). (3) Blackbutt (*Eucalyptus pilularis*) is the dominant tree species in sites BRU15cbbbf and BRU23estchf. (4) Site WAR06cbr is an open forest of Turpentine (*Syncarpia glomulifera*) and Brush Box (*Lophostemon confertus*).

The sites appear to be grouped on the basis of species in the middle and lower strata. The mid-layer is an open to closed, tree or shrub layer with Hard Corkwood (*Endiandra sieberi*), Tree Heath (*Trochocarpa laurina*), Blueberry Ash (*Elaeocarpus reticulatus*) and *Baeckea frutescens*. A lower layer consists of Plume Rush (*Baloskion tetraphyllum*), Saw Sedge (*Gahnia clarkei*), Spiny-headed Mat-rush (*Lomandra longifolia*), Midgen Berry (*Austromyrtus dulcis*), Bracken Fern (*Pteridium esculentum*), and *Pomax umbellata*.

### Distribution and Habitat

**Habitat:** Coastal sandplain sites transitional between wetter backbarrier flats and drier strandplain sites on



Pleistocene barrier sands.

**Disturbance:** There has been some moderate to light burning (20–50 years previously) and some incursions by weeds, and there is some evidence of light clearing at sites BRU15cbbbf and BRU16cbbbf. However, there is no evidence of disturbance at site WAR05cbrdg.

**Example locations:** Tuckean Broadwater, Brunswick Heads, and Lumleys Road at Wardell.

## Conservation

**Threats:** Clearing.

**Conservation status:** Assessment of the Conservation status of such a disparate grouping of overstorey sites is problematic. Most of the overstorey associations listed above are represented in reserves in the study area, but as relatively small areas. Only overstorey association 35291 – *Eucalyptus pilularis* - *Corymbia intermedia*, 35501 – *Eucalyptus pilularis* - *Corymbia gummifera*/E. *planchoniana* appears well reserved in Bundjalung NP (Griffith and Wilson, 2007)

**Significant taxa:** *Arthrochilus prolixus* (ROTAP: 3K), *Cordyline congesta* (ROTAP: 2RC-).

## Structure

Layer	Height (m)	Cover (%)
Tallest	15–40	15–60
Middle 1	3–25	10–70
Middle 2	1–5	15–40
Lower 1	0–1.5	5–90
Lower 2	0–0.5	40

## Floristics

**Trees:** *Endiandra sieberi* (T), *Eucalyptus pilularis* (T), *Melaleuca quinquenervia* (T), *Eucalyptus robusta* (T), *Syncarpia glomulifera* (T), *Eucalyptus resinifera* subsp. *hemilampra* (T), *Lophostemon suaveolens* (T), *Corymbia intermedia* (T), *Eucalyptus grandis* (T), *Lophostemon confertus* (T), *Eucalyptus signata* (T), *Archontophoenix cunninghamiana*.

**Sub canopy trees and saplings:** *Livistona australis*, *Melicope elleryana*, *Cupaniopsis anacardioides*, *Jagera pseudorhus* var. *pseudorhus* forma *pseudorhus*, *Guioa semiglaucula*, *Cinnamomum camphora*\*, *Ficus watkinsiana*, *Sarcopteryx stipata*, *Syzygium oleosum*, *Commersonia bartramia*, *Dysoxylum mollissimum* subsp. *molle*, *Flindersia schottiana*, *Litsea australis*, *Pittosporum revolutum*.

**Shrubs:** *Baeckea frutescens* (M1), *Elaeocarpus reticulatus* (M1), *Trochocarpa laurina* (M1), *Nematolepis squamea* subsp. *squamea* (M1), *Pilidiostigma glabrum*, *Banksia serrata*, *Myrsine howittiana*, *Senna pendula* var. *glabrata*\*, *Tasmannia insipida*, *Acacia concurrens*, *Alyxia ruscifolia*, *Ardisia crenata*\*, *Banksia oblongifolia*, *Callistemon salignus*, *Lantana camara*\*, *Leptospermum polygalifolium* subsp. *cismontanum*, *Myrsine variabilis*, *Oxylobium arborescens*.

**Climbers:** *Smilax glycyphylla* (L2), *Smilax australis* (M2), *Parsonsia straminea*, *Marsdenia rostrata* (L1), *Hibbertia scandens* (L2), *Marsdenia fraseri*, *Pandorea pandorana*, *Cissus hypoglauca*, *Cassytha glabella*, *Cissus antarctica*, *Echinostephia aculeata*, *Geitonoplesium cymosum*, *Kennedia rubicunda*, *Lygodium microphyllum*, *Morinda jasminoides*.

**Epiphytes:** *Platyterium bifurcatum*, *Cymbidium suave*, *Platyterium superbum*.

**Grasses:** *Paspalidium distans*, *Axonopus compressus*\*, *Ottochloa gracillima*, *Andropogon virginicus*\*, *Entolasia stricta*, *Ischaemum australe*.

**Ferns:** *Pteridium esculentum* (L1), *Todea barbara*, *Blechnum indicum*, *Hypolepis muelleri*, *Calochlaena dubia*, *Lygodium microphyllum*.

**Sedges and rushes:** *Baloskion tetraphyllum* (L1), *Gahnia clarkei* (L1), *Lomandra longifolia* (L1).

**Herbs and shrubs:** *Baeckea frutescens* (M1), *Austromyrtus dulcis* (L1), *Acrotriche aggregata* (M2), *Pomax umbellata* (L2), *Cryptostylis erecta*, *Cordyline congesta*, *Arthrochilus prolixus*, *Breynia oblongifolia*, *Chiloglottis diphylla*, *Cordyline rubra*, *Dianella caerulea*, *Alpinia arundelliana*, *Cordyline petiolaris*, *Desmodium rhytidophyllum*, *Gonocarpus tetragynus*, *Leucopogon lanceolatus* var. *gracilis*, *Melastoma affine*, *Platysace lanceolata*.

Number of native taxa: 89

Number of taxa per site: 26–42 (mean 33 ± 7)

Number of exotic taxa: 7

### Indicator native taxa

Species	Group score	Group frequency	Non-group score	Non-group frequency	Fidelity class
<i>Austromyrtus dulcis</i>	2	86%	2	14%	Positive
<i>Baeckea frutescens</i>	6	57%	2	4%	Positive
<i>Baloskion tetraphyllum</i>	4	86%	2	6%	Positive
<i>Chiloglottis diphylla</i>	2	14%	0	0%	Positive
<i>Elaeocarpus reticulatus</i>	2	100%	2	17%	Positive
<i>Endiandra sieberi</i>	3	100%	1	9%	Positive
<i>Eucalyptus pilularis</i>	5	57%	3	6%	Positive
<i>Gahnia clarkei</i>	3	86%	3	16%	Positive
<i>Livistona australis</i>	2	86%	1	14%	Positive
<i>Marsdenia fraseri</i>	1	43%	0	0%	Positive
<i>Melaleuca quinquenervia</i>	2	57%	3	39%	Positive
<i>Melicope elleryana</i>	2	57%	2	19%	Positive
<i>Nematolepis squamea</i> subsp. <i>squamea</i>	2	57%	3	3%	Positive
<i>Parsonsia straminea</i>	2	86%	1	44%	Positive
<i>Platysace lanceolata</i>	1	14%	0	0%	Positive
<i>Pomax umbellata</i>	2	86%	2	8%	Positive
<i>Pteridium esculentum</i>	2	86%	2	19%	Positive
<i>Smilax australis</i>	2	86%	2	41%	Positive
<i>Smilax glyciophylla</i>	2	100%	1	6%	Positive
<i>Trochocarpa laurina</i>	2	71%	2	12%	Positive



## Community 33 Coast Cypress Pine on Dunes and Ridges

**Scientific name:** Coast Cypress Pine (*Callitris collumelaris*) on Dunes and Ridges.

**Sites:** (3) BRU19cbrdg, POT31cbrdg, WOO28cbdne.

### Equivalent communities

Dry Sclerophyll Forests-Coastal Dune Dry Sclerophyll Forests (Keith 2006); Qld Regional Ecosystem 12.2.5 Open forest to low closed forest of Quaternary coastal dunes and beaches (Young and Dillewaard 1999); 313 – Cypress Pine Open Forest to Woodland (Kingston *et al.* 2004); Cypress Pine (CP) (Landmark Ecological Services 1999); 3502 – Dry sclerophyll forest & woodland NPWS NSW Coastal Vegetation (Griffith & Wilson 2007); North-east NSW Forest Ecosystem 22 – Coast Cypress Pine (NPWS 1999).

### Description

A closed forest dominated by Coast Cypress Pine (*Callitris collumelaris*). An open middle strata comprises Coast Cypress Pine, Tantoon (*Leptospermum polygalifolium*), Salwood (*Acacia disparrima* subsp. *disparrima*) and Lancewood (*Acacia aulacocarpa*). An open to dense lower layer is present in which *Cyperus stradbrokeensis*, *Pomax umbellata*, *Leucopogon leptospermoides* and Spiny-headed Mat-rush (*Lomandra longifolia*) are abundant.

### Distribution and Habitat

**Habitat:** This community occurs on beach ridge and transgressive dunes of Pleistocene and Holocene age, and shell material is often obvious in *Callitris* communities with links to midden material at one confirmed location (Griffith 1999).

**Disturbance:** There have been light to moderately intense fires (30–60 years previously). Site WOO28cbdne had been lightly logged, and there was evidence of clearing at site POT31cbrdg. Steve Griffith (pers. comm.) observed virtually no seedling recruitment of *C. collumelaris* in extensive areas of *Eucalyptus pilularis* and *Callitris* that was severely burnt in Bundjalung NP, and suggests that the fire may have consumed the seed bank.

**Example locations:** Broadwater NP, Arakwal NP, and Tyagarah NR.

### Conservation

**Threats:** Clearing.

**Conservation status:** Survey sites were located in Broadwater NP, Arakwal NP and Billinudgel NR. Griffith and Wilson (2007) record only 52 ha of Coast Cypress Pine in reserves on the north coast of NSW. In the study area, they recorded Coast Cypress Pine in Broadwater NP (16 ha) and Bundjalung NP (7 ha); and approximately 25 ha is mapped within Billinudgel NR. The North-east NSW Forest Ecosystem 22 – Coastal Cypress Pine was assessed as rare (NPWS 1999). The NSW Scientific Committee has made a preliminary determination to list Coastal Cypress Pine Forest in the NSW North Coast Bioregion as an EEC.





**Significant taxa:** None recorded.

## Structure

Layer	Height (m)	Cover (%)
Emergent	15–20	15
Tallest	10–17	70
Middle 1	1–10	15–30
Lower 1	0–1	30–70

## Floristics

**Trees:** *Callitris columellaris* (T), *Eucalyptus resinifera* subsp. *hemilampra* (E), *Euroschinus falcata* var. *falcata* (T), *Acronychia imperforata*, *Corymbia intermedia*, *Cupaniopsis anacardioides*, *Eucalyptus pilularis* (T), *Melicope elleryana*.

**Sub-canopy trees:** *Polyscias elegans*.

**Shrubs:** *Monotoca elliptica* (M1), *Leptospermum polygalifolium* subsp. *polygalifolium* (M1), *Acacia disparrima* subsp. *disparrima* (M1), *Acacia aulacocarpa* (M1), *Acacia longifolia* subsp. *sophorae*, *Leucopogon margarodes* (M1), *Zieria smithii*, *Persoonia stradbokensis* (M1), *Homoranthus virgatus*, *Oxylobium robustum*, *Pittosporum revolutum*.

**Climbers:** *Kennedia rubicunda*, *Marsdenia rostrata*, *Parsonsia straminea*, *Smilax australis*, *Solanum seaforthianum*\*.

**Grasses:** *Panicum maximum*\*, *Ottochloa gracillima*, *Oplismenus imbecillis*.

**Ferns:** *Pteridium esculentum* (L1), *Davallia solida* var. *pyxidata*, *Pyrrosia rupestris*, *Microsorium pustulatum*.

**Sedges and rushes:** *Cyperus stradbokensis* (L1), *Lomandra longifolia* (L1), *Coleocarya gracilis*, *Schoenus ericetorum*.

**Herbs and shrubs:** *Pomax umbellata* (L1), *Austromyrtus dulcis* (L1), *Leucopogon leptospermoides*, *Monotoca elliptica*, *Commelina cyanea*, *Acacia suaveolens*, *Acacia ulicifolia*, *Asparagus aethiopicus*\*, *Astroloma pinifolium*, *Bryophyllum delagoense*\*, *Dianella caerulea*, *Leucopogon margarodes*, *Sida cordifolia*, *Solanum nigrum*\*, *Acrotriche aggregata*, *Caladenia carnea*, *Jasminum didymum*, *Leucopogon ericoides*, *Platysace ericoides*, *Rhaphiolepis indica*\*, *Stylidium laricifolium*.

**Number of native taxa:** 59

**Number of taxa per site:** 17–50 (mean 29 ± 18)

**Number of exotic taxa:** 8

## Indicator native taxa

Species	Group score	Group frequency	Non-group score	Non-group frequency	Fidelity class
<i>Acacia aulacocarpa</i>	3	33%	0	0%	positive
<i>Acacia ulicifolia</i>	2	67%	1	4%	positive
<i>Astroloma pinifolium</i>	2	33%	0	0%	positive
<i>Austromyrtus dulcis</i>	3	67%	2	15%	positive
<i>Caladenia carnea</i>	1	33%	0	0%	positive
<i>Callitris columellaris</i>	6	100%	2	1%	positive
<i>Cyperus strabroakensis</i>	3	100%	2	5%	positive
<i>Dianella caerulea</i>	2	67%	1	29%	positive
<i>Euroschinus falcata</i> var. <i>falcata</i>	3	67%	2	5%	positive
<i>Leucopogon leptospermoides</i>	3	67%	1	4%	positive
<i>Lomandra longifolia</i>	4	67%	2	29%	positive
<i>Microsorium pustulatum</i>	1	33%	0	0%	positive
<i>Monotoca elliptica</i>	2	100%	3	5%	positive
<i>Oxylobium robustum</i>	1	33%	0	0%	positive
<i>Paspalidium distans</i>	2	67%	2	6%	positive
<i>Pomax umbellata</i>	3	100%	2	8%	positive
<i>Sida cordifolia</i>	1	33%	0	0%	positive
<i>Stylidium laricifolium</i>	1	33%	0	0%	positive

## Community 34 Coast Banksia Frontal Dune Open Forest on Holocene Dunes

**Scientific name:** Coast Banksia (*Banksia integrifolia* subsp. *integrifolia*) Frontal Dune Open Forest on Holocene Dunes.

**Sites:** (6) BRU03cbdne, BRU27cbdne, BRU28cbdne, BYR12cbdne, BYR11cbdne, TWE19cbdne.

### Equivalent communities

Qld Regional Ecosystem 12.2.5 Open forest to low closed forest of Quaternary coastal dunes and beaches (Young and Dillewaard 1999); 310 – Banksia Dry Sclerophyll Open Forest to Shrubland (Kingston *et al.* 2004); Coast Banksia (CB1) (Landmark Ecological Services 1999); 3523 – *Banksia integrifolia* subsp. *integrifolia* NPWS NSW Coastal Vegetation (Griffith & Wilson 2007); North-east NSW Forest Ecosystem 5 – Banksia (NPWS 1999).

### Description

An open to closed forest in which Coast Banksia (*Banksia integrifolia* subsp. *integrifolia*) dominates the tallest strata. Horsetail Sheoak (*Casuarina equisetifolia* subsp. *incana*) is dominant in site TWE19cbdne. A closed mid-strata of littoral rainforest species, such as Logan Apple (*Acronychia imperforata*) and Tuckeroo (*Cupaniopsis anacardioides*) is present. Bitou Bush (*Chrysanthemoides monilifera* subsp. *rotundata*) is a frequent mid-strata species. The lower layer contains Spiny-headed Mat-rush (*Lomandra longifolia*) and *Cyperus strabroakensis*. Exotic species, such as Asparagus Fern (*Asparagus aethiopicus*) and Bitou Bush are often dominant lower strata species.



### Distribution and Habitat

**Habitat:** All sites were located on seaward aspects of Holocene sand-dunes. Littoral rainforest trees may establish in sheltered sites or in senescent stand of the community or in those sites where fire has been absent for long periods (Griffith 1999).

**Disturbance:** There is evidence of severe clearing at sites BRU03cbdne, BRU27cbdne and BRU28cbdne as a result of mining, and there was moderate to severe invasions of weeds in all sites. Horse-tail Sheoak had been planted at TWE19cbdne for rehabilitation of the mining site. Moderate disturbance by fire was also evident at sites BRU27cbdne and BRU28cbdne.

**Example locations:** New Brighton, Broken Head NR, and Dreamtime Beach at Fingal.

### Conservation

**Threats:** Clearing and infestation by exotic Bitou Bush.

**Conservation status:** Fairly undisturbed examples of this community are uncommon. This dunal community has been subject to considerable disturbance from sand-mining and clearing in the past, and Bitou Bush is invading this

community. On the FNC the community is mapped from Richmond River NR and Bundjalung NP (Griffith *et al.* 2000). It is also reserved in Ukerebagh NR and Wooyung NR (Kingston *et al.* 2004) Ecograph), Arakwal NP (Baker 2000), Cape Byron SCA and Broken Head NR (Landmark Ecological Services, 1999). The community is also found in Crown Reserves along the coast managed by the NSW Department of Lands (A. Benwell, pers. comm.).

**Significant taxa:** *Cordyline congesta* (ROTAP: 2RC-), *Cryptocarya foetida* (TSC: Vulnerable).

## Structure

Layer	Height (m)	Cover (%)
Tallest	4–20	30–70
Middle 1	2–10	60–90
Middle 2	1–2	90
Lower 1	0–2	20–60
Lower 2	0–0.5	30

## Floristics

**Trees:** *Banksia integrifolia* subsp. *integrifolia* (T), *Acronychia imperforata* (T), *Casuarina equisetifolia* subsp. *incana* (T), *Lophostemon confertus* (T), *Flindersia bennettiana* (T), *Eucalyptus robusta*, *Ficus watkinsiana*.

**Sub-canopy trees:** *Cupaniopsis anacardioides* (M1), *Alphitonia excelsa*, *Cryptocarya foetida*, *Syzygium luehmannii*.

**Shrubs:** *Acacia concurrens* (T), *Acacia disparrima* subsp. *disparrima* (T), *Euroschinus falcata* var. *falcata* (T), *Macaranga tanarius* (T), *Chrysanthemoides monilifera* subsp. *rotundata*\* (M1), *Litsea australis* (M1), *Syzygium oleosum* (M1), *Polyscias elegans* (M1), *Acacia melanoxylon*, *Backhousia myrtifolia*, *Elaeocarpus obovatus*, *Flindersia schottiana*, *Notelaea longifolia*, *Notelaea venosa*, *Rhodomyrtus psidioides*, *Senna pendula* var. *glabrata*\*, *Xanthorrhoea macronema*, *Cryptocarya triplinervis* var. *triplinervis* (M1), *Callistemon salignus* (M1), *Acmena hemilampra* subsp. *hemilampra* (M1), *Acmena smithii* (M1), *Acacia longifolia* subsp. *sophorae*, *Alectryon coriaceus*, *Denhamia celastroides*, *Guioa semiglaucula*, *Halfordia kendack*, *Lantana camara*\*, *Pittosporum revolutum*, *Pittosporum undulatum*.

**Climbers:** *Cissus hypoglauca* (M1), *Smilax australis* (L1), *Cassytha pubescens*, *Cayratia clematidea*, *Cissus antarctica*, *Coelospermum paniculatum*, *Flagellaria indica*, *Geitonoplesium cymosum*, *Hibbertia scandens*, *Ipomoea cairica*\*, *Marsdenia rostrata*, *Pandorea pandorana*, *Stephania japonica* var. *discolour*.

**Epiphytes:** *Asplenium australasicum* f. *australasicum*.

**Grasses:** *Oplismenus imbecillis* (L1), *Eragrostis interrupta*, *Oplismenus aemulus*, *Ottochloa gracillima*.

**Ferns:** *Pteridium esculentum* (M2), *Asplenium australasicum* f. *australasicum*, *Davallia solida* var. *pyxidata*.

**Sedges and rushes:** *Lomandra longifolia* (L1), *Cyperus stradbrokeensis* (L1), *Cyperus gracilis*, *Ficinia nodosa*.

**Herbs and shrubs:** *Dianella congesta* (L1), *Alpinia arundelliana* (L2), *Alyxia ruscifolia*, *Cordyline congesta*, *Dianella caerulea* (L1), *Pomax umbellata* (L1), *Austromyrtus dulcis* (L2), *Acrotriche aggregata*, *Commelina cyanea*, *Dianella crinoides*, *Gloriosa superba*\*, *Monotoca elliptica* (M1), *Asparagus aethiopicus*\* (L1), *Breynia oblongifolia*, *Viola banksii*.

**Number of native taxa:** 88

**Number of taxa per site:** 21–43 (mean 30 ± 8)

**Number of exotic taxa:** 9

## Indicator native taxa

Species	Group score	Group frequency	Non-group score	Non-group frequency	Fidelity class
<i>Acronychia imperforata</i>	3	83%	2	4%	positive
<i>Alphitonia excelsa</i>	2	50%	2	26%	positive
<i>Austromyrtus dulcis</i>	2	50%	2	15%	positive
<i>Backhousia myrtifolia</i>	2	50%	0	0%	positive
<i>Banksia integrifolia</i>	4	100%	2	6%	positive
<i>Cupaniopsis anacardioides</i>	3	100%	1	33%	positive
<i>Cyperus stradbokensis</i>	2	100%	2	4%	positive
<i>Dianella caerulea</i>	2	50%	1	29%	positive
<i>Lomandra longifolia</i>	3	67%	2	29%	positive
<i>Lophostemon confertus</i>	3	50%	3	19%	positive
<i>Notelaea venosa</i>	2	17%	0	0%	positive
<i>Polyscias elegans</i>	2	67%	1	5%	positive
<i>Pteridium esculentum</i>	3	50%	2	20%	positive
<i>Smilax australis</i>	3	100%	2	41%	positive
<i>Syzygium oleosum</i>	3	67%	2	12%	positive



## Community 35 Brush Box Lowland Rainforest

**Scientific name:** Brush Box (*Lophostemon confertus*), Bennett's Ash (*Flindersia bennettiana*) and Logan Apple (*Acronychia imperforata*) Lowland Rainforest.

**Sites:** (6) POT09alfan, TWE11esttdf, TWE12esttdf, TWE27cbtd, TWE28cbdne, TWE32vbrh.

### Equivalent communities

Rainforest-Subtropical Rainforest (Keith 2006); F2 – *Lophostemon confertus* tall to very tall closed forest (Pressey and Griffith 1992); 303 – Coastal Brush Box Open Forest to Woodland (Kingston *et al.* 2004); Brush Box (Bb) (Landmark Ecological Services 1999); 3002 – *Lophostemon confertus* mid-high to very tall, open to closed forest (Griffith & Wilson 2007); Suballiance 18 – *Lophostemon confertus* (Floyd 1990); North-east NSW Forest Ecosystem 50 – Wet Bangalow–Brushbox (NPWS 1999).

### Description

A closed forest community with abundant Brush Box (*Lophostemon confertus*), and often associated with Bennett's Ash (*Flindersia bennettiana*), Logan Apple (*Acronychia imperforata*), Bangalow Palm (*Archontophoenix cunninghamiana*), Rose Walnut (*Endiandra discolor*), Hard Corkwood (*Endiandra sieberi*), Three-veined Laurel (*Cryptocarya triplinervis*), Cheese Tree (*Glochidion ferdinandi*) and *Mischocarpus pyriformis* subsp. *pyriformis*. The mid-strata comprises species such as Blue Lilly Pilly (*Syzygium oleosum*), Stinking Laurel (*Cryptocarya foetida*), Pear-fruited Tamarind (*Mischocarpus pyriformis* subsp. *pyriformis*), Coogera (*Arytera divaricata*), Broad-leaved Native Cherry (*Exocarpos latifolius*) and Mock Olive (*Notelaea longifolia*).



An open lower strata of Saw Sedge (*Gahnia clarkei*), Lawyer Vine (*Smilax australis*), Native Sarsparilla (*Smilax glycyphylla*), Palm Lily (*Cordyline congesta*), Canary Beech (*Polyalthia nitidissima*), Thin-leaved Coondoo (*Pouteria chartacea*) and Spiny-headed Mat-rush (*Lomandra longifolia*) is present.

### Distribution and Habitat

**Habitat:** Lowland sites associated with the estuarine plain of the Tweed River and Pleistocene barrier dunes.

**Disturbance:** Sites show moderate levels of burning (fires 15–20 years previously); and infestation by weeds is light to severe (TWE32vbrh). There has been severe clearing at site POT09alfan, and there is evidence of light to moderate logging at sites TWE11esttdf and TWE32vbrh.

**Example locations:** Ukerebagh NR, Billinudgel NR, Barneys Point, Shallow Point and Fingal.

### Conservation

**Threats:** Clearing, logging and weeds.

**Conservation status:** The Conservation status of Forest Ecosystem 50 – Wet Bangalow–Brushbox has been assessed as vulnerable (NPWS 1999). Floyd (1990) considered Suballiance 18 – *Lophostemon confertus* to be adequately reserved in the northern part of its range in NSW. Survey sites were located in reserves. In the coastal zone, Coastal

Brush Box is reserved in Ukerebagh NR and Cudgen NR and Cape Byron SCA.

**Significant taxa:** *Archidendron hendersonii* (TSC: Vulnerable), *Cordyline congesta* (ROTAP: 2RC-), *Syzygium moorei* (TSC: Vulnerable), *Cryptocarya foetida* (TSC: Vulnerable), *Cassia brewsteri* var. *marksiana* (TSC: Endangered), *Grevillea hilliana* (TSC: Endangered), *Randia moorei* (TSC: Endangered), *Niemeyera antiloga*.

## Structure

Layer	Height (m)	Cover (%)
Tallest	8–28	65–90
Middle 1	1–15	40–80
Lower 1	0–2	50–90

## Floristics

This community contains two groups identified in the dendrogram.

**Trees:** *Lophostemon confertus* (T), *Cryptocarya triplinervis* (T), *Cupaniopsis anacardioides* (T), *Flindersia bennettiana* (M1), *Pouteria chartacea* (L1), *Archontophoenix cunninghamiana* (M1), *Acronychia imperforata*, *Archidendron hendersonii*, *Mischocarpus pyriformis* subsp. *pyriformis* (T), *Schefflera actinophylla*\*, *Glochidion ferdinandi* (T), *Diospyros fasciculosa*, *Endiandra sieberi* (T), *Endiandra discolor* (T), *Alphitonia excelsa*, *Jagera pseudorhus* var. *pseudorhus* forma *pseudorhus*, *Mallotus philippensis* (T), *Syzygium luehmannii* (T), *Banksia integrifolia* subsp. *integrifolia* (T), *Ficus obliqua* (T), *Harpullia pendula*, *Ficus watkinsiana*, *Flindersia schottiana*, *Harpullia hillii*, *Polyscias elegans*, *Siphonodon australis*, *Acmena hemilampra* subsp. *hemilampra*, *Beilschmiedia obtusifolia*, *Commersonia bartramia*, *Corymbia intermedia*, *Gossia bidwillii*, *Litsea australis*, *Dysoxylum mollissimum* subsp. *molle*, *Sterculia quadrifida*.

**Sub-canopy trees:** *Drypetes deplanchei*, *Alphitonia excelsa* (M1), *Endiandra discolor* (M1), *Acmena smithii*.

**Shrubs:** *Exocarpos latifolius*, *Syzygium oleosum* (M1), *Polyalthia nitidissima*, *Psydrax lamprophylla* (T), *Arytera divaricata* (M1), *Cryptocarya foetida* (M1), *Drypetes deplanchei* (M1), *Notelaea longifolia* (M1), *Euroschinus falcata* var. *falcata* (T), *Pilidiostigma glabrum*, *Pittosporum revolutum*, *Celtis paniculata* (M1), *Jasminum volubile*, *Myrsine variabilis*, *Rivina humilis*\*, *Sarcomelicope simplicifolia* subsp. *simplicifolia*, *Trochocarpa laurina*, *Halfordia kendack* (M1), *Hibiscus tiliaceus*, *Maclura cochinchinensis*, *Psychotria loniceroides*, *Cyclophyllum longipetalum* (T), *Actephila lindleyi* (L1), *Alchornea ilicifolia*, *Alectryon coriaceus*, *Alectryon tomentosus*, *Alyxia ruscifolia*, *Aurantiarpa rhombifolia*, *Elaeodendron australe*, *Niemeyera antiloga*, *Pouteria pohlmanniana* var. *pohlmanniana*, *Rhodomyrtus psidioides*, *Senna pendula* var. *glabrata*\*, *Lantana camara*\* (L1), *Symplocos stawellii*, *Triumfetta rhomboidea*.

**Climbers:** *Smilax australis* (L1), *Geitonoplesium cymosum*, *Smilax glycyphylla*, *Coelospermum paniculatum*, *Cissus antarctica*, *Cissus sterculiifolia*, *Hibbertia scandens*, *Hoya australis* subsp. *australis* (L1), *Ipomoea cairica*\*, *Marsdenia rostrata* (L1), *Derris involuta* (M1), *Cayratia acris*, *Dioscorea transversa*, *Hippocratea barbata*, *Morinda jasminoides*, *Parsonsia straminea*, *Solanum seaforthianum*, *Tragia novae-hollandiae*, *Tylophora benthamii*, *Cissus hypoglauca*\*, *Desmodium nemorosum*, *Eustrephus latifolius*, *Pandorea jasminoides*, *Passiflora suberosa*\*, *Rauwenhoffia leichhardtii*.

**Epiphytes:** *Asplenium australasicum* f. *australasicum*, *Platynerium bifurcatum*, *Platynerium superbum*.

**Misteltoes:** *Muellerina celastroides*, *Notothixos subaureus*.

**Grasses:** *Ottochloa gracillima*, *Imperata cylindrica* var. *major*.

**Ferns:** *Pteridium esculentum*, *Nephrolepis cordifolia* (L1), *Asplenium australasicum* f. *australasicum*, *Pyrrosia rupestris*, *Platynerium superbum*.

**Sedges and rushes:** *Gahnia clarkei* (L1), *Cyperus stradbrokeensis* (L1), *Lomandra longifolia* (L1), *Gahnia aspera*.

**Herbs and shrubs:** *Asparagus aethiopicus*\* (L1), *Ochna serrulata*\* (L1), *Polyalthia nitidissima* (L1), *Cordyline congesta*, *Alpinia caerulea*, *Acrotriche aggregata*, *Linospadix monostachya* (L1), *Dianella caerulea*, *Dodonaea triquetra*, *Persoonia stradbrokeensis*, *Jasminum didymum*, *Gloriosa superba*\*, *Aneilema acuminatum*, *Alpinia arundelliana*, *Capparis arborea*, *Commelina cyanea*, *Dianella congesta*, *Leucopogon margarodes*, *Peperomia blanda* var. *floribunda*.

Number of native taxa: 144

Number of taxa per site: 40–65 (mean 49 ± 9)

Number of exotic taxa: 13

## Indicator native taxa

## Sub-group 1

Species	Group score	Group frequency	Non-group score	Non-group frequency	Fidelity class
<i>Acronychia imperforata</i>	2	100%	2	5%	positive
<i>Acrotriche aggregata</i>	2	67%	2	2%	positive
<i>Alphitonia excelsa</i>	4	67%	2	26%	positive
<i>Alpinia caerulea</i>	3	67%	2	11%	positive
<i>Archidendron hendersonii</i>	3	67%	2	3%	positive
<i>Archontophoenix cunninghamiana</i>	3	100%	2	25%	positive
<i>Breynia oblongifolia</i>	2	67%	1	21%	positive
<i>Cissus sterculiifolia</i>	2	67%	1	2%	positive
<i>Cordyline congesta</i>	2	67%	1	13%	positive
<i>Dianella caerulea</i>	2	67%	1	29%	positive
<i>Drypetes deplanchei</i>	2	67%	2	4%	positive
<i>Endiandra discolor</i>	4	67%	1	8%	positive
<i>Endiandra sieberi</i>	4	67%	1	10%	positive
<i>Flagellaria indica</i>	2	67%	2	17%	positive
<i>Flindersia bennettiana</i>	4	100%	2	7%	positive
<i>Gahnia clarkei</i>	2	100%	3	16%	positive
<i>Geitonoplesium cymosum</i>	2	100%	2	41%	positive
<i>Glochidion ferdinandi</i>	3	100%	1	24%	positive
<i>Hibbertia scandens</i>	2	67%	1	28%	positive
<i>Jagera pseudorhus</i> var. <i>pseudorhus</i>	2	67%	1	27%	positive
<i>Jasminum volubile</i>	2	67%	1	2%	positive
<i>Lophostemon confertus</i>	5	100%	3	18%	positive
<i>Mischocarpus pyriformis</i> subsp. <i>pyriformis</i>	2	100%	1	5%	positive
<i>Notelaea longifolia</i>	2	100%	1	21%	positive
<i>Pilidiostigma glabrum</i>	2	100%	1	14%	positive
<i>Pittosporum revolutum</i>	2	67%	1	15%	positive
<i>Polyalthia nitidissima</i>	2	67%	3	1%	positive
<i>Pouteria chartacea</i>	3	67%	2	5%	positive
<i>Psydrax lamprophylla</i>	2	67%	1	2%	positive
<i>Pteridium esculentum</i>	2	67%	2	20%	positive
<i>Smilax australis</i>	2	100%	2	42%	positive
<i>Smilax glycyphylla</i>	3	67%	1	8%	positive
<i>Syzygium luehmannii</i>	4	67%	1	5%	positive
<i>Syzygium oleosum</i>	4	100%	2	13%	positive
<i>Trochocarpa laurina</i>	2	67%	2	13%	positive

## Sub-group 2

Species	Group score	Group frequency	Non-group score	Non-group frequency	Fidelity class
<i>Acronychia imperforata</i>	3	67%	2	5%	positive
<i>Aphananthe philippinensis</i>	3	67%	2	8%	positive
<i>Archidendron hendersonii</i>	2	67%	3	3%	positive
<i>Arytera divaricata</i>	2	100%	2	3%	positive
<i>Celtis paniculata</i>	3	67%	2	2%	positive
<i>Cissus antarctica</i>	2	67%	2	10%	positive
<i>Coeleospermum paniculatum</i>	2	67%	1	3%	positive
<i>Cordyline congesta</i>	2	67%	1	13%	positive
<i>Cryptocarya foetida</i>	4	67%	2	2%	positive
<i>Cryptocarya triplinervis</i>	4	100%	2	6%	positive
<i>Cupaniopsis anacardioides</i>	2	100%	1	34%	positive
<i>Diospyros fasciculosa</i>	2	100%	2	2%	positive
<i>Drypetes deplanchei</i>	3	67%	2	4%	positive
<i>Euroschinus falcifolia</i>	3	67%	1	5%	positive
<i>Exocarpos latifolius</i>	3	100%	1	2%	positive
<i>Ficus obliqua</i>	3	67%	1	5%	positive
<i>Flagellaria indica</i>	2	67%	2	17%	positive
<i>Geitonoplesium cymosum</i>	2	100%	2	41%	positive
<i>Grevillea hilliana</i>	2	67%	3	2%	positive
<i>Hodgkinsonia ovatiflora</i>	2	67%	2	1%	positive
<i>Mallotus discolor</i>	3	67%	1	6%	positive
<i>Mallotus philippensis</i>	4	67%	2	16%	positive
<i>Morinda canthoides</i>	2	33%	0	0%	positive
<i>Polyalthia nitidissima</i>	4	67%	2	1%	positive
<i>Pouteria chartacea</i>	3	67%	2	5%	positive
<i>Sarcomelicope simplicifolia</i> subsp. <i>simplicifolia</i>	2	67%	1	1%	positive
<i>Smilax australis</i>	2	100%	2	42%	positive
<i>Streblus brunonianus</i>	2	67%	2	7%	positive
<i>Tylophora benthamii</i>	2	33%	0	0%	positive



## Community 36 Coast Wattle–Coast Tea-tree–Coast Banksia Shrubland on Holocene Dunes and Ridges

**Scientific name:** Coast Wattle (*Acacia longifolia* var. *sophorae*), Coast Tea-tree (*Leptospermum laevigatum*) and Coast Banksia (*Banksia integrifolia* subsp. *integrifolia*) Shrubland on Holocene Dunes and Ridges.

**Sites:** (6) BRU04cbdne, BRU22cbdne, BRU21cbdne, TWE04assw, CUD09cbdne, POT03cbrdg.

### Equivalent communities

Qld Regional Ecosystem 12.2.14 Strand and foredune complex (Young and Dillewaard 1999); 1008 – Post-mining Regeneration, 801 – Foredune Complex (Kingston *et al.* 2004); Horsetail She-oak–Coast Banksia–Bitou Bush (OcB) (Landmark Ecological Services 1999); 5411 *Chrysanthemoides monilifera* subsp. *rotundata* – *Acacia sophorae* mid-high to tall closed shrubland NPWS NSW Coastal Vegetation (Griffith & Wilson 2007).

### Description

An open to closed shrubland of Coast Wattle (*Acacia longifolia* var. *sophorae*), Coast Tea-tree (*Leptospermum laevigatum*), Coast Banksia (*Banksia integrifolia* subsp. *integrifolia*), Horsetail Sheoak (*Casuarina equisetifolia* subsp. *incana*), and Bitou Bush (*Chrysanthemoides monilifera* subsp. *rotundata*). An open middle strata of Bitou Bush is sometimes present. A lower strata of Bitou Bush, Blue Couch (*Cynodon dactylon*), *Cyperus stradbokensis* and Blady Grass (*Imperata cylindrica* var. *major*) occurs.



### Distribution and Habitat

**Habitat:** Coastal barrier sands on Holocene–Pleistocene dunes, ridges and strandplain. A derived community from rehabilitation after sand-mining.

**Disturbance:** All sites are dunal sites regenerating after sand-mining and have been severely infested by Bitou Bush. Some species, such as Horsetail Sheoak and Coast Tea-tree have been planted for mine rehabilitation.

**Example locations:** New Brighton, Brunswick Heads, Fingal and Hastings Point.

### Conservation

**Threats:** Clearing, and infestation by weeds.

**Conservation status:** Reserved in Bundjalung NP and Iluka NR. This is a derived community.

**Significant taxa:** *Geodorum densiflorum* (TSC: Endangered).



## Structure

Layer	Height (m)	Cover (%)
Emergent	3–8	5
Tallest	1–13	40–95
Middle 1	1–7	10–40
Lower 1	0–1.5	40–95

## Floristics

**Trees:** *Banksia integrifolia* subsp. *integrifolia* (T), *Casuarina equisetifolia* subsp. *incana* (T), *Callitris columellaris* (T), *Rivina humilis*\*, *Glochidion ferdinandi*.

**Shrubs:** *Chrysanthemoides monilifera* subsp. *rotundata*\* (T), *Leptospermum laevigatum* (T), *Acacia disparrima* subsp. *disparrima* (T), *Acacia saligna*\* (T), *Acacia longifolia* subsp. *sophorae* (T), *Lantana camara*\* (T), *Macaranga tanarius*, *Senna pendula* var. *glabrata*\*.

**Climbers:** *Ipomoea cairica*\*, *Stephania japonica* var. *discolor*\*, *Lablab purpureus*\*, *Hibbertia scandens*, *Passiflora suberosa*\*.

**Grasses:** *Imperata cylindrica* var. *major* (L1), *Lomandra longifolia* (L1), *Eragrostis interrupta* (L1), *Melinis repens*\*, *Cynodon dactylon* (L1), *Cenchrus caliculatus*, *Panicum maximum*\*, *Panicum simile*, *Themeda australis*.

**Sedges and rushes:** *Cyperus strabroakensis* (L1), *Ficinia nodosa* (L1).

**Herbs and shrubs:** *Conyza bonariensis*\*, *Ambrosia artemisiifolia*\*, *Bryophyllum delagoense*, *Gloriosa superba*\*, *Asparagus aethiopicus*, *Bidens pilosa*\*, *Ochna serrulata*\*, *Crinum pedunculatum*, *Diplocyclos palmatus*\*, *Geodorum densiflorum*, *Ipomoea pes-caprae* subsp. *brasiliensis*, *Richardia brasiliensis*\*, *Solanum mauritianum*\*, *Triumfetta rhomboidea*.

Number of native taxa: 31

Number of taxa per site: 13–27 (mean 19 ± 6)

Number of exotic taxa: 19

## Indicator native taxa

Species	Group score	Group frequency	Non-group score	Non-group frequency	Fidelity class
<i>Acacia longifolia</i>	2	75%	2	3%	positive
<i>Acacia saligna</i>	3	25%	0	0%	positive
<i>Banksia integrifolia</i> subsp. <i>integrifolia</i>	4	75%	2	7%	positive
<i>Casuarina equisetifolia</i> subsp. <i>incana</i>	3	50%	3	0%	positive
<i>Cenchrus caliculatus</i>	2	25%	0	0%	positive
<i>Cupaniopsis anacardioides</i>	2	50%	1	34%	positive
<i>Cynodon dactylon</i>	5	50%	2	5%	positive
<i>Cyperus strabroakensis</i>	3	100%	2	5%	positive
<i>Eragrostis interrupta</i>	3	50%	2	2%	positive
<i>Geodorum densiflorum</i>	1	25%	0	0%	positive
<i>Imperata cylindrica</i>	5	75%	2	20%	positive
<i>Ipomoea pes-caprae</i> subsp. <i>brasiliensis</i>	1	25%	0	0%	positive
<i>Isolepis nodosa</i>	2	75%	1	0%	positive
<i>Leptospermum laevigatum</i>	4	75%	1	1%	positive

## Community 37 Kangaroo Grass headland Grassland

**Scientific name:** Kangaroo Grass (*Themeda australis*) Headland Grassland.

**Sites:** (1) CUD18lsrh.

### Equivalent communities

Heathlands-Coastal Headland Heaths (Keith 2006); 6302 – *Themeda australis* Sod Grassland NPWS NSW Coastal Vegetation (Griffith & Wilson 2007).

### Description

A sod-tussock grassland with a closed cover of Kangaroo Grass (*Themeda australis*) and a low cover of emergent Coast Banksia (*Banksia integrifolia* subsp. *integrifolia*), Tuckeroo (*Cupaniopsis anacardioides*) and Screw Pine (*Pandanus tectorius* var. *australianus*). Associated vegetation includes shrubs (e.g. *Aotus ericoides*, *Scaevola calendulacea*), herbs (e.g. *Wollastonia biflora*, *Xerochrysum bracteatum*) and grasses (e.g. *Cynodon dactylon*, *Eragrostis interrupta*).



### Distribution and Habitat

**Habitat:** Headlands on an outcropping of meta-sedimentary rock.

**Disturbance:** Light infestation by weeds.

**Location:** Norries Headland, Bogangar.

### Conservation

**Threats:** Displacement of grassland with shrubs species.

**Conservation status:** Poorly reserved over parts of its range on the north coast. In the study area it is reserved in Bundjalung NP.

**Significant taxa:** None recorded.

### Structure

Layer	Height (m)	Cover (%)
Emergent	1–3	10
Lower 1	0–0.7	100

### Floristics

**Emergent trees:** *Banksia integrifolia* subsp. *integrifolia* (E), *Cupaniopsis anacardioides* (E).

**Shrubs:** *Myoporum boninense* subsp. *australe* (E), *Pandanus tectorius* var. *australianus* (E).

**Climbers:** *Canavalia rosea*, *Galactia tenuiflora*, *Hardenbergia violacea*.

**Grasses:** *Themeda australis* (L1), *Scaevola calendulacea* (L1), *Cynodon dactylon* (L1), *Eragrostis tenuifolia*, *Ischaemum triticeum*.

**Sedges and rushes:** *Lomandra longifolia*.

**Herbs and shrubs:** *Scaevola calendulacea*, *Aotus ericoides*, *Dianella crinoides*, *Pimelea linifolia*, *Wikstroemia indica*, *Melanthera biflora*, *Xerochrysum bracteatum*, *Zornia muriculata* subsp. *angustata*.

Number of native taxa: 21

Number of taxa per site: 21

Number of exotic taxa: 1

### Indicator native taxa

Species	Group score	Group frequency	Non-group score	Non-group frequency	Fidelity class
<i>Canavalia rosea</i>	2	100%	0	0%	positive
<i>Cynodon dactylon</i>	4	100%	3	5%	positive
<i>Dianella crinoides</i>	2	100%	2	1%	positive
<i>Eragrostis interrupta</i>	2	100%	2	2%	positive
<i>Galactia tenuiflora</i>	2	100%	0	0%	positive
<i>Hardenbergia violacea</i>	2	100%	1	1%	positive
<i>Ischaemum triticeum</i>	2	100%	0	0%	positive
<i>Lomandra longifolia</i>	3	100%	2	29%	positive
<i>Melanthera biflora</i>	2	100%	0	0%	positive
<i>Myoporum bonariensis</i>	3	100%	0	0%	positive
<i>Pandanus tectorius</i> var. <i>australianus</i>	3	100%	0	0%	positive
<i>Pimelea linifolia</i>	2	100%	1	3%	positive
<i>Scaevola calendulacea</i>	4	100%	0	0%	positive
<i>Themeda australis</i>	5	100%	2	8%	positive
<i>Wikstroemia indica</i>	2	100%	1	5%	positive
<i>Xerochrysum bracteatum</i>	2	100%	0	0%	positive
<i>Zornia muriculata</i>	2	100%	0	0%	positive

## Community 38 Scribbly Gum–Old Man Banksia–Slender Tea-tree Heathy Low Open Sclerophyll Forest to Shrubland

**Scientific name:** Scribbly Gum (*Eucalyptus signata*), Old Man Banksia (*Banksia serrata*), Slender Tea-tree (*Leptospermum trinervium*) Heathy Low Open Sclerophyll Forest to Shrubland.

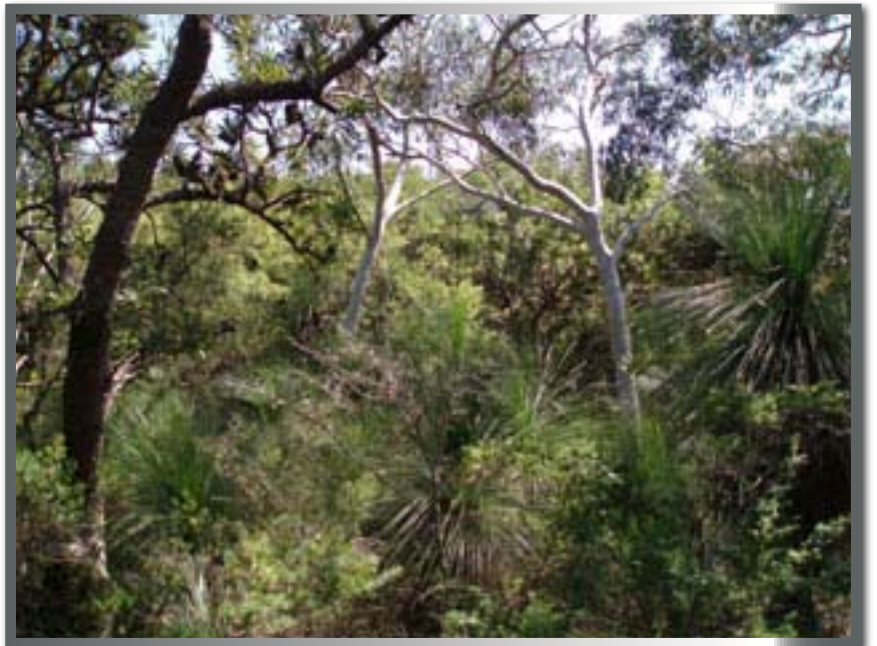
**Sites:** (2) BYR06cbsw, BYR07estcl.

### Equivalent communities

Dry Sclerophyll Forests-Coastal Dune Dry Sclerophyll Forest (Keith 2006); Qld Regional Ecosystem 12.2.6 Open forest on dunes (Young and Dillewaard 1999); F6 – *Eucalyptus signata* mid-high to tall open forest and woodland (Pressey and Griffith 1992); Wallum Banksia – Scribbly Gum (BsG), (Landmark Ecological Services 1999); 5003 – *Eucalyptus signata* very tall to extremely tall mallee woodland and open mallee forest NPWS NSW Coastal Vegetation (Griffith & Wilson 2007); North-east NSW Forest Ecosystem 65 – Heathy Scribbly Gum (NPWS 1999).

### Description

A low open forest of Scribbly Gum (*Eucalyptus signata*), Old Man Banksia (*Banksia serrata*) and Slender Tea-tree (*Leptospermum trinervium*). Heathy shrubs form the open mid-strata and include Old Man Banksia, Slender Tea-tree, the grass tree (*Xanthorrhoea johnsonii*), *Homoranthus virgatus*, *Agiortia pedicellata*, *Zieria laevigata* and *Dillwynia retorta*. The ground layer consists of *Xanthorrhoea johnsonii*, *Dillwynia retorta*, Tooton Tea-tree (*Leptospermum polygalifolium*), *Caustis recurvata*, *Gompholobium virgatum* and *Coleocarya gracilis*.



### Distribution and Habitat

**Habitat:** Elevated drier sites on Pleistocene barrier sands.

**Disturbance:** Moderate fire (15 years).

**Example locations:** Taylors Lake.

### Conservation

**Threats:** Inappropriate fire regimes.

**Conservation status:** Considered adequately reserved in Broadwater NP and Bundjalung NP (Griffith and Wilson 2007).

**Significant taxa:** None recorded.

## Structure

Layer	Height (m)	Cover (%)
Tallest	5–10	30–50
Middle 1	1–5	50–60
Lower 1	0–1.5	30

## Floristics

**Trees:** *Banksia serrata* (T), *Eucalyptus signata* (T).

**Shrubs:** *Leptospermum trinervium* (T), *Xanthorrhoea johnsonii* (M1), *Homoranthus virgatus* (M1), *Dillwynia retorta* (M1), *Leptospermum polygalifolium* (L1), *Persoonia virgata*, *Phyllota phyllicoides*, *Baeckea frutescens*, *Bossiaea heterophylla*, *Leptomeria acida*, *Leucopogon leptospermoides*, *Leucopogon margarodes*.

**Climbers:** *Cassytha glabella*, *Cassytha pubescens*.

**Ferns:** *Pteridium esculentum*, *Schizaea bifida*.

**Sedges and rushes:** *Coleocarya gracilis* (L1), *Caustis recurvata*.

**Herbs and shrubs:** *Zieria laevigata*, *Agiortia pedicellata*, *Gompholobium virgatum*, *Leucopogon lanceolatus* var. *gracilis*, *Acacia suaveolens*, *Austromyrtus dulcis*, *Hibbertia acicularis*, *Cryptostylis erecta*, *Pimelea linifolia*, *Acacia ulicifolia*, *Aotus ericoides*, *Baloskion tetraphyllum*, *Hibbertia linearis*, *Monotoca elliptica*, *Ochrosperma lineare*, *Strangea linearis*, *Styphelia viridis* subsp. *breviflora*, *Thelymitra purpurata*, *Xanthosia pilosa*.

**Number of native taxa:** 40

**Number of taxa per site:** 27–34 (mean 31 ± 5)

**Number of exotic taxa:** 0



## Indicator native taxa

Species	Group score	Group frequency	Non-group score	Non-group frequency	Fidelity class
<i>Banksia aemula</i>	4	71%	3	2%	positive
<i>Bossiaea ensata</i>	1	43%	0	0%	positive
<i>Cassytha pubescens</i>	2	71%	2	3%	positive
<i>Caustis recurvata</i>	2	100%	2	1%	positive
<i>Coleocarya gracilis</i>	4	71%	1	0%	positive
<i>Conospermum taxifolium</i>	1	14%	0	0%	positive
<i>Dillwynia retorta</i>	3	57%	0	0%	positive
<i>Epacris pulchella</i>	2	57%	1	1%	positive
<i>Gompholobium virgatum</i>	2	71%	0	0%	positive
<i>Hibbertia acicularis</i>	1	57%	0	0%	positive
<i>Hibbertia acicularis</i>	2	57%	0	0%	positive
<i>Homoranthus virgatus</i>	3	100%	1	2%	positive
<i>Laxmannia compacta</i>	1	14%	0	0%	positive
<i>Leptomeria acida</i>	1	43%	0	0%	positive
<i>Leptospermum trinervium</i>	3	71%	2	1%	positive
<i>Leucopogon deformis</i>	2	14%	0	0%	positive
<i>Leucopogon virgatus</i>	3	29%	0	0%	positive
<i>Ochrosperma lineare</i>	2	86%	3	1%	positive
<i>Petrophile canescens</i>	1	14%	0	0%	positive
<i>Phyllota phyllicoides</i>	1	29%	0	0%	positive
<i>Platysace ericoides</i>	2	57%	1	2%	positive
<i>Ricinocarpos pinifolius</i>	2	57%	1	0%	positive
<i>Schoenus ericetorum</i>	2	57%	1	0%	positive
<i>Stackhousia nuda</i>	1	29%	0	0%	positive
<i>Strangea linearis</i>	2	86%	1	0%	positive
<i>Tetratheca thymifolia</i>	2	57%	0	0%	positive
<i>Thelymitra purpurata</i>	1	14%	0	0%	positive
<i>Themeda australis</i>	2	57%	3	7%	positive
<i>Xanthorrhoea johnsonii</i>	3	71%	4	1%	positive
<i>Xanthorrhoea australis</i>	4	14%	0	0%	positive
<i>Zieria laevigata</i>	3	57%	0	0	positive

## Community 39 Wallum Banksia Dry Heath

**Scientific name:** Wallum Banksia (*Banksia aemula*) Dry Heath

**Sites:** (5) BYR17cbdne, BYR34estcd, BYR35cbdne, CUD01cbdne, CUD06cbdne.

### Equivalent communities

Heathlands-Wallum Sand Heaths (Keith 2006); Qld Regional Ecosystem 12.2.9 *Banksia aemula* low shrubby woodland on Quaternary coastal dunes (Young and Dillewaard 1999); 501 – Dry Heathland to Shrubland (Kingston *et al.* 2004); Wallum Banksia/Dwarf Banksia/Coast Banksia (BK), Sh. – mid high to tall closed heathland (Landmark Ecological Services 1999); 5802 – Dry heathland NPWS NSW Coastal Vegetation (Griffith & Wilson 2007).

### Description

A heath or shrubland in which the shrubs Wallum Banksia (*Banksia aemula*), *Homoranthus virgatus*, and Slender Tea-tree (*Leptospermum trinervium*) are abundant. A mid-layer is present with grass trees (*Xanthorrhoea australis*), *Leptospermum semibaccatum*, *Leucopogon virgatus*, *Ochrosperma lineare*, *Leucopogon leptospermoides* and Wallum Banksia. Abundant species in the lower layer include *Coleocarya gracilis*, *Hibbertia fasciculata*, *Caustis recurvata* and *Platysace ericoides*.

### Distribution and Habitat

**Habitat:** Low beach Pleistocene sand-ridges away from the influence of onshore winds.

**Disturbance:** Severe fire 5–20 years previously.

**Example locations:** Byron Bay High School, Broken Head Road, Hastings Point, Coast Road, and Cudgen.

### Conservation

**Threats:**

**Conservation status:** Well reserved. Surveyed sites were in Arakwal NP.

**Significant taxa:** None recorded.



## Structure

Layer	Height (m)	Cover (%)
Tallest	0.5–3	15–90
Middle 1	1.5–2	25
Lower 1	0–1	60–80
Lower 2	0–0.3	25

## Floristics

**Shrubs:** *Banksia aemula* (T), *Homoranthus virgatus* (T), *Leptospermum trinervium* (T), *Xanthorrhoea johnsonii* (T), *Leucopogon leptospermoides*, *Acacia suaveolens*, *Leptospermum semibaccatum*, *Monotoca elliptica* (T), *Acacia longifolia* subsp. *sophorae*, *Xanthorrhoea australis*, *Corymbia intermedia* (T), *Lophostemon confertus* (T), *Xanthosia pilosa*, *Acronychia imperforata* (T), *Banksia integrifolia* subsp. *integrifolia* (T), *Baeckea frutescens*, *Persoonia cornifolia*, *Persoonia stradbrokeensis*, *Leptomeria acida*.

**Climbers:** *Cassytha glabella*, *Cassytha filiformis*, *Hibbertia scandens*, *Pandorea pandorana*.

**Grasses:** *Themeda australis* (L1), *Imperata cylindrica* var. *major*, *Eragrostis interrupta*, *Panicum simile*.

**Ferns:** *Pteridium esculentum*, *Schizaea dichotoma*.

**Sedges and rushes:** *Coleocarya gracilis* (L1), *Caustis recurvata* (L1), *Schoenus ericetorum*, *Lomandra elongata*, *Lomandra longifolia* (L2), *Leptocarpus tenax*.

**Herbs and shrubs:** *Strangea linearis* (L1), *Platysace ericoides* (L2), *Ochrosperma lineare* (L1), *Hibbertia fasciculata*, *Acacia ulicifolia*, *Gompholobium virgatum*, *Tetradlea thymifolia*, *Austromyrtus dulcis*, *Epacris pulchella*, *Leucopogon ericoides* (L1), *Pimelea linifolia*, *Ricinocarpos pinifolius*, *Leucopogon virgatus*, *Leptospermum semibaccatum* (L1), *Monotoca elliptica*, *Zieria laevigata*, *Banksia oblongifolia* (L1), *Brachyloma daphnoides*, *Styphelia viridis* subsp. *breviflora*, *Bossiaea ensata*, *Hibbertia linearis*, *Dianella caerulea*, *Agiortia pedicellata*, *Patersonia sericea* (L1), *Aotus ericoides*, *Hibbertia acicularis*, *Laxmannia gracilis*, *Leucopogon deformis*, *Monotoca scoparia*, *Pseudanthus orientalis*, *Stackhousia nuda*, *Zieria laxiflora*, *Dianella longifolia* var. *longifolia*, *Hibbertia riparia*, *Laxmannia compacta*, *Persoonia virgata*, *Petrophile canescens*, *Tricoryne elatior*.

**Number of native taxa:** 80

**Number of taxa per site:** 17–44 (mean 32 ± 11)

**Number of exotic taxa:** 0

## Indicator native taxa

Species	Group score	Group frequency	Non-group score	Non-group frequency	Fidelity class
<i>Banksia aemula</i>	4	71%	3	2%	positive
<i>Bossiaea ensata</i>	1	43%	0	0%	positive
<i>Cassytha pubescens</i>	2	71%	2	3%	positive
<i>Caustis recurvata</i>	2	100%	2	1%	positive
<i>Coleocarya gracilis</i>	4	71%	1	0%	positive
<i>Conospermum taxifolium</i>	1	14%	0	0%	positive
<i>Dillwynia retorta</i>	3	57%	0	0%	positive
<i>Epacris pulchella</i>	2	57%	1	1%	positive
<i>Gompholobium virgatum</i>	2	71%	0	0%	positive
<i>Hibbertia acicularis</i>	2	57%	0	0%	positive
<i>Homoranthus virgatus</i>	3	100%	1	2%	positive
<i>Laxmannia compacta</i>	1	14%	0	0%	positive
<i>Leptomeria acida</i>	1	43%	0	0%	positive
<i>Leptospermum trinervium</i>	3	71%	2	1%	positive
<i>Leucopogon deformis</i>	2	14%	0	0%	positive
<i>Leucopogon virgatus</i>	3	29%	0	0%	positive
<i>Ochrosperma lineare</i>	2	86%	3	1%	positive
<i>Petrophile canescens</i>	1	14%	0	0%	positive
<i>Phyllota phyllicoides</i>	1	29%	0	0%	positive
<i>Platysace ericoides</i>	2	57%	1	2%	positive
<i>Ricinocarpos pinifolius</i>	2	57%	1	0%	positive
<i>Schoenus ericetorum</i>	2	57%	1	0%	positive
<i>Stackhousia nuda</i>	1	29%	0	0%	positive
<i>Strangea linearis</i>	2	86%	1	0%	positive
<i>Tetrateca thymifolia</i>	2	57%	0	0%	positive
<i>Thelymitra purpurata</i>	1	14%	0	0%	positive
<i>Themeda australis</i>	2	57%	3	7%	positive
<i>Xanthorrhoea australis</i>	4	14%	0	0%	positive
<i>Xanthorrhoea johnsonii</i>	3	71%	4	1%	positive
<i>Zieria laevigata</i>	3	57%	0	0%	positive

## Group 4–Forests on alluvium or fine-textured soils of coastal floodplains and foothills

### Community 40. Lower Richmond Mesic Successional wet/swamp Sclerophyll Forest/Rainforest

**Scientific Name:** Lower Richmond mesic successional swamp/wet sclerophyll forest, Tuckeroo (*Cupaniopsis anacardioides*) Guioa with sclerophyll emergents, Blackbutt (*Eucalyptus pilularis*), Swamp Mahogany (*Eucalyptus robusta*), Red Mahogany (*Eucalyptus resinifera*), Swamp Box (*Lophostemon suaveolens*) on basalt, sedimentary, coastal barrier sands and alluvial soils.

**Sites:** (10) BALL02VBRLH, WAR12cbrdg, WAR17hsrlh, BALL11esttdf, EMP03albk, WAR02cbbbf, WAR34cbsw, WAR03cbr, WAR41vbgur, WAR42hsrlh

#### Equivalent communities

Wet Sclerophyll Forest-North Coast Wet Sclerophyll Forest (Keith, 2006); Community 4013: *Melaleuca quinquenervia*- *Lophostemon suaveolens*/*Eucalyptus tereticornis* mid-high to very tall, open woodland to closed forest, NPWS NSW Coastal Vegetation (Griffith & Wilson, 2007); 206-Flooded Gum Open Forest; 211- Turpentine +/- Pink Bloodwood Open Forest; 307-Coastal Blackbutt Open Forest to woodland; 303- Coastal Brush Box Open Forest to Woodland; 305-Coastal Swamp Mahogany Open Forest to Woodland, 309- Coastal Swamp Box Open Forest to Woodland (Kingston *et al.*, 2004); Flooded Gum (fG); Blackbutt (BB) Moist to dry sclerophyll Forest; Swamp Mahogany/Swamp Box (SMB) (Landmark Ecological Services, 1999); CASf17 *Eucalyptus resinifera* *Eucalyptus pilularis* *Lophostemon suaveolens* *Syncarpia glomulifera* *Corymbia intermedia* (Binns, 1995b).

#### Description

This community consists of wet sclerophyll, closed forest and Swamp Sclerophyll sites with a variety of sclerophyll emergents.

1) Sites BALL11esttdf, EMP03albk, WAR34cbsw are of Broad-leaved Paperbark (*Melaleuca quinquenervia*) and Swamp Box (*Lophostemon suaveolens*) swamp sclerophyll sites with a mesic understorey with Blue Lily Pily (*Syzygium oleosum*), Buff Hazelwood (*Symplocos thwaitesii*) and Tuckeroo (*Cupaniopsis anacardioides*).

2) Sites BALL02vbrlh, WAR41vbgur, WAR42hsrlh have a closed forest structure and possess in common a tallest layer of Red Ash (*Alphitnoia excelsa*) and an abundance of Guioa *semiglauc*a and Tuckeroo (*Cupaniopsis anacardioides*).

3) WAR02 was dominated by Brush Box (*Lophostemon confertus*),

4) WAR03 Flooded Gum (*Eucalyptus grandis*)





5) Blackbutt (*Eucalyptus pilularis*) was a dominant species in both WAR12cbrdg and WAR17hsrlh.

Brown Bolly Gum (*Litsea australis*), Blue Lily Pily (*Syzygium oleosum*) and Bennett's Ash (*Flindersia bennettiana*) are conspicuous in the small tree layer in this community. The lower layer is variable with *Ottochloa gracillima* being particularly abundant in some sites and is often associated with Kangaroo Grass (*Themeda australis*), *Viola hederacea/banksii*, and *Carex maculata*.

## Distribution and Habitat

**Example locations:** Lennox Head, Tuckean Broadwater, Bagotville/Alstonville Road; Ballina Industrial Estate; Beswick Beach, Coolgardie, Wyralla Woodburn Road; Tuckunrimea.

**Habitat:** This complex occurs on three habitats on low relief topography 1) Swamp Sclerophyll sites occur on slightly more elevated locations on the alluvial/estuarine and coastal sand plains allowing the development of a mesic understorey. 2) Lowland rainforest occurred on basalt and high sedimentary quartz soils at Tuckarimba and Lennox Head; high sedimentary quartz soils and coastal barrier sand soils on gentle relief coastal plains influenced by adjoining fine grained sedimentary rocks near Wardell 3) Lowland wet sclerophyll forest were found on wet sites on coastal sandplains and riparian areas adjoining high sedimentary quartz soils.

**Disturbance:** Weed disturbance light to severe. Site WAR42hsrlh has been heavily cleared. Evidence of light grazing.

## Conservation

**Threats:** Clearing

**Conservation status:** Sites BALL02vbrlh, WAR41vbgur, WAR42hsrlh are samples of Lowland Rainforest in NSW North Coast and Sydney Basin Bioregion Endangered Ecological Community. BALL11estdf, EMP03albk, WAR34cbw are examples of Swamp sclerophyll forest on coastal floodplains Endangered Ecological Community. These lowland sites are clearly threatened by clearing and occur in environments where there are few reserves.

**Significant taxa:** *Cordyline congesta*, *Cryptocarya foetida*, TSC-V

## Structure

Layer	Height (m)	Cover (%)
Tallest	15–30	20–60
Middle 1	1–20	10–50
Lower 1	0–0.8	5–80

## Floristics

**Trees:** *Guioa semiglaucula* (T), *Cupaniopsis anacardioides* (T), *Melaleuca quinquenervia*-T, *Alphitonia excelsa* (T), *Schefflera actinophylla*\*, *Livistona australis* (M1), *Eucalyptus pilularis* (T), *Archontophoenix cunninghamiana* (M1), *Melicope elleryana*, *Lophostemon suaveolens* (T), *Callistemon salignus* (T), *Glochidion sumatranum* (T), *Cupaniopsis parvifolia* (T), *Elaeocarpus obovatus*, *Waterhousea floribunda* (T), *Rhodamnia rubescens* (T), *Lophostemon confertus* (T), *Cryptocarya obovata*, *Callitris columellaris* (T), *Banksia serrata* (T), *Casuarina glauca*, *Eucalyptus grandis*, *Eucalyptus robusta* (T), *Polyscias elegans*, *Synoum glandulosum* subsp. *glandulosum*, *Arytera divaricata*, *Diploglottis cunninghamii*, *Corymbia intermedia* (T), *Eucalyptus microcorys*, *Syagrus romanzoffiana*\*, *Eucalyptus resinifera* subsp. *hemilampira* (T), *Commersonia bartramia* (T), *Callicoma serratifolia*, *Cinnamomum oliveri*, *Cinnamomum virens*, *Cryptocarya foetida*, *Dysoxylum mollissimum* subsp. *molle*, *Endiandra discolor*, *Eriobotrya japonica*, *Ficus superba* var. *henneana*, *Ficus watkinsiana*, *Grevillea robusta*, *Olea paniculata*, *Podocarpus elatus*, *Syzygium luehmannii*

**Sub canopy trees:** *Cinnamomum camphora*\* (M1), *Syzygium oleosum* (M1), *Jagera pseudorhus* var. *pseudorhus* forma *pseudorhus* (M1), *Mallotus philippensis* (M1), *Rhodomyrtus psidioides*, *Litsea australis* (M1), *Melicope elleryana* (M1), *Mallotus discolor*, *Flindersia bennettiana* (M1), *Acacia maidenii*, *Acacia melanoxylon*, *Acmena smithii*, *Aphananthe*

*philippinensis*, *Cryptocarya obovata* (M2), *Glochidion ferdinandi*, *Neolitsea australiensis* (M1), *Symplocos thwaitesii* (M1), *Cryptocarya triplinervis* (M1), *Polyscias elegans* (M1), *Endiandra sieberi*, *Cryptocarya microneura*, *Sarcopteryx stipata*, *Symplocos thwaitesii*, *Streblus brunonianus*, *Symplocos stawellii*, *Alectryon coriaceus*, *Croton verreauxii*, *Cyclophyllum longipetalum* (M1), *Diospyros pentamera*, *Flindersia schottiana*, *Allocasuarina torulosa* (M1), *Archirhodomyrtus beckleri*, *Cryptocarya laevigata*, *Euroschinus falcata* var. *falcata* (M1), *Acronychia imperforata* (M1), *Acronychia wilcoxiana*, *Mischocarpus pyriformis* subsp. *pyriformis*, *Pararchidendron pruinosum* var. *pruinosum*, *Toechima dasyrrhache*

**Shrubs:** *Lantana camara*\* (M2), *Maclura cochinchinensis*, *Ochna serrulata*\* (M1), *Notelaea longifolia*, *Syzygium oleosum*, *Pittosporum undulatum* (M2), *Psychotria loniceroides* (M2), *Elaeocarpus reticulatus* (M2), *Ligustrum sinense*\*, *Mallotus discolor* (M2), *Pittosporum revolutum*, *Neolitsea australiensis*, *Pilidiostigma glabrum*, *Tabernaemontana pandacaqui*, *Trochocarpa laurina* (M2), *Myrsine howittiana* (M2), *Trochocarpa laurina*, *Eupomatia laurina*, *Ficus coronata*, *Ligustrum lucidum*\*, *Myrsine variabilis*, *Murraya paniculata*\*, *Denhamia celastroides*, *Duboisia myoporoides*, *Elaeodendron australe*, *Endiandra virens*, *Exocarpos latifolius*, *Harpullia hillii*, *Hedraianthera porphyropetala*, *Jasminum volubile*, *Myrsine subsessilis*, *Nematolepis squamea* subsp. *squamea*, *Psydrax lamprophylla*, *Senna pendula* var. *glabrata*\*, *Syzygium australe*, *Wilkiea huegeliana*, *Zieria smithii*

**Climbers:** *Geitonoplesium cymosum*, *Marsdenia rostrata*, *Smilax australis* (L1), *Morinda jasminoides* (L1), *Pandorea pandorana*, *Trophis scandens*, *Asparagus plumosus*\* (M1), *Flagellaria indica*, *Stephania japonica* var. *discolor*, *Cissus antarctica*, *Parsonia straminea*, *Passiflora subpeltata*\*, *Melodinus australis*, *Hibbertia scandens*, *Cissus hypoglauca*, *Echinostephia aculeata*, *Passiflora edulis*\*, *Aphanopetalum resinum*, *Dioscorea transversa*, *Solanum seafortianum*\*, *Derris involuta*, *Eustrephus latifolius*, *Passiflora suberosa*\*, *Senna septemtrionalis*\*, *Smilax glycyphylla*, *Austrosteenisia glabristyla*, *Caesalpinia subtropica*, *Calamus muelleri*, *Cardiospermum grandiflorum*\*, *Cayratia clematidea*, *Cissus sterculiifolia*, *Clematis glycinoides* var. *submutica*, *Embelia australiana*, *Glycine clandestina*, *Hibbertia dentata*, *Ipomoea cairica*\*, *Ripogonum album*, *Ripogonum discolor*, *Ripogonum elseyanum*, *Ripogonum fawcettianum*, *Rubus moluccanus* var. *trilobus*

**Epiphytes:** *Asplenium australasicum* f. *australasicum*, *Platynerium bifurcatum*, *Platynerium superbum*, *Psilotum nudum*

**Mistletoes:** *Amylotheca dictyophleba*

**Grasses** *Ottocloa gracillima* (L1), *Oplismenus aemulus*, *Themeda australis* (L1), *Cymbopogon refractus* (L1), *Imperata cylindrica* var. *major*, *Digitaria parviflora*, *Paspalidium gracile*, *Paspalum wettsteinii*\*, *Entolasia marginata*, *Eragrostis pubescens*

**Ferns:** *Asplenium australasicum* f. *australasicum*, *Blechnum indicum* (L1), *Hypolepis muelleri* (L1), *Adiantum hispidulum*, *Pteridium esculentum* (L1), *Platynerium bifurcatum*, *Doodia aspera* (L1), *Blechnum cartilagineum* (L1), *Lastreopsis microsora* subsp. *microsora* (L1), *Oplismenus imbecillis* (L1), *Davallia solida* var. *pyxidata*, *Lastreopsis microsora* subsp. *microsora*, *Platynerium superbum*, *Pyrrhosia confluens* var. *confluens*, *Lastreopsis decomposita*

**Sedges/Rushes:** *Carex maculata* (L1), *Gahnia clarkei* (L1), *Lomandra longifolia*, *Cyperus eglobosus* (L1), *Gahnia aspera*, *Lomandra multiflora* subsp. *multiflora*, *Baloskion tetraphyllum*, *Cyperus enervis*, *Cyperus tetraphyllum*

**Herbs/Shrubs:** *Ochna serrulata*\* (L1), *Cordyline congesta* (M2), *Breynia oblongifolia*, *Dianella caerulea*, *Alpinia caerulea*, *Commelina cyanea*, *Wikstroemia indica*, *Pratia purpurascens*, *Alyxia ruscifolia*, *Dichondra repens*, *Aneilema acuminatum*, *Viola banksii* (L1), *Ardisia crenata*\* (L1), *Cordyline rubra*, *Homalanthus populifolius*, *Pomax umbellata*, *Pseuderanthemum variabile*, *Asparagus aethiopicus*\* (L1), *Viola banksii*, *Austromyrtus dulcis*, *Desmodium gunnii*, *Gymnostachys anceps*, *Bidens pilosa*\*, *Cheirostylis notialis*, *Hydrocotyle peduncularis*, *Lobelia trigonocaulis*, *Veronica plebeia*, *Brunoniella australis*, *Carissa ovata*, *Cryptostylis erecta*, *Cryptostylis subulata*, *Hibiscus heterophyllus* subsp. *heterophyllus*, *Hypochaeris radicata*\*, *Alocasia brisbanensis*, *Persicaria dichotoma*, *Plectranthus parviflorus*, *Rhaphiolepis indica*\*, *Rivina humilis*\*, *Rubus parvifolius*, *Tripladenia cunninghamii*

**Number of native taxa:** 212

**Number of taxa per site:** 42-81 (mean 59, +/- 18)

**Number of exotic taxa:** 27

## Indicator native taxa

Species	Group score	Group freq	Non-group score	Non-group freq	class
<i>Aphanopetalum resinosum</i>	1	10%	0	0%	positive
<i>Clematis glycinoides</i>	1	10%	0	0%	positive
<i>Cupaniopsis anacardioides</i>	2	70%	1	33%	positive
<i>Cyperus eglobulosus</i>	3	20%	0	0%	positive
<i>Eragrostis pubescens</i>	1	10%	0	0%	positive
<i>Ficus superba</i>	1	10%	0	0%	positive
<i>Geitonoplesium cymosum</i>	2	100%	2	39%	positive
<i>Grevillea robusta</i>	1	10%	0	0%	positive
<i>Guioa semiglauca</i>	2	100%	1	27%	positive
<i>Lobelia trigonocaulis</i>	2	10%	0	0%	positive
<i>Maclura cochinchinensis</i>	2	90%	2	26%	positive
<i>Morinda jasminoides</i>	2	60%	2	26%	positive
<i>Oplismenus aemulus</i>	2	60%	2	14%	positive
<i>Ottochloa gracillima</i>	3	100%	2	30%	positive
<i>Pittosporum undulatum</i>	2	50%	2	9%	positive
<i>Pyrrrosia confluens</i>	1	20%	0	0%	positive

## Community 41 Lower Richmond Brush Box–Pink Bloodwood–Grey Ironbark Mesic Tall Open Forest

**Scientific name:** Lower Richmond Brush Box (*Lophostemon confertus*), Pink Bloodwood (*Corymbia intermedia*) and Grey Ironbark (*Eucalyptus siderophloia*) Mesic Tall Open Forest of Sedimentary Soils on Rolling Low Hills.

**Sites:** (6) WAR18hsrlh, WAR52hsrlh, WAR20hsrlh, WAR22hsrlh, WAR21albk, WAR24lsrh.

### Equivalent communities

Wet Sclerophyll Forest-North Coast Wet Sclerophyll Forest (Keith 2006); Qld Regional Ecosystem 12.11.3 Tall open forest on sediments (Young and Dillewaard 1999); Brush Box (Bb) (Landmark Ecological Services 1999); 3002 – *Lophostemon confertus* mid-high to very tall, open to closed forest NPWS NSW Coastal Vegetation (Griffith & Wilson 2007); CASf 36 *Lophostemon confertus* *Syncarpia glomulifera* *Corymbia intermedia* (Binns 1995b).

### Description

A tall moist open forest in which Brush Box (*Lophostemon confertus*) is frequently abundant and often occurs with Pink Bloodwood (*Corymbia intermedia*) and Grey Ironbark (*Eucalyptus siderophloia*). Mesic shrubs and small trees characterise the open mid-stratum; common species include Bangalow Palm (*Archontophoenix cunninghamiana*), Hoop Pine (*Araucaria cunninghamii*) and Bennett's Ash (*Flindersia bennettiana*). A lower stratum of shrubs, to 5 m tall, is present, including Cabbage Tree Palm (*Livistona australis*), Scentless Rosewood (*Synoum glandulosum* subsp. *glandulosum*) and Brown Kurrajong (*Commersonia bartramia*). Other common lower stratum species are Fishbone Fern (*Blechnum cartilagineum*), *Gahnia aspera*, *Ottochloa gracillima* and Prickly Rasp Fern (*Doodia aspera*), *Aneilema acuminatum* and Native Wandering Jew (*Commelina cyanea*) and Pastel Flower (*Pseuderanthemum variable*).



### Distribution and Habitat

**Habitat:** Sheltered aspects on lower slopes, footslopes and riparian sites on finely grained sedimentary quartz soils of the Bundamba Group.

**Disturbance:** Site WAR52hsrlh showed no evidence of disturbance. Other sites showed light infestation by weeds. WAR21albk had been severely burnt (4 years previously), there was evidence of light grazing at WAR22hsrlh and WAR21albk, light logging was recorded at WAR18hsrlh and WAR24lsrh, and there was some evidence of clearing at WAR22hsrlh.

**Example locations:** Buckombil Mountain, Tuckean, Wardell Trig and Coolgardie Road.

### Conservation

**Threats:** Logging and clearing.



**Conservation status:** A lower slope community that is probably not well represented in reserves and threatened by clearing and logging.

**Significant taxa:** *Archidendron muellerianum* (ROTAP: 3RCa), *Endiandra hayesii* (TSC: Vulnerable), *Endiandra muelleri* subsp. *bracteata* (TSC: Vulnerable), *Lindsaea brachypoda* (TSC: Vulnerable), *Acronychia baeuerlenii* (ROTAP: 3RC-), *Cordyline congesta* (ROTAP: 2RC).

## Structure

Layer	Height (m)	Cover (%)
Tallest	20–40	25–45
Middle 1	4–25	15–50
Middle 2	1–5	10–40
Lower 1	0–2	2–60

## Floristics

**Trees:** *Lophostemon confertus* (T), *Livistona australis* (L1), *Corymbia intermedia* (T), *Archontophoenix cunninghamiana* (M1), *Eucalyptus siderophloia* (T), *Araucaria cunninghamii*, *Elaeocarpus obovatus*, *Eucalyptus microcorys* (T), *Eucalyptus carnea* (T), *Melaleuca quinquenervia* (T), *Waterhousea floribunda* (M1), *Leptospermum petersonii* (M1), *Archidendron muellerianum*, *Eucalyptus acmenoides*, *Cinnamomum camphora*\*, *Endiandra discolor*, *Mallotus philippensis*, *Bridelia exaltata*, *Cryptocarya obovata*, *Lophostemon suaveolens*.

**Sub-canopy trees:** *Synoum glandulosum* subsp. *glandulosum*, *Commersonia bartramia* (M1), *Cryptocarya microneura* (M1), *Acronychia oblongifolia*, *Flindersia bennettiana* (M1), *Jagera pseudorhus* var. *pseudorhus* forma *pseudorhus*, *Alphitonia excelsa*, *Cupaniopsis parvifolia* (M1), *Callicoma serratifolia* (M1), *Syzygium oleosum* (M1), *Flindersia schottiana*, *Archidendron muellerianum* (M1), *Acacia melanoxylon*, *Allocasuarina torulosa*, *Acronychia baeuerlenii*, *Aphananthe philippinensis*, *Clerodendrum tomentosum*, *Cryptocarya triplinervis* var. *pubens*, *Endiandra pubens*, *Flindersia australis*, *Guioa semiglaucula*, *Litsea australis*, *Mischocarpus pyriformis* subsp. *pyriformis*, *Siphonodon australis*.

**Small trees and shrubs:** *Synoum glandulosum* subsp. *glandulosum* (M2), *Commersonia bartramia* (M2), *Wilkiea huegeliana* (M1), *Lantana camara*\* (M2), *Claoxylon australe* (M2), *Croton verreauxii*, *Rhodamnia rubescens*, *Pilidiostigma glabrum* (M2), *Acacia disparrima* subsp. *disparrima* (M1), *Trochocarpa laurina*, *Pittosporum multiflorum*, *Glochidion ferdinandi*, *Maclura cochinchinensis*, *Notelaea longifolia* (M1), *Pittosporum revolutum*, *Ficus coronata* (M1), *Leptospermum petersonii*, *Rhodomyrtus psidioides*, *Syzygium oleosum*, *Cyclophyllum longipetalum*, *Embelia australiana*, *Sarcopteryx stipitata*, *Streblus brunonianus*, *Acmena smithii*, *Archirhodomyrtus beckleri*, *Atractocarpus chartaceus*, *Capparis arborea*, *Citrus australasica*, *Clerodendrum floribundum*, *Denhamia celastroides*, *Diospyros pentamera*, *Drypetes deplanchei*, *Duboisia myoporoides*, *Endiandra sieberi*, *Helicia ferruginea*, *Mischocarpus australis*, *Myrsine variabilis*, *Neolitsea dealbata*, *Pararchidendron pruinosum* var. *pruinosum*, *Scolopia braunii*, *Symplocos thwaitesii*, *Syzygium australe*, *Trema tomentosa* var. *viridis*.

**Climbers:** *Morinda jasminoides* (L1), *Smilax australis* (L1), *Dioscorea transversa*, *Geitonoplesium cymosum*, *Stephania japonica* var. *discolor* (L1), *Cissus hypoglauca*, *Cissus antarctica*, *Derris involuta*, *Trophis scandens*, *Calamus muelleri*, *Cayratia clematidea*, *Echinostephia aculeata*, *Flagellaria indica*, *Marsdenia rostrata*, *Melodinus australis*, *Zehneria cunninghamii*, *Eustrephus latifolius*, *Kennedia rubicunda*, *Parsonsia straminea*, *Passiflora edulis*\*, *Ripogonum album*, *Ripogonum elseyanum*, *Ripogonum fawcettianum*, *Solanum seaforthianum*\*, *Callerya megasperma*, *Hibbertia scandens*, *Ipomoea cairica*\*, *Palmeria scandens*, *Pandorea pandorana*, *Passiflora suberosa*\*, *Tylophora paniculata*.

**Epiphytes:** *Platynerium bifurcatum*, *Cymbidium suave*, *Dendrobium aemulum*.

**Mistletoes:** *Amylotheca dictyophleba*.

**Grasses:** *Ottocloa gracillima* (L1), *Doodia aspera* (L1), *Oplismenus aemulus*, *Entolasia stricta*, *Imperata cylindrica* var. *major*, *Microlaena stipoides* var. *stipoides*, *Oplismenus imbecillis*, *Paspalum wettsteinii*\*.

**Ferns:** *Blechnum cartilagineum* (L1), *Hypolepis muelleri* (L1), *Cyathea leichhardtiana* (M2), *Adiantum hispidulum*,



*Lastreopsis decomposita*, *Davallia solida* var. *pyxidata*, *Histiopteris incisa*, *Lastreopsis marginans*, *Lindsaea brachypoda*, *Pellaea paradoxa*, *Pyrrosia confluens* var. *confluens*.

**Sedges and rushes:** *Gahnia aspera* (L1), *Cyperus enervis*, *Cyperus tetraphyllus*, *Lomandra longifolia*, *Exocarya scleroides*, *Lepidosperma laterale*, *Lomandra filiformis* subsp. *filiformis*, *Carex maculata*.

**Herbs and shrubs:** *Aneilema acuminatum*, *Commelina cyanea* (L1), *Pseuderanthemum variabile* (L1), *Dianella caerulea* (L1), *Cordyline petiolaris* (M1), *Cordyline congesta*, *Gymnostachys anceps*, *Alyxia ruscifolia*, *Breynia oblongifolia*, *Alpinia caerulea*, *Ageratina riparia*\*, *Bursaria spinosa*, *Hydrocotyle peduncularis*, *Tabernaemontana pandacaqui*, *Bidens pilosa*\*, *Cordyline stricta*, *Desmodium gunnii*, *Dodonaea triquetra*, *Hibiscus heterophyllus* subsp. *heterophyllus*, *Homalanthus populifolius*, *Pratia purpurascens*, *Vernonia cinerea*, *Alocasia brisbanensis*, *Alpinia arundelliana*, *Ageratina adenophora*\*, *Cheirostylis notialis*, *Cordyline rubra*, *Cuphea carthagenensis*\*, *Dichondra repens*, *Endiandra muelleri* subsp. *bracteata*, *Endiandra muelleri* subsp. *muelleri*, *Erechtites valerianifolia*\*, *Eupomatia bennettii*, *Eupomatia laurina*, *Geranium homeanum*, *Leucopogon juniperinus*, *Oxalis exilis*, *Ozothamnus diosmifolius*, *Phytolacca octandra*\*, *Plectranthus parviflorus*, *Psychotria loniceroides*, *Senna pendula* var. *glabrata*\*, *Solanum mauritianum*\*, *Tripladenia cunninghamii*, *Veronica plebeia*, *Viola banksii*.

Number of native taxa: 185

Number of taxa per site: 40–80 (mean 71 ± 16)

Number of exotic taxa: 16

### Indicator native taxa

Species	Group score	Group frequency	Non-group score	Non-group frequency	Fidelity class
<i>Acronychia oblongifolia</i>	2	50%	1	2%	positive
<i>Aneilema acuminatum</i>	2	67%	2	3%	positive
<i>Archontophoenix cunninghamiana</i>	3	67%	2	25%	positive
<i>Blechnum cartilagineum</i>	3	67%	3	12%	positive
<i>Cissus hypoglauca</i>	2	50%	2	11%	positive
<i>Commelina cyanea</i>	2	50%	1	16%	positive
<i>Commersonia bartramia</i>	2	83%	2	9%	positive
<i>Cordyline petiolaris</i>	2	50%	2	4%	positive
<i>Corymbia intermedia</i>	3	67%	3	16%	positive
<i>Croton verreauxii</i>	2	67%	2	8%	positive
<i>Dianella caerulea</i>	2	67%	1	29%	positive
<i>Dioscorea transversa</i>	2	100%	2	16%	positive
<i>Gahnia aspera</i>	2	50%	2	11%	positive
<i>Geitonoplesium cymosum</i>	2	83%	2	40%	positive
<i>Livistona australis</i>	3	100%	1	14%	positive
<i>Lophostemon confertus</i>	3	83%	3	18%	positive
<i>Morinda jasminoides</i>	2	100%	2	26%	positive
<i>Oplismenus aemulus</i>	2	50%	2	14%	positive
<i>Pseuderanthemum variabile</i>	2	83%	2	12%	positive
<i>Rhodmannia rubescens</i>	2	67%	2	8%	positive
<i>Ripogonum brevifolium</i>	1	17%	0	0%	positive
<i>Smilax australis</i>	2	100%	2	41%	positive
<i>Synoum glandulosum</i>	2	83%	2	13%	positive
<i>Wilkiea huegeliana</i>	2	100%	2	14%	positive
<i>Zehneria cunninghamii</i>	2	33%	0	0%	positive

## Community 42 Tweed–Brunswick Valley Brush Box–Blackbutt–Pink Bloodwood–Tallowwood Foothill Wet Sclerophyll Forest

**Scientific Name:** Tweed–Brunswick Brush Box (*Lophostemon confertus*), Blackbutt (*Eucalyptus pilularis*), Pink Bloodwood (*Corymbia intermedia*) and Tallowwood (*Eucalyptus microcorys*) Foothill Wet Sclerophyll.

**Sites:** (19) BIL02lsrrh, WAR51hsrlh, BYR13hsrh, BYR18lsrh, BYR20alfan, TWE30lsrh, BIL07lsrh, BIL11albk, BRU09un, BRU10un, BRU11allv, TWE01cbdne, POT19esticd, POT20esticd, CUD08lsrh, CUD02lsrh, CUD11lsrh, POT29lsrh, MUR15lsrh.

### Equivalent communities

Wet Sclerophyll Forest-North Coast Wet Sclerophyll Forest (Keith 2006); Qld Regional Ecosystems 12.11.3 Tall open forest on sediments (Young and Dillewaard 1999); 201 – Blackbutt Open Forest Complex, 202 – Grey Ironbark/White Mahogany/Grey Gum Open Forest Complex, and 207 – Brush Box Open Forest (Kingsford *et al.* 2004); F3 – *Eucalyptus pilularis* very tall open forest, and F2 – *Lophostemon confertus* tall to very tall closed forest (Pressey and Griffith 1992); Blackbutt (BB), and Grey Ironbark–Pink Bloodwood (gIB) (Landmark Ecological Services 1999).

### Description

This community is a tall, mesic forest to rainforest with very abundant Brush Box (*Lophostemon confertus*) associated with Blackbutt (*Eucalyptus pilularis*), Pink Bloodwood (*Corymbia intermedia*), Tallowwood (*Eucalyptus microcorys*), Grey Ironbark (*Eucalyptus siderophloia*) and occasionally Flooded Gum (*Eucalyptus grandis*). There is a low, open to closed shrubland to open forest mid-stratum of rainforest species, including Guioa (*Guioa semiglauca*), Camphor Laurel (*Cinnamomum camphora*), and Tuckeroo (*Cupaniopsis anacardioides*). A second mid-layer of shrubs is occasionally present and includes Tree Heath (*Trochocarpa laurina*), Veiny Wilkiea (*Wilkiea huegeliana*), Lantana (*Lantana camara*) and Guioa. An open to dense lower stratum is present, including Gristle Fern (*Blechnum cartilagineum*), Blue Flax-lily (*Dianella caerulea*), *Ottochloa gracillima*, False Bracken (*Calochlaena dubia*), Spiny-headed Mat-rush (*Lomandra longifolia*) and Native Ginger (*Alpinia caerulea*).

### Distribution and Habitat

**Habitat:** Mainly north of Byron Bay on mid-slopes and exposed aspects of the Condong Range and Tweed Valley on low meta-sedimentary substrates on rolling and low rolling hills.

**Disturbance:** Sites show evidence of light to moderate fire (10–60 years previously), light to severe logging, and light to moderate infestation by weeds. There has been severe clearing at sites CUD02lsrh and TWE01cbdne.

**Example locations:** Piggabeen Road, Tuckean Broadwater, Ti Tree Cemetery Road, Bangalow Road, Cobaki Broadwater, Marshalls Creek NR, Old New Brighton Road, Marshalls Creek, north of Chinderah Bypass, Pottsville Environment Park, Tweed Valley Way, Cudgen Road, Clothiers Creek, and Sleepy Hollow.



## Conservation

**Threats:** Clearing; logging, and invasion by weeds.

**Conservation status:** Lower slope occurrences of this community are possibly not well reserved in the study area. Sites were located in Cudgera Creek NR and Marahsalls Creek NR.

**Significant taxa:** *Acronychia littoralis* (TSC: Endangered), *Cordyline congesta* (ROTAP: 2RC-), *Argophyllum nullumense* (ROTAP: 3RCa), *Lepiderema pulchella* (TSC: Vulnerable), *Marsdenia longiloba* (TSC: Endangered).

## Structure

Layer	Height (m)	Cover (%)
Tallest	15–40	40–90
Middle 1	1–20	15–70
Middle 2	0.5–5	10–60
Lower 1	0–2	20–100
Lower 2	0–0.2	40

## Floristics

**Trees:** *Lophostemon confertus* (T), *Eucalyptus pilularis* (T), *Guioa semiglauca* (T), *Corymbia intermedia* (T), *Eucalyptus siderophloia* (T), *Callistemon salignus* (T), *Eucalyptus microcorys* (T), *Elaeocarpus obovatus*, *Alphitonia excelsa* (T), *Archontophoenix cunninghamiana*, *Livistona australis*, *Lophostemon suaveolens* (T), *Endiandra discolor*, *Eucalyptus robusta* (T), *Cryptocarya obovata*, *Eucalyptus resinifera* (T), *Eucalyptus grandis* (T), *Dysoxylum mollissimum* subsp. *molle*, *Eucalyptus acmenoides*, *Flindersia bennettiana*, *Syncarpia glomulifera* (T), *Araucaria cunninghamii*, *Beilschmiedia elliptica*, *Casuarina glauca*, *Melaleuca quinquenervia*, *Brachychiton acerifolius*, *Bridelia exaltata*, *Dysoxylum fraserianum*, *Ficus watkinsiana*.

**Sub-canopy trees:** *Cinnamomum camphora*\* (M1), *Cupaniopsis anacardioides* (M1), *Denhamia celastroides* (M1), *Synoum glandulosum* subsp. *glandulosum* (M1), *Mallotus philippensis* (M1), *Schefflera actinophylla*\*, *Elaeocarpus obovatus* (M1), *Allocasuarina torulosa* (M1), *Polyscias elegans* (M1), *Melicope elleryana* (M1), *Aphananthe philippinensis*, *Archirhodomyrtus beckleri*, *Sterculia quadrifida*, *Syagrus romanzoffiana*\*.

**Small trees and shrubs:** *Guioa semiglauca* (M1), *Lantana camara*\* (M1), *Pittosporum revolutum*, *Jagera pseudorhus* var. *pseudorhus* forma *pseudorhus*, *Notelaea longifolia* (M1), *Maclura cochinchinensis*, *Denhamia celastroides* (M1), *Pittosporum undulatum* (M1, M2), *Psychotria loniceroides* (M2), *Myrsine variabilis* (M1), *Daviesia arborea* (M1), *Breynia oblongifolia*, *Mallotus discolor* (M1), *Ficus obliqua*, *Cryptocarya microneura*, *Ligustrum sinense*\*, *Trochocarpa laurina* (M1, M2), *Commersonia bartramia* (M1), *Wilkiea huegeliana* (M2), *Acmena smithii* (M2), *Ficus coronata*, *Glochidion ferdinandii*, *Endiandra sieberi* (M1), *Macaranga tanarius*, *Pouteria chartacea*, *Rhodomyrtus psidioides* (M1), *Acacia disparrima* subsp. *disparrima*, *Acronychia imperforata* (M1), *Clerodendrum floribundum*, *Cyclophyllum longipetalum*, *Symplocos stawellii*, *Syzygium oleosum*, *Ardisia crenata*\*, *Cryptocarya rigida*, *Celtis paniculata* (M1), *Litsea australis* (M1), *Euroschinus falcata* var. *falcata* (M1), *Glochidion sumatranum*, *Murraya paniculata*\*, *Pomaderris discolor* (M1), *Psydrax lamprophylla*, *Abrophyllum ornans*, *Clerodendrum tomentosum*, *Cryptocarya triplinervis*, *Duranta erecta*, *Drypetes deplanchei*, *Jacaranda mimosifolia*\*, *Mischocarpus pyriformis* subsp. *pyriformis*, *Pilidiostigma glabrum*, *Argophyllum nullumense*, *Banksia integrifolia* subsp. *integrifolia*, *Citrus x taitensis*\*, *Decaspermum humile*, *Ficus fraseri*, *Lepiderema pulchella*, *Myrsine howittiana*, *Neolitsea dealbata*, *Pittosporum multiflorum*\*.

**Climbers:** *Smilax australis* (L1), *Geitonoplesium cymosum*, *Stephania japonica* var. *discolor*, *Flagellaria indica* (M1), *Parsonia straminea*, *Morinda jasminoides*, *Echinostephia aculeata*, *Hibbertia scandens*, *Cissus hypoglauca*, *Eustrephus latifolius*, *Trophis scandens*, *Cissus antarctica* (L1), *Smilax glyciphylla* (L1), *Marsdenia rostrata*, *Derris involuta*, *Passiflora subpeltata*\*, *Hibbertia dentata*, *Ipomoea cairica*\*, *Melodinus australis*, *Pandorea pandorana*, *Ripogonum album*, *Cayratia clematidea*, *Passiflora edulis*\*, *Asparagus plumosus*\*, *Hoya australis* subsp. *australis*, *Kennedia rubicunda*, *Mucuna gigantea*\*, *Cardiospermum grandiflorum*\*, *Clematis glycinoides*, *Coelospermum paniculatum*, *Hardenbergia violacea*,

*Marsdenia longiloba*, *Monstera deliciosa*\*, *Passiflora foetida* var. *hispida*\*, *Rubus parvifolius*, *Rubus rosifolius*.

**Epiphytes:** *Platycerium bifurcatum*, *Dendrobium kingianum*, *Platycerium superbum*, *Asplenium australasicum* f. *australasicum*, *Dendrobium monophyllum*.

**Mistletoes:** *Amylotheca dictyophleba*.

**Grasses:** *Ottochloa gracillima* (L1), *Oplismenus imbecillis* (L1), *Imperata cylindrica* var. *major* (L1), *Entolasia stricta*, *Paspalum wettsteinii*\*, *Oplismenus undulatifolius* var. *mollis*, *Entolasia marginata*, *Themeda australis*, *Axonopus compressus*\*, *Digitaria ramularis*, *Melinis repens*\*, *Oplismenus aemulus*, *Paspalidium distans*\*.

**Ferns:** *Blechnum cartilagineum* (L1), *Calochlaena dubia* (L1), *Pteridium esculentum* (L1), *Doodia caudata* (L1), *Hypolepis muelleri*, *Pyrrhosia rupestris*, *Adiantum hispidulum*, *Cheilanthes sieberi*, *Pellaea nana*, *Pellaea viridis* var. *viridis*, *Asplenium australasicum* f. *australasicum*, *Christella dentata*, *Davallia solida* var. *pyxidata*, *Lastreopsis munita*.

**Sedges and rushes:** *Lomandra longifolia* (L1), *Gahnia sieberiana* (L1), *Lomandra filiformis* (L1), *Gahnia aspera*, *Lepidozamia peroffskyana* (L1), *Lepidosperma laterale*, *Gahnia clarkei* (L1), *Lomandra confertifolia* subsp. *pallida*, *Cyperus stradbrokeensis*.

**Herbs and shrubs:** *Dianella caerulea* (L1), *Senna pendula* var. *glabrata*\* (M2), *Pseuderanthemum variabile* (L1), *Alpinia caerulea* (M2), *Eupomatia laurina* (M2), *Pratia purpurascens*, *Austromyrtus dulcis*, *Ageratina riparia*\*, *Ochna serrulata*\*, *Tripladenia cunninghamii*, *Asparagus aethiopicus*\*, *Commelina cyanea*, *Cordyline congesta* (L1), *Hovea acutifolia*, *Lepidozamia peroffskyana*, *Wikstroemia indica*, *Viola banksii* (L2), *Dichondra repens* (L2), *Xanthorrhoea macronema* (L1), *Ageratina adenophora*\*, *Atractocarpus chartaceus*, *Dodonaea triquetra*, *Chrysanthemoides monilifera* subsp. *rotundata*\*, *Cordyline rubra*, *Pomaderris discolor*, *Zieria smithii*, *Viola hederacea*, *Acacia viscidula* (M1), *Ageratum houstonianum*\*, *Cordyline petiolaris*, *Desmodium rhytidophyllum*, *Gymnostachys anceps*, *Hibiscus tiliaceus*, *Homalanthus populifolius*, *Hydrocotyle acutiloba*, *Leptospermum microcarpum*, *Oxalis chnoodes*, *Peperomia blanda* var. *floribunda*, *Persoonia media*, *Pomax umbellata*, *Poranthera microphylla*, *Pterostylis nutans*, *Crinum pedunculatum*, *Desmodium gunnii*, *Leucopogon margarodes*, *Phytolacca octandra*\*, *Pomaderris argyrophylla*, *Solanum mauritianum*\*, *Triumfetta rhomboidea*, *Vernonia cinerea*.

**Number of native taxa:** 207

**Number of taxa per site:** 32–71 (mean 45 ± 15)

**Number of exotic taxa:** 31

## Indicator native taxa

Species	Group score	Group frequency	Non-group score	Non-group frequency	Fidelity class
<i>Smilax australis</i>	2	95%	2	39%	positive
<i>Geitonoplesium cymosum</i>	2	89%	2	38%	positive
<i>Lophostemon confertus</i>	4	89%	3	15%	positive
<i>Guioa semiglauc</i>	2	84%	1	26%	positive
<i>Cupaniopsis anacardioides</i>	2	79%	1	32%	positive
<i>Jagera pseudorhus</i> var. <i>pseudorhus</i> forma <i>pseudorhus</i>	2	79%	1	25%	positive
<i>Lomandra longifolia</i>	2	74%	2	27%	positive
<i>Ottochloa gracillima</i>	3	74%	2	30%	positive
<i>Dianella caerulea</i>	2	68%	1	27%	positive
<i>Blechnum cartilagineum</i>	3	63%	2	10%	positive
<i>Dioscorea transversa</i>	2	63%	2	14%	positive
<i>Notelea longifolia</i>	2	63%	1	19%	positive
<i>Calochlaena dubia</i>	3	53%	2	8%	positive
<i>Maclura cochinchinensis</i>	2	53%	2	26%	positive
<i>Clematis glycinoides</i>	1	5%	0	0%	positive
<i>Dendrobium kingianum</i>	2	5%	0	0%	positive
<i>Dendrobium monophyllum</i>	1	5%	0	0%	positive
<i>Leptospermum microcarpum</i>	2	5%	0	0%	positive
<i>Pellaea viridis</i> var. <i>viridis</i>	2	5%	0	0%	positive
<i>Pomaderris argyrophylla</i>	1	5%	0	0%	positive
<i>Pomaderris discolor</i>	3	5%	0	0%	positive
<i>Prostanthera nivea</i>	2	5%	0	0%	positive



## Community 43 Brunswick–Tweed Brush Box Gully Rainforest on Meta-sediments

**Scientific name:** Brunswick–Tweed Brush Box (*Lophostemon confertus*) Gully Rainforest on Meta-sedimentary Soils.

**Sites:** (20) BIL14lsrh, BUR01lsrh, CUD12lsrh, MUR14lsrh, POT33lsrh, MUR16lsrh, BRU06lsrh, MUR06lsrh, POT16alvf, MUR11lsrh, MUR12lsrh, BUR04lsrh, CUD03lsrh, POT30lsrh, BUR02lsrh, POT11alfan, BUR03lsfl, POT14lsrh, POT17lsrh, POT18lsrh.

### Equivalent communities

Rainforest-Subtropical Rainforest (Keith 2006); Qld Regional Ecosystem 12.11.1 Brush Box closed forest in gullies (Young and Dillewaard 1999); 207 – Brush Box Open Forest (Kingston *et al.* 2004); Brush Box (Bb) (Landmark Ecological Services 1999); F2 – *Lophostemon confertus* tall to very tall closed forest (Pressey and Griffith 1992); Suballiance 18 – *Lophostemon confertus* (Floyd 1990).

### Description

This community comprises mostly closed forest sites with abundant Brush Box (*Lophostemon confertus*), Camphor Laurel (*Cinnamomum camphora*) and Guioa (*Guioa semiglauca*). Eucalypt and *Corymbia* species occur in the canopy, including Tallowwood (*Eucalyptus microcorys*), White Mahogany (*Eucalyptus acmenoides*), Flooded Gum (*Eucalyptus grandis*) and Pink Bloodwood (*Corymbia intermedia*). A highly species-rich dense middle stratum of small trees and shrubs is present, including Blue Lilly Pilly (*Syzygium oleosum*), Rose Myrtle (*Archirhodomomyrtus beckleri*), Black Walnut (*Endiandra globosa*), Murrogun (*Cryptocarya microneura*) and Scrub Turpentine (*Rhodamnia rubescens*). Fishbone Fern (*Blechnum cartilagineum*) is the most frequent lower stratum species, and often occurs with shrubs Rose Myrtle, Veiny Wilkiea (*Wilkiea huegliana*), Prickly Rasp Fern (*Doodia aspera*) and grasses (*Ottochloa gracillima*). This community contains populations of many rare, threatened and endangered plant species (28 taxa) and a rich diversity of climbing and twining plants (48 taxa).



### Distribution and Habitat

**Habitat:** Most common on metamorphic sedimentary rocks on lower slopes and footslopes on low rolling hills, at Marhalls Ridge, Burringbar Range and in the Tweed Valley lowlands.

**Disturbance:** Includes moderate to severe levels of fire (15–45 years prior), moderate to severe logging, light to severe clearing, and light to severe invasion by weeds.

**Example locations:** Piggabeen Road, Tweed Valley Way, east of Round Mountain, Reserve Creek Road, Sleepy

Hollow, Environ Road, Ocean Shores Salad Bowl, Urliup, North Tumbulgum cemetery, New Brighton, Forest Hill, Billinudgel NR, and Jones Road.

## Conservation

**Threats:** This is a low er slope community subject to significant threat from clearing, logging, inappropriate fire regimes and invasion by noxious weeds.

**Conservation status:** Lower slope examples of this community are possibly not well reserved in the FNC study area. The community described here is an example of 'Lowland Rainforest in NSW North Coast and Sydney Basin Bioregion' EEC. Sites in reserves include those in Cudgera Creek NR, Billinudgel NR and Marshalls Creek NR.

**Significant taxa:** *Endiandra muelleri* subsp. *bracteata* (TSC: Endangered), *Rhodamnia maideniana* (ROTAP: 2RC-), *Archidendron hendersonii* (TSC: Vulnerable), *Elaeocarpus williamsianus* (TSC: Endangered), *Elaeocarpus* sp. Rocky Creek (TSC: Endangered), *Acacia bakeri* (TSC: Vulnerable), *Endiandra globosa* (ROTAP: 2RC), *Acianthus amplexicaulis* (ROTAP: 3RC-), *Archidendron muellerianum* (ROTAP: 3RCa), *Cordyline congesta* (ROTAP: 2RC-), *Cupaniopsis newmanii* (ROTAP: 2RC-), *Davidsonia jerseyana* (TSC: Endangered), *Endiandra floydii* (TSC: Vulnerable), *Fontainea australis* (TSC: Vulnerable), *Gahnia insignis* (ROTAP: 3RCa), *Hicksbeachia pinnatifolia* (ROTAP: 3RC-), *Lindsaea brachypoda* (TSC: Vulnerable), *Macadamia tetraphylla* (TSC: Vulnerable), *Marsdenia longiloba* (TSC: Vulnerable), *Randia moorei* (TSC: Endangered), *Syzygium hodgkinsoniae* (TSC: Vulnerable), *Brunoniella spiciflora* rare in NSW).

## Structure

Layer	Height (m)	Cover (%)
Tallest	5–30	25–90
Middle 1	2–20	15–80
Middle 2	1–10	50–70
Lower 1	0–2	30–90

## Floristics

**Trees:** *Lophostemon confertus* (T), *Guioa semiglauca* (T), *Cinnamomum camphora*\* (T), *Cryptocarya microneura* (T), *Araucaria cunninghamii* (T), *Archontophoenix cunninghamiana*, *Eucalyptus microcorys* (T), *Melicope elleryana* (T), *Glochidion sumatranum* (T), *Toechima dasyrrhache* (M2), *Flindersia bennettiana* (T), *Alphitonia excelsa* (T), *Cryptocarya glaucescens* (T), *Glochidion ferdinandi* (T), *Ficus fraseri* (T), *Commersonia bartramia* (T), *Corymbia intermedia* (T), *Diploglottis cunninghamii*, *Elaeocarpus kirtonii* (T), *Flindersia schottiana* (T), *Cryptocarya obovata*, *Eucalyptus grandis* (T), *Euroschinus falcata* var. *falcata* (T), *Sloanea woollsii* (T), *Syzygium luehmannii*, *Gmelina leichhardtii*, *Polyscias murrayi* (T), *Acmena hemilampra* subsp. *hemilampra* (T), *Eucalyptus pilularis* (T), *Melaleuca quinquenervia* (T), *Polyscias elegans*, *Schefflera actinophylla*\*, *Sloanea australis*, *Eucalyptus acmenoides* (T), *Eucalyptus propinqua* (T), *Heritiera trifoliolata*, *Pouteria australis*, *Flindersia australis*, *Livistona australis*, *Brachychiton acerifolius*, *Doryphora sassafras*, *Ficus watkinsiana*, *Toona ciliata*.

**Sub-canopy trees:** *Melicope elleryana* (M1), *Dysoxylum mollissimum* subsp. *molle*, *Endiandra discolor*, *Heritiera trifoliolata* (M1), *Bridelia exaltata*.

**Small trees and shrubs:** *Archirhodomyrtus beckleri* (M1), *Archirhodomyrtus beckleri* (M1), *Synoum glandulosum* subsp. *glandulosum* (M1), *Guioa semiglauca*, *Wilkiea huegeliana* (M2), *Lantana camara*\* (M2), *Syzygium oleosum* (M1), *Endiandra globosa* (M1), *Pilidiostigma glabrum* (M1), *Maclura cochinchinensis*, *Trochocarpa laurina* (M2), *Acmena smithii* (M1), *Elaeocarpus reticulatus* (M1), *Elaeocarpus reticulatus* (M1), *Rhodamnia rubescens* (M1), *Cyathea leichhardtiana*, *Rhodamnia maideniana* (M1), *Jagera pseudorhus* var. *pseudorhus* forma *pseudorhus*, *Toechima dasyrrhache* (M1), *Croton verreauxii* (M2), *Mallotus philippensis*, *Notelaea longifolia*, *Cryptocarya glaucescens*, *Pittosporum revolutum*, *Tabernaemontana pandacaqui*, *Ficus coronata* (M1), *Neolitsea dealbata*, *Gossia hillii*, *Myrsine variabilis*, *Elaeocarpus obovatus*, *Cupaniopsis anacardioides*, *Elaeocarpus kirtonii*, *Pittosporum undulatum*, *Acacia disparrima* subsp. *disparrima*,

*Canarium australasicum* (M1, M2), *Cryptocarya laevigata*, *Litsea australis*, *Endiandra pubens* (M1), *Arytera distylis* (M1), *Alchornea ilicifolia* (M1), *Abrophyllum ornans*, *Decaspermum humile*, *Hedraianthera porphyropetala*, *Pouteria chartacea*, *Sarcopteryx stipata*, *Symplocos stawellii*, *Aphananthe philippinensis*, *Archidendron hendersonii* (M1), *Elaeocarpus* sp. Rocky Creek, *Mallotus discolor*, *Psychotria loniceroides*, *Quintinia verdonii*, *Acacia bakeri*, *Acacia melanoxylon*, *Allocasuarina torulosa*, *Auranticarpa rhombifolia*, *Elaeocarpus williamsianus* (M1), *Cryptocarya rigida*, *Macadamia tetraphylla*, *Mischocarpus pyriformis* subsp. *pyriformis*, *Acronychia imperforata*, *Acronychia wilcoxiana*, *Actephila lindleyi*, *Allocasuarina littoralis* (T), *Atractocarpus benthamianus*, *Callistemon salignus*, *Daphnandra tenuipes*, *Daviesia arborea*, *Diospyros pentamera*, *Drypetes deplanchei*, *Duboisia myoporoides*, *Fontainea australis*, *Hicksbeachia pinnatifolia*, *Ligustrum sinense*\*, *Medicosma cunninghamii*, *Meiogyne stenopetala* subsp. *stenopetala*, *Melicope hayesii*, *Notelaea johnsonii*, *Olea paniculata*, *Polyosma cunninghamii*, *Randia moorei*, *Triunia youngiana*, *Cupaniopsis parvifolia*, *Elattostachys nervosa*, *Helicia ferruginea*, *Persoonia media*, *Syzygium hodgkinsoniae*.

**Climbers:** *Smilax australis*, *Morinda jasminoides* (L1), *Dioscorea transversa*, *Geitonoplesium cymosum*, *Hibbertia scandens*, *Echinostephia aculeata*, *Flagellaria indica*, *Trophis scandens*, *Pandorea pandorana*, *Cissus hypoglauca* (T), *Marsdenia rostrata*, *Calamus muelleri* (L1), *Passiflora suberosa*\*, *Eustrephus latifolius*, *Stephania japonica* var. *discolor*, *Ripogonum album*, *Melodinus australis*, *Passiflora edulis*\*, *Coelospermum paniculatum*, *Parsonsia straminea*, *Ripogonum elseyanum* (M2), *Rubus moluccanus* var. *trilobus*, *Marsdenia longiloba*, *Palmeria scandens*, *Pothos longipes*, *Austrosteenisia glabristyla*, *Callerya megasperma*, *Carronia multisepealea*, *Cissus antarctica*, *Cissus sterculiifolia*, *Passiflora subpeltata*\*, *Smilax glyciphylla*, *Caesalpinia scortechinii*, *Callerya australis*, *Diplocyclos palmatus*, *Hibbertia dentata*, *Hippocratea barbata*, *Ipomoea cairica*\*, *Pandorea jasminoides*, *Celastrus subspicata*, *Derris involuta*, *Elattostachys nervosa*, *Parsonsia velutina*, *Ripogonum discolor*.

**Epiphytes:** *Asplenium australasicum* f. *australasicum* (L1), *Platyterium bifurcatum*, *Platyterium superbum*.

**Grasses:** *Ottochloa gracillima* (L1), *Oplismenus undulatifolius* var. *mollis* (L1), *Oplismenus imbecillis* (L1), *Paspalum wettsteinii*\*, *Entolasia marginata*, *Imperata cylindrica* var. *major*, *Oplismenus aemulus*, *Paspalidium distans*\*.

**Ferns:** *Blechnum cartilagineum* (L1), *Calochlaena dubia* (L1), *Cyathea leichhardtiana* (M1), *Asplenium australasicum* f. *australasicum* (L1), *Doodia aspera* (L1), *Christella dentata*, *Doodia caudata*, *Hypolepis muelleri* (L1), *Pteridium esculentum*, *Pyrrosia rupestris*, *Lastreopsis munita* (L1), *Lastreopsis marginans* (L1), *Cyathea australis*, *Psilotum nudum*, *Lastreopsis microsora* subsp. *microsora*, *Pyrrosia confluens* var. *confluens*, *Adiantum silvaticum*, *Legnephora moorei*, *Adiantum diaphanum*, *Arachniodes aristata*, *Arthropteris tenella*, *Blechnum indicum*, *Cupaniopsis parvifolia*, *Davallia solida* var. *pyxidata*, *Dictymia brownii*, *Lindsaea brachypoda*.

**Sedges and rushes:** *Lomandra longifolia* (L1), *Gahnia aspera* (L1), *Gahnia clarkei*, *Gahnia insignis*, *Gahnia sieberiana*, *Lepidosperma laterale*, *Lomandra spicata*.

**Herbs and shrubs:** *Cordyline rubra*, *Ageratina riparia*\* (L1), *Eupomatia laurina* (L1), *Dianella caerulea*, *Zieria smithii* (L1), *Pseuderanthemum variabile* (L1), *Alpinia caerulea*, *Senna pendula* var. *glabrata*\*, *Breynia oblongifolia*, *Cyperus tetraphyllus*, *Homalanthus populifolius*, *Pratia purpurascens*, *Viola banksii*, *Cleistanthus cunninghamii* (L1), *Alyxia ruscifolia*, *Aneilema acuminatum*, *Capparis arborea*, *Macaranga tanarius*, *Vernonia cinerea*, *Alpinia arundelliana*, *Eupomatia bennettii*, *Gymnostachys anceps*, *Hovea acutifolia*, *Linospadix monostachya*, *Ageratina adenophora*\*, *Brunoniella spiciflora*, *Cordyline petiolaris*, *Olearia nemstii*, *Oxalis chnoodes*, *Solanum mauritianum*\*, *Tasmannia insipida*, *Tripladenia cunninghamii*, *Acianthus amplexicaulis*, *Alocasia brisbanensis*, *Centella asiatica*, *Cordyline congesta*, *Cyperus enervis*, *Lepidozamia peroffskyana*, *Ozothamnus diosmifolius*, *Sida rhombifolia*\*, *Solanum capsicoides*\*, *Wikstroemia indica*.

**Number of native taxa:** 256

**Number of taxa per site:** 34–107 (mean 59 ± 20)

**Number of exotic taxa:** 20

## Indicator native taxa

Species	Group score	Group frequency	Non-group score	Non-group frequency	Fidelity class
<i>Acmena smithii</i>	2	58%	1	13%	positive
<i>Adiantum hispidulum</i>	2	63%	2	7%	positive
<i>Arachniodes aristata</i>	1	5%	0	0%	positive
<i>Archirhodomomyrtus beckleri</i>	4	84%	2	3%	positive
<i>Asplenium australasicum</i> f. <i>australasicum</i>	2	53%	1	13%	positive
<i>Blechnum cartilagineum</i>	3	74%	2	9%	positive
<i>Calochlaena dubia</i>	2	58%	2	7%	positive
<i>Cordyline rubra</i>	2	53%	2	10%	positive
<i>Cryptocarya microneura</i>	2	68%	1	7%	positive
<i>Denhamia celastroides</i>	2	58%	1	6%	positive
<i>Dictymia brownii</i>	1	5%	0	0%	positive
<i>Dioscorea transversa</i>	2	63%	2	14%	positive
<i>Elaeocarpus</i> species. Rocky Creek	4	5%	0	0%	positive
<i>Elaeocarpus williamsianus</i>	3	5%	0	0%	positive
<i>Endiandra globosa</i>	3	63%	3	3%	positive
<i>Eupomatia laurina</i>	2	58%	1	4%	positive
<i>Geitonoplesium cymosum</i>	2	63%	2	40%	positive
<i>Guioa semiglauca</i>	2	100%	1	25%	positive
<i>Hibbertia scandens</i>	2	53%	1	27%	positive
<i>Lophostemon confertus</i>	5	84%	3	15%	positive
<i>Maclura cochinchinensis</i>	2	74%	2	25%	positive
<i>Melicope hayesii</i>	2	5%	0	0%	positive
<i>Morinda jasminoides</i>	2	79%	2	24%	positive
<i>Olearia nernstii</i>	1	5%	0	0%	positive
<i>Ottochloa gracillima</i>	2	58%	2	31%	positive
<i>Pilidiostigma glabrum</i>	2	68%	1	11%	positive
<i>Rhodmaniania rubescens</i>	2	58%	1	6%	positive
<i>Smilax australis</i>	2	79%	2	40%	positive
<i>Synoum glandulosum</i>	2	95%	2	10%	positive
<i>Syzygium oleosum</i>	3	58%	2	11%	positive
<i>Tabernaemontana pandacaqui</i>	2	53%	1	7%	positive
<i>Toechima dasyrrhache</i>	2	53%	2	3%	positive
<i>Trochocarpa laurina</i>	2	58%	2	11%	positive
<i>Wilkiea huegiana</i>	2	84%	2	12%	positive



## Community 44 Tweed–Brunswick Valley Blue Quandong Subtropical Rainforest

**Scientific name:** Tweed–Brunswick Valley Blue Quandong (*Elaeocarpus obovatus*) Subtropical Rainforest.

**Sites:** (13) BIL04lsrh, MUR13lsrh, BIL05vbrh, TWE06lsrh, MUR07lsrh, TWE05lsrh, BRU05alterr, MUR17lsrh, MUR18lsrh, POT24alfl, POT25lsrh, POT26lsrh, POT27lsrh, TWE16lsrh.

### Equivalent communities

Rainforest-Subtropical Rainforest (Keith 2006); Qld Regional Ecosystem 12.11.1 Brush Box closed forest in gullies (Young and Dillewaard 1999); Subtropical rainforest on metasediments, and Subtropical rainforest on alluvial soils (Landmark Ecological Services 1999); 102 – Sub-tropical/Warm Temperate Rainforest on Bedrock Substrates (Kingston *et al.* 2004); Suballiance 2 – *Toona–Flindersia* (Floyd 1990).

### Description

This community is characterised by emergent Blue Quandong (*Elaeocarpus grandis*), Red Ash (*Alphitonia excelsa*), Cudgerie (*Flindersia schottiana*), Strangling Fig (*Ficus watkinsiana*), Brush Box (*Lophostemon confertus*) and Logan Apple (*Acmena hemilampra* subsp. *hemilampra*) and a closed tallest strata with Cudgerie (*Flindersia schottiana*), Bangalow Palm (*Archontophoenix cunninghamiana*), Red Ash, Hoop Pine (*Araucaria cunninghamii*), Red Bean (*Dysoxylum mollissimum* subsp. *molle*) and Sandpaper Fig (*Ficus fraseri*).

The middle stratum consists of shrubs and small trees, including Bangalow Palm, Rough-leaved Elm (*Aphananthe philippinensis*), Red-fruited Laurel

(*Cryptocarya laevigata*), Hairy-leaved Bolly

Gum (*Neolitsea dealbata*) and *Toechima dasyrrhache*. Ferns (including *Lastreopsis decomposita*, *Lastreopsis marginans*, *Lastreopsis munita*, and *Adiantum hispidulum*), grasses (e.g. *Oplismenus undulatifolius* var. *mollis*) and shrubs (e.g.

*Cleistanthus cunninghamii*, *Cryptocarya laevigata*) are the most frequent lower strata groups. A total of 52 climbing and twining plant taxa was recorded in the survey sites, and 31 threatened species were recorded in this community.



### Distribution and Habitat

**Habitat:** Metamorphic sedimentary and basalt soils on lower slopes of rolling hills in the Tweed Valley, the Burringbar Range and near Billinudgel. Also occurs on alluvial terraces and floodplain.

**Disturbance:** Disturbance includes moderate to severe logging and light to moderate invasion of weeds, and light to moderate clearing at several sites. Moderate fire damage was recorded at site BIL05vbrh (50years previously).

**Example locations:** Durobby Creek, Terranora Plateau, Terranora Country Club, Chambers Lookout, Terranora, McCauleys Road, SW of Billinudgel, Palmdale Road, Hogans Road, Cudgera Creek Road, Taggets Hill, Sleepy Hollow, and Birds Bay Road.



## Conservation

**Threats:** This is a lower slope community subject to significant threat from clearing, logging, inappropriate fire regimes and invasion by noxious weeds. This rainforest type is a hotspot for populations of rare and threatened plant species.

**Conservation status:** Sites sampled on lower sedimentary quartz and basalt soils are examples of 'Lowland Rainforest in NSW North Coast and Sydney Basin Bioregion' EEC. Occurrences on the floodplain are examples of 'Lowland Rainforest on Floodplain in the NSW North Coast Bioregion' EEC. Surveyed sites were in reserves at Cudgera Creek NR and Billinudgel NR.

**Significant taxa:** *Acalypha eremorum* (TSC: Endangered), *Grevillea hilliana* (TSC: Endangered), *Syzygium moorei* (TSC: Vulnerable), *Archidendron muellerianum* (ROTAP: 3RCa), *Macadamia tetraphylla* (TSC: Vulnerable), *Randia moorei* (TSC: Endangered), *Cassia brewsteri* var. *marksiana* (TSC: Endangered), *Cupaniopsis newmanii* (ROTAP: 2RC-), *Davidsonia jerseyana* (TSC: Endangered), *Cryptocarya foetida* (TSC: Vulnerable), *Endiandra floydii* (TSC: Endangered), *Endiandra muelleri* subsp. *bracteata* (TSC: Endangered), *Endiandra hayesii* (TSC: Vulnerable), *Lepiderema pulchella* (TSC: Vulnerable), *Rhodammia maideniana* (ROTAP: 2RC-), *Bosistoa transversa* (TSC: Vulnerable), *Cordyline congesta* (ROTAP: 2RC-), *Diospyros major* var. *ebenus* (TSC: Endangered), *Ochrosia moorei* (TSC: Endangered), *Peristeranthus hillii* (TSC: Vulnerable), *Syzygium hodgkinsoniae* (TSC: Vulnerable), *Argophyllum nullumense* (ROTAP: 3RCa), *Endiandra globosa* (ROTAP: 2RC-), *Acronychia baeuerlenii* (ROTAP: 3RC-), *Archidendron hendersonii* (TSC: Vulnerable), *Marsdenia hemiptera* (ROTAP: 3RC-).

## Structure

Layer	Height (m)	Cover (%)
Emergent	20–45	20–40
Tallest	10–30	60–95
Middle 1	2–20	30–80
Middle 2	1–10	30–60
Lower 1	0–2	30–80

## Floristics

**Trees:** *Archontophoenix cunninghamiana* (T), *Guioa semiglauca* (T), *Jagera pseudorhus* var. *pseudorhus* forma *pseudorhus* (T), *Dysoxylum mollissimum* subsp. *molle* (T), *Aphananthe philippinensis* (T), *Flindersia schottiana* (T), *Diospyros pentamera* (T), *Cryptocarya obovata*, *Pouteria queenslandica*, *Endiandra pubens* (T), *Heritiera trifoliolata*, *Elaeocarpus grandis* (E), *Ficus fraseri* (T), *Cupaniopsis newmanii*, *Dysoxylum fraserianum* (T), *Syzygium moorei* (T), *Araucaria cunninghamii* (T), *Synoum glandulosum* subsp. *glandulosum*, *Alphitonia excelsa* (E, T), *Cinnamomum camphora*\*, *Grevillea hilliana* (T), *Toechima dasyrrhache* (T), *Diploglottis cunninghamii*, *Glochidion sumatranum*, *Acacia bakeri*, *Commersonia bartramia* (T), *Litsea australis* (T), *Pentaceras australe* (T), *Tabernaemontana pandacaqui*, *Beilschmiedia elliptica*, *Cinnamomum virens*, *Cryptocarya microneura* (T), *Ficus watkinsiana* (E), *Castanospermum australe* (T), *Endiandra discolor*, *Pouteria australis*, *Syzygium francisii*, *Acmena hemilampira* subsp. *hemilampira* (E), *Archidendron hendersonii*, *Cryptocarya foetida*, *Endiandra floydii*, *Ficus virens* var. *sublanceolata* (T), *Flindersia bennettiana* (T), *Flindersia schottiana* (E), *Hodgkinsonia ovatiflora*, *Lophostemon confertus* (E, T), *Mallotus discolor* (T), *Baloghia inophylla* (T), *Cassia brewsteri* var. *marksiana*, *Pouteria chartacea*, *Siphonodon australis*, *Sloanea australis*, *Sterculia quadrifida*, *Elaeocarpus obovatus* (T), *Endiandra hayesii*, *Flindersia australis*, *Ficus obliqua* (T), *Gmelina leichhardtii* (T), *Polyosma cunninghamii*, *Pouteria pohlmanniana* var. *pohlmanniana*, *Cupaniopsis anacardioides*, *Doryphora sassafras*, *Dysoxylum rufum*, *Elaeocarpus kirtonii*, *Litsea reticulata*, *Pseudoweinmannia lachnocarpa*, *Schefflera actinophylla*\*, *Toona ciliata*, *Cinnamomum oliveri*, *Geissois benthamiana*, *Polyscias elegans*, *Quintinia verdonii*, *Stenocarpus sinuatus*, *Syagrus romanzoffiana*\*.

**Shrubs and small trees:** *Cryptocarya laevigata* (M1), *Archontophoenix cunninghamiana* (M1), *Wilkiea huegeliana* (M1), *Mallotus philippensis* (M1), *Sarcopteryx stipata* (M1), *Arytera distylis* (M1), *Calamus muelleri* (M1), *Neolitsea*

*dealbata* (M1), *Flagellaria indica* (M1), *Aphananthe philippinensis* (M1), *Cleistanthus cunninghamii* (M1), *Diospyros pentamera*, *Endiandra globosa* (M1), *MacLura cochinchinensis*, *Cryptocarya triplinervis* var. *pubens*, *Ficus coronata* (M1), *Hedraianthera porphyropetala* (M2), *Streblus brunonianus* (M2), *Lepiderema pulchella*, *Macadamia tetraphylla* (M1), *Arytera divaricata* (M1), *Endiandra pubens* (M1), *Randia moorei* (M2), *Endiandra muelleri* subsp. *muelleri* (M1), *Medicosma cunninghamii* (M1), *Mischocarpus pyriformis* subsp. *pyriformis* (M1), *Syzygium luehmannii*, *Harpullia hillii*, *Toechima dasyrrhache* (M1), *Sloanea woollsii* (M1), *Canarium australasicum*, *Drypetes deplanchei*, *Meiogyne stenopetala* subsp. *stenopetala*, *Pittosporum multiflorum*, *Wilkiea macrophylla*, *Pilidiostigma glabrum*, *Croton verreauxii*, *Glochidion ferdinandi* (M1), *Gossia acmenoides* (M2), *Helicia glabriflora*, *Pentaceras australe* (M1), *Psychotria loniceroides*, *Archidendron muellerianum* (M1), *Elattostachys nervosa*, *Neolitsea australiensis*, *Acmena smithii*, *Cryptocarya glaucescens*, *Notelaea longifolia*, *Rhodamnia maideniana*, *Acmena ingens* (M1), *Alangium villosum* subsp. *polyosmoides*, *Anthocarapa nitidula*, *Archidendron hendersonii*, *Capparis arborea*, *Coffea arabica*\*, *Daphnandra tenuipes* (M1), *Cryptocarya foetida*, *Decaspermum humile*, *Euroschinus falcata* var. *falcata*, *Olea paniculata*, *Acronychia pubescens*, *Archirhodomyrtus beckleri*, *Baloghia inophylla*, *Denhamia celastroides*, *Gossia bidwillii*, *Gossia punctata* (M1), *Pittosporum revolutum*, *Syzygium oleosum* (M1), *Symplocos stawellii*, *Alchornea ilicifolia*, *Ailanthus triphysa*, *Archidendron grandiflorum*, *Atractocarpus chartaceus*, *Carissa ovata*, *Citrus australasica*, *Diospyros major* var. *ebenus*, *Elaeodendron australe*, *Harpullia pendula*, *Lantana camara*\*, *Ligustrum lucidum*, *Mischocarpus anodontus*, *Notelaea johnsonii*, *Wilkiea austroqueenslandica*, *Acronychia wilcoxiana*, *Argophyllum nullumense*, *Bosistoa pentacocca* var. *pentacocca*, *Celtis paniculata*, *Ligustrum sinense*\*, *Excoecaria dallachyana*, *Hymenosporum flavum*, *Myrsine variabilis*, *Ochrosia moorei*, *Pararchidendron pruinatum* var. *pruinatum*, *Psydrax lamprophylla*, *Rhodamnia rubescens*, *Sarcomelicope simplicifolia* subsp. *simplicifolia*, *Trochocarpa laurina*, *Acalypha eremorum*, *Acronychia bauerlenii*, *Akania bidwillii*, *Alectryon subcinereus*, *Atalaya salicifolia*, *Bosistoa transversa*, *Bridelia exaltata*, *Callicarpa pedunculata*, *Claoxylon australe*, *Clerodendrum tomentosum*, *Cupaniopsis parvifolia*, *Harpullia alata*, *Diospyros fasciculosa*, *Elaeocarpus eumundii*, *Myrsine subsessilis*, *Scolopia braunii*, *Symplocos thwaitesii*, *Syzygium hodgkinsoniae*, *Trema tomentosa* var. *viridis*, *Triunia youngiana*.



**Climbers:** *Trophis scandens*, *Calamus muelleri* (M1), *Flagellaria indica* (M1), *Smilax australis*, *Callerya megasperma* (M1), *Dioscorea transversa*, *Geitonoplesium cymosum*, *Melodinus australis*, *Cissus antarctica* (M1), *Ripogonum album*, *Cissus hypoglauca*, *Pothos longipes*, *Morinda jasminoides*, *Carronia multiselepalea* (L1), *Austrosteenisia blackii* var. *blackii*, *Derris involuta*, *Pararistolochia praevenosa*, *Rauwenhoffia leichhardtii*, *Stephania japonica* var. *discolor*, *Caesalpinia scortechinii* (M1), *Embelia australiana*, *Mucuna gigantea*, *Cayratia clematidea*, *Ripogonum elseyanum*, *Cissus sterculiifolia*, *Echinostephia aculeata*, *Marsdenia rostrata*, *Melodinus acutiflorus*, *Pandorea jasminoides*, *Pandorea pandorana*, *Ripogonum discolor*, *Sarcopetalum harveyanum*, *Tragia novae-hollandiae*, *Anredera cordifolia*\*, *Asparagus plumosus*\*, *Celastrus subspicata*, *Eustrephus latifolius*, *Marsdenia hemiptera*, *Passiflora subpeltata*, *Coelospermum paniculatum*, *Hibbertia scandens*, *Hippocratea barbata*, *Parsonsia fulva*, *Parsonsia straminea*, *Passiflora edulis*, *Passiflora suberosa*.

**Epiphytes:** *Pothos longipes*, *Peristeranthus hillii*, *Asplenium harmanii*, *Asplenium australasicum* f. *australasicum*, *Platyterium superbum*, *Asplenium attenuatum*.

**Ferns:** *Adiantum hispidulum* (L1), *Lastreopsis decomposita* (L1), *Lastreopsis marginans* (L1), *Arthropteris tenella* (L1), *Blechnum cartilagineum* (L1), *Lastreopsis munita* (L1), *Cyathea leichhardtiana* (L1), *Doodia caudata* (L1), *Doodia aspera* (L1), *Adiantum diaphanum* (L1), *Adiantum hispidulum* (L1), *Christella dentata*, *Arthropteris beckleri*, *Pellaea nana*, *Adiantum silvaticum*, *Asplenium attenuatum*, *Adiantum formosum*, *Asplenium australasicum* f. *australasicum*, *Pteris tremula*.

**Grasses:** *Oplismenus undulatifolius* var. *mollis* (L1), *Ottochloa gracillima*, *Oplismenus imbecillis* (L1), *Paspalum wettsteinii*\*.

**Sedges and rushes:** *Cyperus tetraphyllus*, *Exocarya sclerioides*, *Gahnia aspera*, *Lomandra longifolia*, *Lomandra spicata*.

**Herbs and shrubs:** *Cordyline rubra*, *Dioscorea transversa*, *Actephila lindleyi* (L1), *Alpinia caerulea* (L1), *Ageratina riparia*\*, *Alpinia caerulea* (L1), *Linospadix monostachya* (M2), *Meiogyne stenopetala* subsp. *stenopetala* (L1), *Alyxia ruscifolia*, *Ochna serrulata*\*, *Breynia oblongifolia*, *Eupomatia bennettii*, *Homalanthus populifolius*, *Eupomatia laurina*, *Ixora beckleri*, *Atractocarpus chartaceus* (L1), *Alocasia brisbanensis* (L1), *Cordyline petiolaris*, *Dianella caerulea*, *Macaranga tanarius*, *Solanum mauritianum*\*, *Myrsine variabilis* (L1), *Cordyline congesta*, *Brunoniella spiciflora*, *Bryophyllum delagoense*\*, *Impatiens walleriana*, *Pseuderanthemum variabile*, *Tasmannia insipida*, *Ageratina adenophora*\*, *Aneilema acuminatum*, *Hibiscus tiliaceus*, *Pollia crispata*, *Senna pendula* var. *glabrata*\*, *Viola hederacea*.

Number of native taxa: 268

Number of taxa per site: 40–101 (mean 66 ± 17)

Number of exotic taxa: 23

### Indicator native taxa

Species	Group score	Group frequency	Non-group score	Non-group frequency	Fidelity class
<i>Acmena ingens</i>	3	13%	0	0%	positive
<i>Adiantum formosum</i>	1	7%	0	0%	positive
<i>Adiantum hispidulum</i>	2	87%	2	7%	positive
<i>Adiantum silvaticum</i>	2	13%	0	0%	positive
<i>Alectryon subcinereus</i>	1	7%	0	0%	positive
<i>Aphananthe philippinensis</i>	3	53%	1	6%	positive
<i>Archontophoenix cunninghamiana</i>	2	73%	2	24%	positive
<i>Arthropteris beckleri</i>	1	7%	0	0%	positive
<i>Arytera distylis</i>	2	73%	2	4%	positive
<i>Asplenium harmanii</i>	2	7%	0	0%	positive
<i>Calamus muelleri</i>	2	73%	2	7%	positive
<i>Callicarpa pedunculata</i>	1	7%	0	0%	positive
<i>Cleistanthus cunninghamii</i>	3	60%	2	3%	positive
<i>Cordyline rubra</i>	2	93%	2	9%	positive
<i>Crypocarya obovata</i>	2	67%	1	7%	positive
<i>Cryptocarya laevigata</i>	3	80%	2	2%	positive
<i>Cupaniopsis newmanii</i>	2	60%	2	2%	positive
<i>Dioscorea transversa</i>	2	80%	2	14%	positive
<i>Diospyros pentamera</i>	2	67%	2	4%	positive
<i>Dysoxylum mollissimum</i> subsp. <i>molle</i>	2	67%	2	5%	positive

Species	Group score	Group frequency	Non-group score	Non-group frequency	Fidelity class
<i>Dysoxylum rufum</i>	2	7%	0	0%	positive
<i>Elaeocarpus eumundii</i>	1	7%	0	0%	positive
<i>Elaeocarpus grandis</i>	5	20%	0	0%	positive
<i>Excoecaria dallachyana</i>	2	7%	0	0%	positive
<i>Ficus coronata</i>	2	53%	1	12%	positive
<i>Flagellaria indica</i>	2	73%	2	15%	positive
<i>Fontainea australis</i>	2	7%	0	0%	positive
<i>Gahnia insignis</i>	1	7%	0	0%	positive
<i>Geissois benthamiana</i>	1	7%	0	0%	positive
<i>Gossia punctata</i>	3	13%	0	0%	positive
<i>Guioa semiglauca</i>	2	87%	1	26%	positive
<i>Hedraianthera porphyropetala</i>	2	60%	2	3%	positive
<i>Hicksbeachia pinnatifolia</i>	2	7%	0	0%	positive
<i>Hymenosporum flavum</i>	1	7%	0	0%	positive
<i>Jagera pseudorhus</i> var. <i>pseudorhus</i> forma <i>pseudorhus</i>	2	73%	1	26%	positive
<i>Legnephora moorei</i>	2	7%	0	0%	positive
<i>Lomandra spicata</i>	2	13%	0	0%	positive
<i>Maclura cochinchinensis</i>	2	60%	2	26%	positive
<i>Mallotus philippensis</i>	2	80%	2	13%	positive
<i>Medicosma cunninghamii</i>	2	40%	0	0%	positive
<i>Melodinus acutiflorus</i>	3	7%	0	0%	positive
<i>Melodinus australis</i>	2	53%	2	7%	positive
<i>Mischocarpus anodontus</i>	2	13%	0	0%	positive
<i>Neolitsea dealbata</i>	2	73%	2	5%	positive
<i>Oplismenus undulatifolius</i> var. <i>mollis</i>	2	73%	2	5%	positive
<i>Parsonsia fulva</i>	1	7%	0	0%	positive
<i>Peristeranthus hillii</i>	3	7%	0	0%	positive
<i>Pollia crispata</i>	1	7%	0	0%	positive
<i>Ripogonum album</i>	2	53%	2	5%	positive
<i>Sarcopteryx stipitata</i>	2	80%	1	5%	positive
<i>Smilax australis</i>	2	73%	2	41%	positive
<i>Synoum glandulosum</i>	2	53%	2	13%	positive
<i>Triunia youngiana</i>	2	13%	0	0%	positive
<i>Trophis scandens</i>	2	73%	1	14%	positive
<i>Wilkiea huegeliana</i>	2	93%	2	12%	positive



## Community 45 Tweed–Brunswick Valleys Bangalow Palm–Lilly Pilly Subtropical Rainforest

**Scientific Name:** Tweed–Brunswick Bangalow Palm (*Archontophoenix cunninghamiana*) and Lilly Pilly (*Acmena smithii*) Subtropical Rainforest.

**Sites (9)** WAR11un, BRU17cbbbf, MUR04lsrh, MUR05lsrh, BRU40cbbbf, BRU42vbrlh, BRU43vbrlh, TWE15lsrh, TWE17albk.

### Equivalent communities

Rainforest-Subtropical Rainforest (Keith 2006); Qld Regional Ecosystem 12.11.1 Brush Box Closed Forest in gullies (Young and Dillewaard 1999); 102 – Sub-tropical/Warm Temperate Rainforest on Bedrock Substrates (Kingston *et al.* 2004); Subtropical rainforest on metasediments, and Subtropical rainforest on basalt soils (Landmark Ecological Services 1999); Suballiance 6 – *Archontophoenix–Livistona* (Floyd 1990).

### Description

A subtropical rainforest community with emergent Flooded Gum (*Eucalyptus grandis*) and Hoop Pine (*Araucaria cunninghamii*). The tallest layer contains Bangalow Palm (*Archontophoenix cunninghamiana*), Hoop Pine, Strangling Fig (*Ficus watkinsiana*), Cheese Tree (*Glochidion ferdinandi*), Umbrella Cheese Tree (*Glochidion sumatranum*) and a mix of rainforest trees, including Lilly Pilly (*Acmena smithii*), Brown Kurrajong (*Commersonia bartramia*), Pepperberry (*Cryptocarya obovata*), Three-veined Laurel (*Cryptocarya triplinervis*), Myrtle Ebony (*Diospyros pentamera*), Rose Walnut (*Endiandra discolor*), Black Walnut (*Endiandra globosa*), Bennett's Ash (*Flindersia bennettiana*), Red Kamala (*Mallotus philippensis*) and Giant Water Gum (*Syzygium francisii*). There are occasional canopy occurrences of *Eucalyptus* species such as Flooded Gum (*E. grandis*) and Red Gum (*E. tereticornis*). A mid-stratum of small trees and shrubs includes Bangalow Palm, Twin-leaved Googera (*Arytera distylis*), *Cleistanthus cunninghamii*, Sandpaper Fig (*Ficus coronata*) and Burny Vine (*Trophis scandens*). Southern Lawyer Vine (*Calamus muelleri*), Whip Vine (*Flagellaria indica*) and Burny Bean (*Mucuna gigantea*) are common vine species in the mid-stratum. Lower strata consist of the grass *Oplismenus undulatifolius* var. *mollis*, Cunjevoi (*Alocasia brisbanensis*), palm lilies (*Cordyline petiolaris*, *Cordyline rubra*) and Rasp Fern (*Doodia aspera*). This community contains populations of many rare and threatened plant taxa (22), and climbers and twiners are also well represented (40 taxa).



### Distribution and Habitat

**Habitat:** Occurs on gently undulating coastal barrier sandplains near Tyagarah, lower slopes on metamorphic rocks in the Tweed Valley, and on mid-slopes near Urliup.

**Disturbance:** There is evidence of light to moderate logging, light infestations of weeds, and light to moderate



levels of grazing. There is also evidence of fire at sites MUR04lsrh and BRU40cbbbf (40–60 years prior).

**Example locations:** Tuckean Broadwater, Urliup Road, Tandys Lane, Charles Bay. A significant remnant is located north of the Tuckean Broadwater.

## Conservation

**Threats:** This is a lower slope community subject to significant threat from clearing, logging, inappropriate fire regimes and invasion by noxious weeds.

**Conservation status:** The community described here is an example of 'Lowland Rainforest in NSW North Coast and Sydney Basin Bioregion' EEC. Occurrences on the floodplain are examples of 'Lowland Rainforest on Floodplain in the NSW North Coast Bioregion' EEC. One survey site was in Tyagarah NR.

**Significant taxa:** *Endiandra floydii* (TSC: Vulnerable), *Xylosma terrae-reginae* (TSC: Vulnerable), *Acacia bakeri* (TSC: Endangered), *Acronychia baeuerlenii* (ROTAP: 2RC-), *Archidendron hendersonii* (TSC: Vulnerable), *Endiandra hayesii* (TSC: Vulnerable), *Endiandra muelleri* subsp. *bracteata* (TSC: Endangered), *Lepiderema pulchella* (TSC: Vulnerable), *Cupaniopsis newmanii* (ROTAP: 2RC-), *Cassia brewsteri* var. *marksiana*, (TSC Endangered) *Archidendron muellerianum* (ROTAP: 3RCa), *Dendrocnide moroides* (TSC: Endangered), *Diospyros major* var. *ebenus* (TSC: Endangered), *Endiandra floydii* (TSC: Endangered), *Endiandra globosa* (ROTAP: 2RC-), *Ochrosia moorei* (TSC: Endangered), *Rhodamnia maideniana* (ROTAP: 2RC-), *Syzygium moorei* (TSC: Vulnerable), *Tinospora tinosporoides* (TSC: Vulnerable).

## Structure

Layer	Height (m)	Cover (%)
Emergent	25–35	30
Tallest	13–40	30–100
Middle 1	1–25	10–90
Middle 2	1–10	60–70
Lower 1	0–2	20–60

## Floristics

**Trees:** *Archontophoenix cunninghamiana* (T), *Glochidion ferdinandi* (T), *Mallotus philippensis* (T), *Glochidion sumatranum* (T), *Guioa semiglaucata* (T), *Cryptocarya triplinervis*, *Eucalyptus grandis* (E), *Ficus watkinsiana* (T), *Araucaria cunninghamii* (E, T), *Capparis arborea* (T), *Diospyros pentamera* (T), *Endiandra globosa*, *Commersonia bartramia* (T), *Flindersia bennettiana* (T), *Melaleuca quinquenervia* (T), *Syzygium francisi* (T), *Endiandra discolor* (T), *Pseudoweinmannia lachnocarpa* (T), *Stenocarpus sinuatus* (T), *Cryptocarya obovata* (T), *Diploglottis cunninghamii*, *Livistona australis*, *Polyscias elegans*, *Pouteria australis*, *Gossia bidwillii*, *Lophostemon confertus* (T), *Macaranga tanarius* (T), *Cinnamomum camphora*\*, *Beilschmiedia elliptica*, *Beilschmiedia obtusifolia*, *Ficus obliqua*, *Ficus virens* var. *sublanceolata*, *Pentaceras australe*, *Toechima dasyrrhache*, *Acacia bakeri*, *Alphitonia excelsa*, *Castanospermum australe*, *Endiandra muelleri* subsp. *bracteata*, *Eucalyptus tereticornis* (T), *Heritiera trifoliolata*, *Arytera divaricata*, *Cryptocarya glaucescens*, *Endiandra muelleri* subsp. *muelleri*, *Podocarpus elatus*, *Siphonodon australis*, *Sloanea australis*, *Syzygium corynanthum*, *Syzygium moorei*, *Emmenosperma alphitonioides*, *Ficus fraseri*, *Flindersia australis*, *Schefflera actinophylla*\*, *Synoum glandulosum* subsp. *glandulosum*.

**Sub-canopy trees:** *Archontophoenix cunninghamiana* (M1), *Calamus muelleri* (M1), *Glochidion ferdinandi* (M1), *Arytera distylis* (M1), *Acmena smithii* (M1), *Glochidion sumatranum* (M1), *Cordyline petiolaris* (M1), *Endiandra globosa* (M1), *Syzygium francisii* (M1), *Endiandra floydii* (M1), *Dysoxylum mollissimum* subsp. *molle* (M1), *Alyxia ruscifolia* (M1), *Elaeocarpus obovatus* (M1), *Mischocarpus pyriformis* subsp. *pyriformis* (M1), *Dysoxylum fraserianum*.

**Shrubs and small trees:** *Archontophoenix cunninghamiana* (M2), *Wilkiea huegeliana* (M2), *Lantana camara*\* (M2), *Ficus coronata*, *Trophis scandens* (M2), *Cleistanthus cunninghamii* (M2), *Diospyros australis*, *Diospyros*

pentamera, *Jagera pseudorhus* var. *pseudorhus* forma *pseudorhus*, *Pittosporum multiflorum*, *Neolitsea dealbata*, *Maclura cochinchinensis*, *Pouteria chartacea*, *Aphananthe philippinensis* (M2), *Drypetes deplanchei* (M2), *Elattostachys nervosa*, *Endiandra floydii* (M2), *Melodinus australis*, *Alchornea ilicifolia*, *Archidendron hendersonii* (M2), *Notelaea longifolia*, *Pouteria australis* (M2), *Toeckima dasyrrhache*, *Bridelia exaltata*, *Claoxylon australe*, *Croton verreauxii*, *Cupaniopsis newmanii*, *Elaeocarpus obovatus*, *Rhodamnia rubescens*, *Mischocarpus pyriformis* subsp. *pyriformis*, *Tabernaemontana pandacaqui*, *Cryptocarya laevigata*, *Cupaniopsis parvifolia*, *Endiandra hayesii*, *Harpullia hillii*, *Pilidiostigma glabrum*, *Pittosporum revolutum*, *Psychotria loniceroides*, *Elaeodendron australe* (M2), *Ixora beckleri* (M2), *Sarcopteryx stipata*, *Streblus brunonianus*, *Trochocarpa laurina*, *Xylosma terrae-reginae*, *Acronychia pubescens*, *Acronychia wilcoxiana*, *Archidendron muellerianum*, *Atractocarpus benthamianus*, *Celtis paniculata*, *Clerodendrum tomentosum*, *Cryptocarya microneura*, *Daphnandra tenuipes*, *Denhamia celastroides* (M2), *Hedraianthera porphyropetala*, *Lepiderema pulchella*, *Pouteria myrsinifolia*, *Rhodamnia maideniana*, *Rhodomyrtus psidioides*, *Symplocos thwaitesii*, *Wilkiea austroqueenslandica*, *Acronychia baeuerlenii*, *Akania bidwillii*, *Archidendron grandiflorum*, *Citrus australasica*, *Polyosma cunninghamii*, *Dendrocnide moroides*, *Diospyros major* var. *ebenus*, *Endiandra sieberi*, *Endiandra virens*, *Excoecaria agallocha*, *Ligustrum sinense*\*, *Ligustrum lucidum*\*, *Mallotus discolor*, *Maytenus disperma*, *Mischocarpus australis*, *Ochrosia moorei*, *Psychotria simmondsiana*, *Syzygium australe*.

**Climbers:** *Calamus muelleri* (M2), *Flagellaria indica* (M2), *Cissus antarctica*, *Derris involuta*, *Smilax australis*, *Geitonoplesium cymosum*, *Mucuna gigantea*, *Capparis arborea*, *Dioscorea transversa*, *Pothos longipes*, *Ripogonum elseyanum*, *Morinda jasminoides*, *Ripogonum album*, *Celastrus subspicata*, *Cissus hypoglauca* (M2), *Ipomoea cairica*\*, *Pandorea jasminoides* (L1), *Stephania japonica*, *Tinospora tinosporoides*, *Austrosteenisia blackii* var. *blackii*, *Diospyros fasciculosa*, *Hippocratea barbata*, *Pararistolochia praevenosa*, *Parsonsia straminea*, *Caesalpinia subtropica*, *Coelospermum paniculatum*, *Embelia australiana*, *Histiopteris incisa*, *Hoya australis* subsp. *australis*, *Marsdenia hemiptera*, *Passiflora edulis*\*, *Echinostephia aculeata*, *Callerya australis*, *Marsdenia rostrata*, *Tetrastigma nitens*.

**Epiphytes:** *Asplenium australasicum* f. *australasicum*, *Platynerium superbum*, *Dendrobium bowmanii*, *Plectorrhiza tridentata*.

**Grasses:** *Oplismenus undulatifolius* var. *mollis* (L1), *Panicum lachnophyllum*, *Oplismenus imbecillis*, *Paspalum wettsteinii*\*, *Oplismenus aemulus*.

**Ferns:** *Blechnum cartilagineum*, *Doodia aspera* (L1), *Arthropteris tenella*, *Calochlaena dubia*, *Christella dentata*, *Doodia caudata*, *Hypolepis muelleri*, *Lastreopsis decomposita*, *Lastreopsis marginans*, *Lastreopsis microsora* subsp. *microsora*, *Lastreopsis munita*, *Microsorium scandens*, *Pellaea nana*.

**Sedges and rushes:** *Lomandra longifolia* (L1), *Gahnia clarkei* (L1), *Gahnia aspera* (L1), *Cyperus tetraphyllus*.

**Herbs and shrubs:** *Cordyline rubra*, *Cleistanthus cunninghamii* (L1), *Alpinia caerulea* (L1), *Alocasia brisbanensis*, *Pseuderanthemum variabile*, *Cordyline petiolaris* (L1), *Linosyadix monostachya*, *Alyxia ruscifolia*, *Lepidozamia peroffskyana*, *Macaranga tanarius*, *Carissa ovata*, *Ageratina riparia*\*, *Atractocarpus chartaceus*, *Breynia oblongifolia*, *Gymnostachys anceps*, *Meiogyne stenopetala* subsp. *stenopetala* (L1), *Myrsine variabilis*, *Tripladenia cunninghamii*, *Viola banksii*, *Alpinia arundelliana*, *Cheirostylis notialis*, *Crinum pedunculatum*, *Eupomatia bennettii*, *Homalanthus populifolius*, *Jasminum didymum*, *Myrsine subsessilis*, *Ochna serrulata*.

**Number of native taxa:** 210

**Number of taxa per site:** 27-85 (mean 58 ± 21)

**Number of exotic taxa:** 9

## Indicator native taxa

Species	Group score	Group frequency	Non-group score	Non-group frequency	Fidelity class
<i>Archontophoenix cunninghamiana</i>	3	89%	2	24%	positive
<i>Calamus muelleri</i>	3	89%	2	8%	positive
<i>Acmena smithii</i>	2	78%	1	14%	positive
<i>Cordyline rubra</i>	2	78%	2	11%	positive
<i>Flagellaria indica</i>	2	78%	2	16%	positive
<i>Mallotus philippensis</i>	2	78%	2	15%	positive
<i>Wilkiea huegeliana</i>	2	78%	2	14%	positive
<i>Arytera distylis</i>	3	67%	2	5%	positive
<i>Asplenium australasicum</i> f. <i>australasicum</i>	2	67%	1	13%	positive
<i>Cordyline petiolaris</i>	2	67%	2	4%	positive
<i>Derris involuta</i>	2	67%	2	5%	positive
<i>Dioscorea transversa</i>	2	67%	2	16%	positive
<i>Geitonoplesium cymosum</i>	2	67%	2	49%	positive
<i>Oplismenus undulatifolius</i> var. <i>mollis</i>	4	67%	2	6%	positive
<i>Smilax australis</i>	2	67%	2	42%	positive
<i>Alpinia caerulea</i>	2	56%	1	10%	positive
<i>Cissus antarctica</i>	3	56%	2	9%	positive
<i>Cryptocarya triplinervis</i>	2	56%	2	5%	positive
<i>Cupaniopsis anacardioides</i>	2	56%	1	34%	positive
<i>Ficus coronata</i>	2	56%	1	13%	positive
<i>Glochdion ferdinandi</i>	4	56%	1	24%	positive
<i>Maclura cochinchinensis</i>	2	56%	2	27%	positive
<i>Pittosporum multiflorum</i>	2	56%	2	5%	positive
<i>Trophis scandens</i>	3	56%	1	15%	positive
<i>Panicum lachnophyllum</i>	3	22%	0	0%	positive
<i>Tinospora tinosporoides</i>	2	22%	0	0%	positive
<i>Dendrobium bowmanii</i>	1	11%	0	0%	positive
<i>Dendrocnide moroides</i>	1	11%	0	0%	positive
<i>Emmenosperma alphitonioides</i>	1	11%	0	0%	positive
<i>Maytenus disperma</i>	1	11%	0	0%	positive
<i>Microsora scandens</i>	2	11%	0	0%	positive
<i>Psychotria simmondsiana</i>	1	11%	0	0%	positive
<i>Syzygium corynanthum</i>	2	11%	0	0%	positive
<i>Xylosma terrae-reginae</i>	3	11%	0	0%	positive

## Community 46 Stinging Tree–White Fig–Brush Bloodwood Subtropical Rainforest

**Scientific Name:** Stinging Tree (*Dendrocnide excelsa*), White Fig (*Ficus virens* var. *sublanceolata*) and Brush Bloodwood (*Baloghia inophylla*) Subtropical Rainforest.

**Sites:** (1) BIL06vbrh.

### Equivalent communities

Rainforest-Subtropical Rainforest (Keith 2006); Qld Regional Ecosystem 12.8.4 Complex notophyll rainforest on basalt and laterised basalt (Young and Dillewaard 1999); 102 – Sub-tropical/Warm Temperate Rainforest on Bedrock Substrates (Kingston *et al.* 2004); Subtropical Rainforest on basalt soils (Landmark Ecological Services 1999); Suballiance 3 – *Cryptocarya obovata*–*Dendrocnide excelsa*–*Ficus* spp.–*Araucaria* (Floyd 1990).

### Description

A closed forest community in which Brush Bloodwood (*Baloghia inophylla*) and White Fig (*Ficus virens* var. *sublanceolata*) and Stinging Tree (*Dendrocnide excelsa*) are the most abundant canopy species. A dense mid-layer of sub-canopy trees is also present and includes Ferny-leaf Bosistoa (*Bosistoa pentacocca* var. *pentacocca*), Brown Bolly Gum (*Litsea australis*) and Green Bolly Gum (*Neolitsea australiensis*). A second middle layer of shrubs also occurs, with Veiny Wilkiea (*Wilkiea macrophylla*) and Lantana (*Lantana camara*). The lower layer consists of *Arthropteris tenella*, Lantana, White Supplejack (*Ripogonum album*) and Native Mulberry (*Pipturus argenteus*). The climbing plants *Callerya megasperma* and *Calamus muelleri* are common.

### Distribution and Habitat

**Habitat:** A lower slope basalt site on rolling hills.

**Disturbance:** Evidence of moderate levels of logging, and light infestation of weeds.

**Location:** Durobby Creek.

### Conservation

**Threats:** Clearing, logging and weeds.

**Conservation status:** Not known. Floyd (1990) records Rainforest Suballiance 3 from basalt-enriched alluvial lowland floodplains north from the Manning River. There is very little of this community remaining on the FNC, and it is only known to be reserved in Stotts Island NR.

**Significant taxa:** None recorded.

### Structure

Layer	Height (m)	Cover (%)
Tallest	18–25	70
Middle 1	5–18	60
Middle 2	1–5	65
Lower 1	0–1	40

## Floristics

**Trees:** *Ficus virens* var. *sublanceolata* (T), *Baloghia inophylla* (T), *Dendrocnide excelsa*, *Dysoxylum mollissimum* subsp. *molle*, *Endiandra pubens*, *Cinnamomum virens*, *Cryptocarya obovata*, *Castanospermum australe*.

**Shrubs and small trees:** *Litsea australis* (M1), *Neolitsea australiensis* (M1), *Wilkiea macrophylla* (M2), *Bosistoa pentacocca* var. *pentacocca* (M1), *Harpullia pendula*, *Lantana camara*\* (M1), *Cryptocarya triplinervis* var. *pubens*, *Hedraianthera porphyropetala*, *Neolitsea dealbata*, *Pipturus argenteus*, *Atractocarpus benthamianus*, *Cryptocarya laevigata*, *Lepiderema pulchella*, *Macaranga tanarius*, *Psychotria loniceroides*, *Sarcopteryx stipata*.

**Climbers:** *Calamus muelleri* (M1), *Callerya megasperma*, *Carronia multiseptata*, *Geitonoplesium cymosum*, *Sarcopetalum harveyanum*, *Tetrastigma nitens*, *Trophis scandens*, *Dioscorea transversa*, *Passiflora subpeltata*\*.

**Epiphytes:** *Asplenium australasicum* f. *australasicum*, *Pothos longipes*.

**Ferns:** *Arthropteris tenella*, *Asplenium australasicum* f. *australasicum*, *Adiantum hispidulum*.

**Grasses:** *Oplismenus imbecillis*.

**Herbs and shrubs:** *Ripogonum album*, *Acalypha capillipes*, *Ageratina riparia*\*, *Alpinia caerulea*, *Commelina cyanea*, *Cordyline petiolaris*, *Homalanthus populifolius*, *Peperomia blanda* var. *floribunda*.

**Number of native species:** 45      **Number of native taxa per site:** 45

**Number of exotic taxa:** 2

## Indicator native taxa

Species	Group score	Group frequency	Non-group score	Non-group frequency	Fidelity class
<i>Atalaya multiflora</i>	3	33%	0	0	positive
<i>Bosistoa selwynii</i>	3	17%	0	0	positive
<i>Bouchardatia neurococca</i>	3	17%	0	0	positive
<i>Citronella moorei</i>	4	17%	0	0	positive
<i>Dendrocnide photinophylla</i>	3	33%	0	0	positive
<i>Diospyros mabacea</i>	3	17%	0	0	positive
<i>Guilfoylia monostylis</i>	1	17%	0	0	positive
<i>Monococcus echinophorus</i>	5	17%	0	0	positive
<i>Notothixos cornifolius</i>	2	17%	0	0	positive
<i>Parsonsia longifolia</i>	3	17%	0	0	positive
<i>Piper novae-hollandiae</i>	1	17%	0	0	positive
<i>Pisonia aculeata</i>	1	17%	0	0	positive
<i>Planchonella myrsinoides</i>	4	17%	0	0	positive



## Community 47 Tweed Valley Meta-sediment and Basalt Low-Elevation Subtropical Rainforest

Scientific name: Tweed Valley Moreton Bay Fig (*Ficus macrophylla*), Rough-leaved Elm (*Aphananthe philippensis*), Myrtle Ebony (*Diospyros pentamera*), Red Kamala (*Mallotus philippinensis*), Brush Bloodwood (*Baloghia inophylla*) and White Booyong (*Heritiera trifoliata*) Subtropical Rainforest on Basalt/Sediments on Rolling Hills.

Sites: (6) MUR01vbrh, TWE21vbrh, TWE24vbrh, MUR08lsrh, MUR09lsrh, MUR10lsrh.

### Equivalent communities

Rainforest-Subtropical Rainforest (Keith 2006); Qld Regional Ecosystems 12.8.3 Complex notophyll rainforest on Cainozoic igneous rocks (Young and Dillewaard 1999); Subtropical rainforest on metasediments, and Subtropical rainforest on basalt soils (Landmark Ecological Services 1999); 102 – Sub-tropical/Warm Temperate Rainforest on Bedrock Substrates (Kingston *et al.* 2004); Suballiance 1 – *Argyrodendron trifoliatum* (Floyd 1990).

### Description

This community is a closed forest characterised by emergent Moreton Bay Fig (*Ficus macrophylla*) and a tallest strata with White Booyong (*Heritiera trifoliolata*), White Bean (*Ailanthus triphysa*), Rough-leaved Elm (*Aphananthe philippinensis*), Twin-leaved Coogera (*Arytera divaricata*), Myrtle Ebony (*Diospyros pentamera*), Small-leaved Tamarind (*Diploglottis campbellii*), Moreton Bay Fig, Strangling Fig (*Ficus watkinsiana*), Red Kamala (*Mallotus philippensis*), Yellow Carabeen (*Sloanea australis*) and Giant Water Gum (*Syzygium francisii*). A dense sub-canopy of trees includes *Actephila lindleyi*, Bangalow Palm (*Archontophoenix cunninghamiana*), Brush Bloodwood (*Baloghia inophylla*), Shiny-leaved Stinging Tree (*Dendrocnide photinophylla*), Grey Ebony (*Diospyros fasciculosa*), Red Bean (*Dysoxylum mollissimum* subsp. *molle*), Beetroot Tree (*Elattostachys nervosa*), *Hedraianthera porphyropetala* and Cockspur Thorn (*Maclura cochinchinensis*). A mid-layer of small trees and shrubs is often present, with Large-leaved Wilkiea (*Wilkiea macrophylla*), *Capparis arborea*, *Alyxia ruscifolia*, Muskwood (*Alangium villosum* subsp. *polyosmoides*), *Monococcus echinophorus*, and Steelwood (*Sarcopteryx stipata*) being frequent species. The lower stratum is a mix of *Cleistanthus cunninghamii*, *Oplismenus undulatifolius* var. *mollis*, Pastel Flower (*Pseuderanthemum variabile*), Palm Lily (*Cordyline petiolaris*) and *Meiogyne stenopetala* subsp. *stenopetala*. Vines are common in all strata, in particular *Calamus muelleri*, *Cissus antarctica*, *Hippocratea barbata* and *Trophis scandens*.



### Distribution and Habitat

**Habitat:** Sheltered lower slopes with metamorphic sedimentary rocks and basalt at Terranorra, Duroby Creek Razorback and the Condong Range.

**Disturbance:** Infestation by weeds varies from light to moderate, and there is no evidence of fire. Light clearing is evident at sites TWE21vbrh and MUR10lsrh, and light logging at site MUR01vbrh.

**Example locations:** Farrants Hill, Tom Beatson Outlook, and McCauleys Road.

## Conservation

**Threats:** A lower slope community subject to significant threats from clearing, logging, inappropriate fire regimes and invasion by noxious weeds.

**Conservation status:** The community described here is an example of 'Lowland Rainforest in NSW North Coast and Sydney Basin Bioregion' EEC.

**Significant taxa:** *Cryptocarya foetida* (TSC: Vulnerable), *Diploglottis campbellii* (TSC: Endangered), *Grevillea hilliiana*, *Lepiderema pulchella* (TSC: Vulnerable), *Macadamia tetraphylla* (TSC: Vulnerable), *Niemeyera antiloga*, *Randia moorei* (TSC: Endangered), *Syzygium moorei* (TSC: Vulnerable), *Cordyline congesta* (ROTAP: 3RC-), *Endiandra hayesii* (TSC: Vulnerable), *Diospyros major* var. *ebenus*, (TSC: Endangered) *Diospyros mabacea* (TSC: Endangered), *Cupaniopsis newmanii* (ROTAP: 2RC-), *Bosistoa selwynii* (TSC: Vulnerable), *Archidendron hendersonii* (TSC: Vulnerable), *Syzygium hodgkinsoniae* (TSC: Vulnerable), *Acalypha eremorum* (TSC: Endangered), *Rhodamnia maideniana* (ROTAP: 2RC-).

## Structure

Layer	Height (m)	Cover (%)
Emergent	20–35	30
Tallest	10–40	80–90
Middle 1	2–30	50–90
Middle 2	1–15	60–70
Lower 1	0–3	10–70

## Floristics

**Trees:** *Heritiera trifoliolata* (T), *Heritiera actinophylla* (M1), *Aphananthe philippinensis* (T), *Diospyros pentamera* (T), *Mallotus philippensis*, *Baloghia inophylla* (M1), *Elattostachys nervosa* (M1), *Ficus watkinsiana* (T), *Syzygium francisii* (M1), *Diploglottis campbellii* (M1), *Ficus macrophylla* (E, T), *Arytera divaricata* (T), *Maclura cochinchinensis* (T), *Pouteria queenslandica*, *Syzygium moorei* (T), *Ailanthus triphyssa*, *Archontophoenix cunninghamiana* (M1), *Celtis paniculata* (M1), *Dysoxylum mollissimum* subsp. *molle* (M1), *Castanospermum australe* (T), *Cryptocarya foetida* (M1), *Mallotus discolor* (M1), *Grevillea hilliiana*, *Siphonodon australis*, *Atalaya multiflora*, *Ficus virens* var. *sublanceolata* (T), *Pentaceras australe*, *Sloanea woollsi* (T), *Dysoxylum fraserianum* (T), *Planchonella myrsinoides* (M1), *Sloanea australis* (M1), *Bosistoa pentacocca* var. *pentacocca*, *Citronella moorei*, *Cryptocarya obovata*, *Beilschmiedia elliptica*, *Litsea reticulata*, *Mischocarpus pyriformis* subsp. *pyriformis*, *Neolitsea dealbata*, *Toechima dasyrrhache*, *Elaeodendron australe* (M1), *Flindersia schottiana*, *Schefflera actinophylla*\*, *Syzygium luehmannii*, *Syzygium moorei*, *Endiandra muelleri* subsp. *muelleri*, *Ficus fraseri*, *Guioa semiglauca*, *Niemeyera antiloga*, *Stenocarpus sinuatus*, *Sterculia quadrifida*, *Toona ciliata*.

**Shrubs and small trees:** *Actephila lindleyi* (M2), *Diospyros pentamera*, *Maclura cochinchinensis* (L1), *Actephila lindleyi*, *Syzygium francisii* (L1), *Arytera divaricata* (L1), *Diploglottis campbellii* (L1), *Hedraianthera porphyropetala*, *Alangium villosum* subsp. *polyosmoides* (M2), *Streblus brunonianus*, *Olea paniculata*, *Celtis paniculata*, *Wilkiea macrophylla*, *Anthocarpa nitidula*, *Arytera distylis*, *Cryptocarya foetida*, *Cryptocarya triplinervis*, *Dendrocnide photinophylla*, *Diospyros fasciculosa*, *Hodgkinsonia ovatiflora*, *Mallotus discolor*, *Akania bidwillii*, *Gossia acmenoides*, *Monococcus echinophorus* (M2), *Randia moorei*, *Drypetes deplanchei*, *Dysoxylum fraserianum*, *Ixora beckleri*, *Pouteria myrsinifolia*, *Alchornea ilicifolia*, *Alectryon tomentosus*, *Bosistoa selwynii* (M2), *Bosistoa transversa* (M2), *Bouchardatia neurococca* (L1), *Croton verreauxii*, *Cupaniopsis newmanii*, *Diospyros mabacea* (M2), *Endiandra hayesii*, *Harpullia alata*, *Mischocarpus australis*, *Pittosporum multiflorum*, *Polyalthia nitidissima*, *Syzygium hodgkinsoniae*, *Alyxia ruscifolia* (M2), *Aurantiarpa rhombifolia*, *Cryptocarya laevigata*, *Elaeodendron australe*, *Endiandra pubens*, *Harpullia hillii*, *Lepiderema pulchella*, *Murraya*

*paniculata\**, *Notelaea johnsonii*, *Sarcomelicope simplicifolia* subsp. *simplicifolia*, *Sarcopteryx stipata*, *Atalaya salicifolia*, *Clerodendrum tomentosum*, *Guilfoylia monostylis*, *Jagera pseudorhus* var. *pseudorhus* forma *pseudorhus*, *Pararchidendron pruinosum* var. *pruinosum\**, *Pittosporum revolutum*, *Pouteria chartacea*, *Psychotria loniceroides*, *Psydrax lamprophylla*, *Rhodamnia maideniana*, *Tabernaemontana pandacaqui*, *Wilkiea austroqueenslandica*, *Diospyros major* var. *ebenus*.

**Climbers:** *Cissus antarctica*, *Calamus muelleri* (L1), *Callerya megasperma*, *Hippocratea barbata*, *Pothos longipes*, *Caesalpinia subtropica*, *Derris involuta*, *Rauwenhoffia leichhardtii*, *Ripogonum album*, *Trophis scandens*, *Pandorea jasminoides*, *Carronia multisepealea*, *Flagellaria indica*, *Parsonsia longipetiolata*, *Mucuna gigantea*, *Cayratia acris*, *Dioscorea transversa*, *Ipomoea cairica\**, *Marsdenia hemiptera*, *Anredera cordifolia\**, *Parsonsia velutina*, *Smilax australis*, *Tetrastigma nitens*, *Cissus sterculiifolia*, *Morinda jasminoides*, *Pararistolochia praevenosa*, *Passiflora suberosa\**, *Piper novae-hollandiae*, *Pisonia aculeata*.

**Epiphytes:** *Platyserium bifurcatum*, *Pyrrosia confluens* var. *confluens*, *Asplenium australasicum* f. *australasicum*.

**Mistletoes:** *Notothixos cornifolius*.

**Ferns:** *Arthropteris tenella*, *Lastreopsis microsora* subsp. *microsora*, *Asplenium attenuatum*, *Doodia aspera*, *Pellaea nana*, *Pyrrosia confluens* var. *confluens*, *Adiantum diaphanum*, *Asplenium australasicum* f. *australasicum*, *Lastreopsis decomposita*, *Lastreopsis marginans*.

**Grasses:** *Oplismenus undulatifolius* var. *mollis*.

**Herbs and shrubs:** *Cleistanthus cunninghamii* (L1), *Meiogyne stenopetala* subsp. *stenopetala* (L1), *Coffea arabica\** (L1), *Hedraianthera porphyropetala* (L1), *Capparis arborea*, *Cordyline petiolaris* (L1), *Castanospermum australe* (L1), *Pseuderanthemum variabile*, *Cordyline rubra*, *Ochna serrulata\** (L1), *Linospadix monostachya*, *Monococcus echinophorus*, *Cordyline congesta*, *Rivina humilis\**, *Asparagus plumosus\**, *Polyalthia nitidissima* (L1), *Carissa ovata*, *Alyxia ruscifolia*, *Asparagus aethiopicus\**, *Breynia oblongifolia*, *Protasparagus africanus\**.

**Number of native species:** 155

**Number of native taxa per site:** 45–68 (mean 57 ± 8)

**Number of exotic taxa:** 12

### Number of indicator taxa

Species	Group score	Group frequency	Non-group score	Non-group frequency	class
<i>Actephila lindleyi</i>	3	67%	2	2%	positive
<i>Aphananthe philippinensis</i>	3	100%	2	7%	positive
<i>Baloghia inophylla</i>	3	83%	3	1%	positive
<i>Caesalpinia subtropica</i>	2	67%	2	1%	positive
<i>Calamus muelleri</i>	2	83%	2	9%	positive
<i>Capparis arborea</i>	2	67%	2	4%	positive
<i>Cissus antartica</i>	2	83%	2	9%	positive
<i>Cleistanthus cunninghamii</i>	2	100%	3	4%	positive
<i>Cryptocarya triplinervis</i>	2	67%	2	5%	positive
<i>Diospyros fasciculosa</i>	2	67%	2	2%	positive
<i>Diospyros pentamera</i>	2	100%	2	5%	positive
<i>Elattostachys nervosa</i>	2	83%	1	3%	positive
<i>Hedraianthera porphyropetala</i>	2	67%	2	4%	positive
<i>Heritiera trifoliolata</i>	4	83%	3	2%	positive
<i>Hippocratea barbata</i>	3	67%	2	2%	positive
<i>Maclura cochinchinensis</i>	3	67%	2	27%	positive
<i>Mallotus philippensis</i>	2	100%	2	15%	positive

Species	Group score	Group frequency	Non-group score	Non-group frequency	class
<i>Meiogyne stenopetala</i> subsp. <i>stenopetala</i>	2	83%	3	1%	positive
<i>Pouteria queenslandica</i>	2	83%	3	2%	positive
<i>Streblus brunonianus</i>	2	83%	2	6%	positive
<i>Wilkiea macrophylla</i>	2	100%	2	1%	positive
<i>Neolitsea dealbata</i>	2	67%	2	7%	positive
<i>Pothos longipes</i>	2	67%	2	4%	positive
<i>Pseuderanthemum variabile</i>	2	67%	2	13%	positive
<i>Randia moorei</i>	2	67%	2	3%	positive
<i>Rauwenhoffia leichhardtii</i>	2	67%	1	2%	positive
<i>Trophis scandens</i>	2	67%	2	16%	positive
<i>Alangium villosum</i> subsp. <i>polyosmoides</i>	2	50%	2	1%	positive
<i>Archontophoenix cunninghamiana</i>	3	50%	2	25%	positive
<i>Arytera distylis</i>	2	50%	2	6%	positive
<i>Beilschmiedia elliptica</i>	2	50%	1	3%	positive
<i>Celtis paniculata</i>	2	50%	2	2%	positive
<i>Cordyline rubra</i>	2	50%	2	12%	positive
<i>Derris involuta</i>	2	50%	2	6%	positive
<i>Diploglottis campbellii</i>	3	50%	0	0%	positive
<i>Ficus watkinsiana</i>	3	50%	1	6%	positive
<i>Flagellaria indica</i>	2	50%	2	17%	positive
<i>Hodgkinsonia ovatiflora</i>	2	50%	2	1%	positive
<i>Ixora beckleri</i>	2	50%	2	1%	positive
<i>Linospadix monostachya</i>	2	50%	2	3%	positive
<i>Olea paniculata</i>	3	50%	2	2%	positive
<i>Oplismenus undulatifolius</i> var. <i>mollis</i>	2	50%	2	7%	positive
<i>Pandorea jasminoides</i>	2	50%	2	1%	positive
<i>Ripogonum album</i>	2	50%	2	6%	positive
<i>Syzygium francisii</i>	4	50%	4	1%	positive
<i>Syzygium moorei</i>	2	50%	3	2%	positive
<i>Atalaya multiflora</i>	3	33%	0	0%	positive
<i>Dendrocnide photinophylla</i>	3	33%	0	0%	positive
<i>Bosistoa selwynii</i>	3	17%	0	0%	positive
<i>Bouchardatia neurococca</i>	3	17%	0	0%	positive
<i>Citronella moorei</i>	4	17%	0	0%	positive
<i>Diospyros mabacea</i>	3	17%	0	0%	positive
<i>Guilfoylia monostylis</i>	1	17%	0	0%	positive
<i>Monococcus echinophorus</i>	5	17%	0	0%	positive
<i>Notothixos cornifolius</i>	2	17%	0	0%	positive
<i>Parsonsia longifolia</i>	3	17%	0	0%	positive
<i>Piper novae-hollandiae</i>	1	17%	0	0%	positive
<i>Pisonia aculeata</i>	1	17%	0	0%	positive
<i>Planchonella myrsinoides</i>	4	17%	0	0%	positive



## Community 48 Flooded Gum–Pink-flowered Doughwood–Hard Quandong Alluvial Plain Wet Sclerophyll Forest

**Scientific name:** Flooded Gum (*Eucalyptus grandis*), Pink-flowered Doughwood (*Melicope elleryana*), Hard Quandong (*Elaeocarpus obovatus*) and Harsh Ground Fern (*Hypolepis muelleri*) Alluvial Plain Wet Sclerophyll Forest.

**Sites:** (4) BRU02alchfl, POT15unfswp, POT10alfan, POT13alfan.

### Equivalent communities

Wet Sclerophyll Forests-North Coast Wet Sclerophyll Forests (Keith 2006); Qld Regional Ecosystem 12.3.2 *Eucalyptus grandis* ± *Eucalyptus microcorys* tall open forest with rainforest understorey (Young and Dillewaard 1999); 206 – Flooded Gum Open Forest (Kingston *et al.* 2004); Mixed regrowth (mr)/Wattle (w), and Flooded Gum (fG) (Landmark Ecological Surveys 1999); North-east NSW Forest Ecosystem 26 Coastal Flooded Gum (NPWS 1999).

### Description

A wet sclerophyll forest in which Blackwood (*Acacia melanoxylon*), Flooded Gum (*Eucalyptus grandis*), Hard Quandong (*Elaeocarpus obovatus*) and Pink-flowered Doughwood (*Melicope elleryana*) are common in the tallest stratum. Pink-flowered Doughwood, Lantana (*Lantana camara*), Camphor Laurel (*Cinnamomum camphora*) and *Senna pendula* var. *glabrata* dominate the mid-stratum of shrubs and small trees. The ground layer consists of *Ageratum houstonianum*, Harsh Ground Fern (*Hypolepis muelleri*), Blady Grass (*Imperata cylindrica* var. *major*), *Paspalum wettsteinii* and *Setaria sphacelata*. The sites are heavily disturbed by clearing and weeds are abundant in the ground layer.



### Distribution and Habitat

**Habitat:** Low-lying moist sites located on the alluvial plain in riparian zones and creek channels. The community also occurs in freshwater swamps on undifferentiated sediments.

**Disturbance:** These are heavily disturbed sites with a history of severe logging, clearing and infestation by weeds.

**Example locations:** Jones Road, Vallances Road, and Billinudgel NR.

### Conservation

**Threats:** Occurrences of Flooded Gum on the alluvial plain are probably poorly reserved. This community qualifies as a northern mesic variation of the River Flat Forest of coastal floodplains EEC.

**Conservation status:** Under considerable threat from clearing and disturbance from weeds. Sites POT10alfan and POT13alfan are within Billinudgel NR.

**Significant taxa:** None recorded.



## Structure

Layer	Height (m)	Cover (%)
Tallest	3–28	30–40
Middle 1	1–12	20–50
Middle 2	1–2.2	30
Lower 1	0–2	15–95

## Floristics

**Trees:** *Melicope elleryana* (T), *Acacia melanoxylon* (T), *Eucalyptus grandis* (T), *Callistemon salignus* (T), *Cinnamomum camphora*\* (T), *Cupaniopsis anacardioides*, *Corymbia intermedia* (T), *Ficus obliqua* (T), *Melaleuca quinquenervia* (T), *Synoum glandulosum* subsp. *glandulosum*, *Ficus fraseri*, *Livistona australis*, *Syagrus romanzoffiana*\*.

**Shrubs and small trees:** *Melicope elleryana* (M1), *Lantana camara*\* (L1, M2), *Acacia melanoxylon* (M1), *Elaeocarpus obovatus* (M1), *Senna pendula* var. *glabrata*\* (M1), *Pittosporum undulatum* (M1), *Glochidion sumatranum* (M1), *Maclura cochinchinensis*, *Callistemon salignus* (M1), *Cinnamomum camphora*\* (M1), *Elaeocarpus reticulatus*, *Syzygium oleosum* (M1), *Rhynchospora corymbosa* (M2), *Tabernaemontana pandacaqui*, *Acmena smithii*, *Archirhodomyrtus beckleri*, *Commersonia bartramia*, *Ficus coronata*, *Pilidiostigma glabrum*, *Jagera pseudorhus* var. *pseudorhus* forma *pseudorhus*, *Rhodomyrtus psidioides*.

**Climbers:** *Morinda jasminoides*, *Marsdenia rostrata*, *Parsonsia straminea*, *Hibbertia scandens*, *Stephania japonica* var. *discolor*, *Hibbertia scandens*, *Geitonoplesium cymosum*, *Ipomoea cairica*\*, *Rubus moluccanus* var. *trilobus*.

**Ferns:** *Hypolepis muelleri* (L1), *Pteridium esculentum* (L1), *Cyathea cooperi*, *Calochlaena dubia*.

**Grasses:** *Paspalum wettsteinii*\* (L1), *Setaria sphacelata*\*, *Imperata cylindrica* var. *major* (L1), *Baccharis halimifolia*\*, *Paspalum conjugatum*\*, *Axonopus fissifolius*\*, *Oplismenus aemulus*, *Paspalum dilatatum*\*.

**Sedges and rushes:** *Gahnia clarkei* (L1), *Rhynchospora corymbosa*, *Eleocharis sphacelata*, *Lomandra longifolia*.

**Herbs and shrubs:** *Ageratum houstonianum*\*, *Ageratina adenophora*\*, *Solanum mauritianum*\*, *Drymaria cordata* subsp. *cordata*, *Gomphocarpus fruticosus*\*, *Macaranga tanarius*, *Commelina cyanea* (L1), *Ageratina riparia*\*, *Oxalis purpurea*\*, *Persicaria dichotoma*, *Gomphocarpus physocarpus*\*, *Oxalis chnoodes*, *Persicaria strigosa*, *Phytolacca octandra*\*, *Pratia purpurascens*, *Senna septemtrionalis*\*, *Solanum capsicoides*\*, *Verbena incompta*\*.

Number of native taxa: 51

Number of native taxa per site: 24–36 (mean 32 ± 3)

Number of exotic taxa: 23

## Indicator native taxa

Species	Group score	Group frequency	Non-group score	Non-group frequency	Fidelity class
<i>Acacia melanoxylon</i>	3	75%	1	8%	positive
<i>Alphitonia excelsa</i>	3	50%	2	26%	positive
<i>Cupaniopsis anacardioides</i>	3	50%	1	34%	positive
<i>Drymaria cordata</i>	2	50%	3	0%	positive
<i>Elaeocarpus obovatus</i>	2	100%	1	16%	positive
<i>Elaeocarpus reticulatus</i>	2	50%	2	18%	positive
<i>Eleocharis sphacelata</i>	2	25%	0	0%	positive
<i>Eucalyptus grandis</i>	5	50%	3	4%	positive
<i>Gahnia clarkei</i>	3	50%	3	17%	positive
<i>Glochidion sumatranum</i>	3	50%	1	21%	positive
<i>Hypolepis muelleri</i>	4	100%	2	15%	positive
<i>Marsdenia rostrata</i>	2	50%	1	23%	positive
<i>Melicope elleryana</i>	4	100%	2	19%	positive
<i>Morinda jasminoides</i>	2	75%	2	26%	positive
<i>Pittosporum undulatum</i>	2	75%	2	10%	positive
<i>Pteridium esculentum</i>	3	50%	2	20%	positive
<i>Tabernaemontana pandacaqui</i>	2	50%	1	9%	positive

## Community 49 Camphor Laurel–Forest Red Gum Open to Closed Forest

**Scientific Name:** Camphor Laurel (*Cinnamomum camphora*) and Forest Red Gum (*Eucalyptus tereticornis*)  
Open to Closed Forest.

**Sites:** (4) LIS01vbrh, LIS02vbrh, LIS03vbrh, LIS04lsrh.

### Equivalent communities

Wet Sclerophyll Forests-North Coast Wet Sclerophyll Forests (Keith 2006); 1004 – Camphor Laurel Dominant Closed to Open Forests (Kingston *et al.* 2004); Camphor Laurel (cL1, cL2) (Landmark Ecological Surveys 1999).

### Description

An open forest in which the exotic Camphor Laurel (*Cinnamomum camphora*) dominates and is occasionally associated with Forest Red Gum (*Eucalyptus tereticornis*), Brush Box (*Lophostemon confertus*) and Pink Bloodwood (*Corymbia intermedia*). Camphor Laurel also co-occurs with other rainforest species, such as Guioa (*Guioa semiglauca*) and Foambark Tree (*Jagera pseudorhus* var. *pseudorhus* forma *pseudorhus*). The middle stratum is also dominated by weeds, including Large-leaved Privet (*Ligustrum lucidum*) and Small-leaved Privet (*Ligustrum sinense*). Some natives are also present, including Red Kamala (*Mallotus philippensis*), *Pittosporum undulatum* and Scrub Turpentine (*Rhodamnia rubescens*). The lower stratum comprises privet seedlings, Blue Couch (*Cynodon dactylon*), *Ottochloa gracillima*, *Paspalum wettsteinii*, *Ochna serrulata*, Fishbone Fern (*Nephrolepis cordifolia*) and *Ardisia crenata*.



### Distribution and Habitat

**Habitat:** Basalt and low sedimentary quartz geology on rolling hills.

**Disturbance:** This community consists of heavily disturbed sites with infestations of weed species.

**Example locations:** Near Lismore Golf Course, Saltwater Creek at Mullumbimby, and Mullumbimby cemetery.

### Conservation

**Threats:** This is a lower slope community subject to significant threats from clearing, logging, inappropriate fire regimes and invasion by noxious weeds.

**Conservation status:** Camphor Laurel forests do contain varying proportions of rainforest species and structure, including threatened plant species. *Davidsonia jerseyana*, an endangered rainforest tree, was recorded at one site (LIS04lsrh).

**Significant taxa:** *Davidsonia jerseyana* (TSC: Endangered).

## Structure

Layer	Height (m)	Cover (%)
Tallest	10–26	40–65
Middle 1	1–10	5–80
Middle 2	1–3	25
Lower 1	0–1	40–95
Lower 2	0–1	85%

## Floristics

**Trees:** *Cinnamomum camphora*\* (T), *Guioa semiglauca*, *Ligustrum sinense*\* (M1), *Jagera pseudorhus* var. *pseudorhus* forma *pseudorhus*, *Eucalyptus tereticornis* (T), *Elaeocarpus obovatus*, *Lophostemon confertus* (T), *Corymbia intermedia* (T), *Cupaniopsis anacardioides*, *Pentaceras australe*, *Alphitonia excelsa*, *Archontophoenix cunninghamiana*, *Eriobotrya japonica*\*, *Ficus fraseri*, *Flindersia schottiana*, *Jacaranda mimosifolia*\*, *Pinus elliotii*\*, *Schinus terebinthifolius*\*, *Syagrus romanoffiana*\*.

**Shrubs and small trees:** *Ligustrum lucidum*\* (M1), *Guioa semiglauca* (M1), *Lantana camara*\* (L1), *Mallotus philippensis* (M1), *Pittosporum undulatum* (M1), *Schefflera actinophylla*\* (M1), *Maclura cochinchinensis*, *Cestrum nocturnum*\*, *Euroschinus falcata* var. *falcata*, *Glochidion ferdinandi*, *Rhodamnia rubescens* (M1), *Acacia maidenii*, *Murraya paniculata*\*, *Ptilidostigma glabrum*, *Rhodomyrtus psidioides*, *Trema tomentosa* var. *viridis*, *Banksia integrifolia* subsp. *monticola*, *Celtis sinensis*, *Citrus x taitensis*\*, *Mischocarpus pyriformis* subsp. *pyriformis*, *Psidium guajava*, *Streblus brunonianus*, *Wilkiea huegeliana*.

**Climbers:** *Elaeocarpus obovatus*, *Passiflora suberosa*\*, *Passiflora edulis*\*, *Passiflora subpeltata*\*, *Passiflora subpeltata*\*, *Eustrephus latifolius*, *Asparagus plumosus*\*, *Derris involuta*, *Dioscorea transversa*, *Geitonoplesium cymosum*, *Hibbertia scandens*, *Araujia sericifera*\*, *Cissus sterculiifolia*, *Marsdenia rostrata*, *Pandorea pandorana*, *Smilax australis*.

**Ferns:** *Nephrolepis cordifolia*\* (L2), *Doodia aspera*, *Adiantum aethiopicum*, *Hypolepis muelleri*, *Pteris tremula*, *Asplenium australasicum* f. *australasicum*.

**Grasses:** *Oplismenus aemulus*, *Ottochloa gracillima* (L1), *Paspalum wettsteinii*\* (L1), *Paspalum scrobiculatum*\*, *Cynodon dactylon* (L1), *Oplismenus imbecillis*, *Paspalidium distans*, *Axonopus compressus*\*, *Bothriochloa macra*, *Chloris gayana*\*, *Microlaena stipoides* var. *stipoides*, *Paspalum dilatatum*\*, *Sporobolus indicus*\*.

**Sedges and rushes:** *Cyperus gracilis*, *Lomandra longifolia*, *Scleria mackaviensis*.

**Herbs and shrubs:** *Ochna serrulata*\*, *Senna pendula* var. *glabrata*\* (M1), *Ageratina adenophora*\*, *Centella asiatica*, *Ambrosia artemisiifolia*\*, *Cirsium vulgare*\*, *Rhaphiolepis indica*\*, *Bidens pilosa*\*, *Crassocephalum crepidioides*\*, *Cestrum nocturnum*\* (M1), *Ageratina riparia*\*, *Asparagus aethiopicus*\*, *Caesalpinia decapetala*\*, *Centipeda minima*, *Commelina cyanea*, *Geranium homeanum*, *Geranium solanderi*, *Hydrocotyle acutiloba*, *Macaranga tanarius*, *Ozothamnus diosmifolius*, *Physalis peruviana*\*, *Salvia coccinea*\*, *Solanum capsicoides*\*, *Solanum mauritianum*\*, *Solanum nigrum*\*, *Verbena incompta*\*, *Desmodium rhytidophyllum*, *Phytolacca octandra*\*, *Potentilla indica*\*, *Pratia purpurascens*, *Pterostylis nutans*, *Senecio madagascariensis*\*, *Sida rhombifolia*\*, *Solanum pseudocapsicum*\*.

**Number of native species:** 62      **Number of taxa per site:** 24–36 (mean 30 ± 5)

**Number of exotic taxa:** 39

## Indicator native taxa

Species	Group score	Group frequency	Non-group score	Non-group frequency	Fidelity class
<i>Banksia integrifolia</i>	1	25%	0	0%	positive
<i>Bothriochloa macra</i>	1	25%	0	0%	positive
<i>Centella asiatica</i>	3	50%	2	12%	positive
<i>Cupaniopsis anacardioides</i>	2	50%	1	34%	positive
<i>Cyperus gracilis</i>	2	50%	2	0%	positive
<i>Elaeocarpus obovatus</i>	2	75%	1	16%	positive
<i>Eucalyptus tereticornis</i>	4	50%	1	10%	positive
<i>Eustrephus latifolius</i>	2	50%	1	10%	positive
<i>Glochidion ferdinandi</i>	2	50%	1	25%	positive
<i>Guioa semiglauca</i>	3	100%	1	28%	positive
<i>Jagera pseudorhus</i> var. <i>pseudorhus</i> forma <i>pseudorhus</i>	2	100%	1	27%	positive
<i>Machura cochinchinensis</i>	2	50%	2	27%	positive
<i>Mallotus philippensis</i>	2	75%	2	16%	positive
<i>Oplismenus aemulus</i>	3	75%	2	14%	positive
<i>Pandorea pandorana</i>	2	75%	1	11%	positive
<i>Pittosporum undulatum</i>	2	100%	2	9%	positive
<i>Pratia purpurescens</i>	2	50%	2	15%	positive
<i>Scleria mackaviensis</i>	2	25%	0	0%	positive



## Community 50 Swamp Oak–Forest Red Gum–Broad-leaved Paperbark–Swamp Box Swamp Sclerophyll Woodland to Open Forest

**Scientific name:** Swamp Oak (*Casuarina glauca*), Forest Red Gum (*Eucalyptus tereticornis*), Broad-leaved Paperbark (*Melaleuca quinquenervia*) and Swamp Box (*Lophostemon suaveolens*) Swamp Sclerophyll Woodland to Open Forest.

**Sites (16)** BRU07esticd, POT21alfl, POT22alfl, BRU08un, BRU14cbbbf, BRU24cbdne, TWE22allv, TWE23albk, ELL12albk, WOO21unund, WOO26unund, WOO27allv, TAB04alvf, WOO08albk, WOO24unund, WOO05alvf.

### Equivalent communities

Forested Wetlands-Coastal Swamp Forests, and Coastal Floodplain Wetlands (Keith 2006); Qld Regional Ecosystem 12.3.5 *Melaleuca quinquenervia* tall open forest on alluvium (Young and Dillewaard 1999); Group 1 Swamp Sclerophyll Forest on Coastal Floodplains, and Group 10 Swamp Sclerophyll Forest on Coastal Sandplains (Keith and Scott 2005); 309 – Coastal Swamp Box Open Forest to Woodland (Kingston *et al.* 2004); F5 – *Eucalyptus tereticornis*–*Eucalyptus intermedia*–*Lophostemon suaveolens* tall to very tall open forest (Pressey and Griffith 1992); Mixed eucalypt spp. (me2) (Landmark Ecological Services 1999); 4013 – *Melaleuca quinquenervia*–*Lophostemon suaveolens*/*Eucalyptus tereticornis* mid-high to very tall, open woodland to closed forest, 3003 – *Lophostemon suaveolens* tall to very tall, open to closed forest, and 3010 – *Lophostemon suaveolens*–*Eucalyptus intermedia*–*E. tereticornis* tall to very tall, open to closed forest (Griffith & Wilson 2007).

### Description

An open swamp sclerophyll forest community in which Forest Red Gum (*Eucalyptus tereticornis*) and Swamp Oak (*Casuarina glauca*) are clearly dominant and associated with Swamp Box (*Lophostemon suaveolens*), Pink Bloodwood (*Corymbia intermedia*), Broad-leaved Paperbark (*Melaleuca quinquenervia*), Swamp Mahogany (*Eucalyptus robusta*), Willow Bottlebrush (*Callistemon salignus*) and, rarely, Flooded Gum (*Eucalyptus grandis*). An open to closed mid-stratum of shrubs and small trees is present, including Salwood (*Acacia disparrima* subsp. *disparrima*), which is abundant, with Swamp Box, Foambark Tree (*Jagera pseudorhus* var. *pseudorhus* forma *pseudorhus*), Tuckeroo (*Cupaniopsis anacardioides*), Swamp Oak, Red Ash (*Alphitonia excelsa*), Cockspur Thorn (*Maclura cochinchinensis*), Guioa (*Guioa semiglauca*) and Willow Bottlebrush (*Callistemon salignus*). A second middle stratum of shrubs is also present, in which the weeds Lantana (*Lantana camara*) and *Senna pendula* var. *glabrata* are abundant and occasionally occur with Salwood (*Acacia disparrima* subsp. *disparrima*), Brush Muttonwood (*Myrsine howittiana*) and Large Mock Olive (*Notelaea longifolia*). The grassy ground cover consists of two layers; the dominants are *Ottochloa gracillima*, *Oplismenus aemulus*, Blady Grass (*Imperata cylindrica* var. *major*) and Warrel Grass (*Paspalum wettsteinii*), and which often occur with other herbs, grasses, shrubs and lilies, including *Centella asiatica*, Blue Flax Lily (*Dianella caerulea*), *Entolasia marginata*, *Enydra fluctuans* and Native Violet (*Viola banksii*). The climbing plant Hairy Silkpod (*Parsonsia straminea*) is common.



## Distribution and Habitat

**Habitat:** Alluvial floodplain, backswamp, levees, valley flat, coastal barrier sands on back barrier flat and dunes.

**Disturbance:** There is evidence of light to moderate impacts of fire (5–30 years previously), light to moderate levels of grazing, light to severe infestation by weeds and, at some sites, light to moderate logging.

**Example locations:** Brunswick River, Pottsville Environment Park, Old New Brighton Road, New Brighton, Charles Bay, Yarrungully NR, Brandy Arm Creek, between Brandy Arm and Sawpit Creek on the Evans River, and Tuckombil TSR.

## Conservation

**Threats:** This is a lower slope community subject to significant threats from clearing, logging, inappropriate fire regimes and invasion by noxious weeds.

**Conservation status:** This community is an example of the 'Sub-tropical Coastal Floodplain Forest of the NSW North Coast bioregion' EEC. Site ELL12albk was within Yarrungully NR. This community is probably poorly reserved on the FNC.

**Significant taxa:** *Polygala linariifolia* TSC-E; *Dendrobium melaleucaphilum* TSC-E

## Structure

Layer	Height (m)	Cover (%)
Tallest	8–35	20–60
Middle 1	1–8	10–70
Middle 2	0–2	5–95
Lower 1	0–2	5–95
Lower 2	0–0.3	10–60

## Floristics

**Trees:** *Casuarina glauca* (T), *Acacia disparrima* subsp. *disparrima* (T), *Eucalyptus tereticornis* (T), *Lophostemon suaveolens* (T), *Melaleuca quinquenervia* (T), *Callistemon salignus* (T), *Glochidion ferdinandi*, *Corymbia intermedia* (T), *Guioa semiglaucata*, *Elaeocarpus obovatus*, *Eucalyptus grandis* (T), *Excoecaria agallocha* (T), *Glochidion sumatranum*, *Archontophoenix cunninghamiana*, *Bridelia exaltata*, *Commersonia bartramia* (T), *Eucalyptus robusta*, *Ficus obliqua*, *Flindersia schottiana*, *Syagrus romanzoffiana*\*, *Flindersia bennettiana*, *Synoum glandulosum* subsp. *glandulosum*, *Schefflera actinophylla*\*, *Streblus brunonianus*, *Callitris columellaris*, *Erythrina vespertilio*, *Eucalyptus microcorys*, *Mallotus philippensis*, *Rivina humilis*\*, *Toechima tenax*, *Araucaria cunninghamii*, *Clerodendrum floribundum*, *Erythrina crista-galli*\*, *Eucalyptus resinifera* subsp. *hemilampira*, *Ficus watkinsiana*, *Livistona australis*.

**Shrubs/Small Trees:** *Casuarina glauca* (M1), *Acacia disparrima* subsp. *disparrima* (M1), *Lophostemon suaveolens* (M1), *Lantana camara*\* (M2), *Senna pendula* var. *glabrata*\* (M2), *Melaleuca quinquenervia* (M1), *Cinnamomum camphora*\* (M2), *Maclura cochinchinensis* (M1), M2, *Glochidion ferdinandi* (M1), *Cupaniopsis anacardioides* (M1), *Jagera pseudorhus* var. *pseudorhus* forma *pseudorhus* (M1), *Alphitonia excelsa* (M1), *Guioa semiglaucata* (M1), *Notelaea longifolia* (M2), *Glochidion sumatranum* (M1), *Melaleuca styphelioides* (M1), *Excoecaria agallocha* (M1), *Acacia melanoxylon*, *Flindersia bennettiana* (M2), *Croton verreauxii* (M2), *Ligustrum sinense*\*, *Myrsine variabilis*, *Acmena smithii*, *Commersonia bartramia* (M1), *Flindersia schottiana* (M1), *Hibiscus tiliaceus* (M1), *Myoporum acuminatum*, *Myrsine howittiana* (M2), *Psychotria loniceroides*, *Acacia leiocalyx* subsp. *leiocalyx*, *Acronychia oblongifolia* (M2), *Cyclophyllum longipetalum*, *Macaranga tanarius*, *Melaleuca alternifolia*, *Melicope elleryana*, *Pittosporum revolutum*, *Synoum glandulosum* subsp. *glandulosum* (M2), *Acacia maidenii*, *Baccharis halimifolia*\*, *Cryptocarya triplinervis* var. *triplinervis*, *Exocarpus latifolius*, *Ficus coronata*, *Litsea australis*, *Pittosporum undulatum*, *Ardisia crenata*\*, *Celtis paniculata*, *Elaeodendron australe*, *Endiandra discolor*, *Endiandra sieberi*, *Euroschinus falcata* var. *falcata*, *Ficus rubiginosa*, *Ficus virens* var. *sublanceolata*, *Jasminum volubile*, *Leptospermum brachyandrum*, *Ligustrum lucidum*\*, *Melaleuca sieberi*

(M1), *Scolopia braunii*, *Syzygium luehmannii*, *Trema tomentosa* var. *viridis*.

**Climbers:** *Parsonsia straminea*, *Geitonoplesium cymosum*, *Ipomoea cairica*\*, *Smilax australis*, *Stephania japonica* var. *discolor*, *Morinda jasminoides* (L1), *Hibbertia scandens*, *Anredera cordifolia*\*, *Calystegia marginata*, *Cayratia clematidea*, *Coelospermum paniculatum*, *Marsdenia rostrata*, *Eustrephus latifolius*, *Melodinus australis*, *Embelia australiana*, *Glycine clandestina*, *Trophis scandens*.

**Epiphytes:** *Platynerium superbum*, *Pyrrhosia rupestris*, *Platynerium bifurcatum*, *Pyrrhosia confluens* var. *confluens*, *Ripogonum album*, *Plectorrhiza tridentata*.

**Ferns:** *Asplenium australasicum* f. *australasicum*, *Pteridium esculentum* (L1), *Acrostichum speciosum*, *Blechnum indicum*, *Pyrrhosia confluens* var. *confluens*, *Pyrrhosia rupestris*, *Hypolepis muelleri*, *Nephrolepis cordifolia*\*.

**Grasses:** *Ottocloa gracillima* (L1), *Oplismenus aemulus* (L1), *Imperata cylindrica* var. *major* (L1), \**Paspalum wettsteinii* (L1), *Entolasia marginata* (L1), *Axonopus compressus*\* (L1), *Ischaemum australe* (L1), *Papalidium distans* (L1), *Setaria sphacelata*\*, *Capillipedium spicigerum*, *Hemarthria uncinata*, *Lachnagrostis billardieri* subsp. *billardieri*, *Lomandra filiformis*, *Sacciolepis indica*.

**Sedges and rushes:** *Lomandra longifolia* (L1), *Gahnia aspera* (L1), *Baumea juncea* (L1), *Carex appressa*, *Cyperus stradbrogensis*, *Juncus usitatus*, *Cyperus lucidus*, *Cyperus trinervis*.

**Herbs and shrubs:** *Viola banksii* (L2), *Dianella caerulea* (L1), *Commelina cyanea*, *Pratia purpurascens*, *Enydra fluctuans* (L1), *Dichondra repens*, *Solanum capsicoides*\*, *Ageratum houstonianum*\*, *Hibiscus tiliaceus*, *Hydrocotyle acutiloba*, *Ochna serrulata*\*, *Oxalis radicata*, *Sida rhombifolia*\*, *Alternanthera denticulata*, *Apium prostratum*, *Dianella longifolia* var. *longifolia*, *Oxalis chnoodes*, *Plectranthus parviflorus*, *Pseuderanthemum variabile*, *Ageratina adenophora*\*, *Ageratina riparia*\*, *Asparagus aethiopicus*\*, *Bidens pilosa*\*, *Conyza bonariensis*\*, *Crassocephalum crepidioides*\*, *Cuphea carthagenensis*\*, *Polygala japonica*, *Rubus moluccanus* var. *trilobus*, *Rubus parvifolius*, *Senna septemtrionalis*\*, *Solanum mauritianum*\*, *Alocasia brisbanensis*, *Alternanthera nana*, *Ambrosia artemisiifolia*\*, *Artanema fimbriatum*, *Aster subulatus*\*, *Celtis paniculata*, *Dendrobium melaleucaphilum*, *Gonocarpus chinensis* subsp. *verrucosus*, *Gonocarpus tetragynus*, *Goodenia paniculata*, *Homalanthus populifolius*, *Hybanthus stellarioides*, *Hydrocotyle peduncularis*, *Oxalis exilis*, *Ranunculus inundatus*, *Solanum nigrum*\*, *Solanum prinophyllum*, *Tradescantia fluminensis*\*, *Vernonia cinerea* var. *cinerea*, *Viola betonicifolia*, *Wikstroemia indica*.

Number of native taxa: 195

Number of taxa per site 30–59 (mean 39 ± 9)

Number of exotic taxa: 37

## Indicator native taxa

Species	Group score	Group frequency	Non-group score	Non-group frequency	Fidelity class
<i>Acacia disparrima</i>	3	69%	2	11%	positive
<i>Acacia leiocalyx</i> subsp. <i>leiocalyx</i>	3	6%	0	0%	positive
<i>Alphitonia excelsa</i>	2	50%	2	25%	positive
<i>Alternanthera denticulata</i>	1	6%	0	0%	positive
<i>Artanema fimbriatum</i>	1	6%	0	0%	positive
<i>Callistemon salignus</i>	3	50%	1	15%	positive
<i>Capillipedium spicigerum</i>	1	6%	0	0%	positive
<i>Casuarina glauca</i>	3	88%	3	19%	positive
<i>Commelina cyanea</i>	2	50%	1	15%	positive
<i>Cupaniopsis anacardioides</i>	2	56%	1	33%	positive
<i>Dendrobium melaleucaphilum</i>	1	6%	0	0%	positive
<i>Dianella caerulea</i>	2	50%	1	28%	positive
<i>Erythrina vespertilio</i>	2	6%	0	0%	positive
<i>Eucalyptus tereticornis</i>	3	56%	1	8%	positive
<i>Geitonoplesium cymosum</i>	2	81%	2	39%	positive
<i>Imperata cylindrica</i>	2	50%	2	20%	positive
<i>Lomandra longifolia</i>	2	56%	2	28%	positive
<i>Lophostemon suaveolens</i>	3	56%	2	21%	positive
<i>Maclura cochinchinensis</i>	2	63%	2	26%	positive
<i>Oplismenus aemulus</i>	2	63%	2	13%	positive
<i>Ottochloa gracillima</i>	4	100%	2	29%	positive
<i>Parsonsia straminea</i>	2	100%	1	42%	positive
<i>Smilax australis</i>	2	63%	2	41%	positive
<i>Stephania japonica</i>	2	50%	1	18%	positive
<i>Viola banksii</i>	2	69%	2	17%	positive



## Community 51 Forest Red Gum–Willow Bottlebrush–Camphor Laurel Dry Open Forest

**Scientific name:** Forest Red Gum (*Eucalyptus tereticornis*), Willow Bottlebrush (*Callistemon salignus*), Camphor Laurel (*Cinnamomum camphora*) and *Ottochloa gracillima* Dry Open Forest.

**Sites:** (3) BRU29alfl, BRU30estsswp, BRU31estsswp.

### Equivalent communities

Forested Wetlands-Coastal Swamp Forests, and Coastal Floodplain Wetlands (Keith 2006); Qld Regional Ecosystem 12.3.3 *Eucalyptus tereticornis* open forest to woodland on alluvial plains (Young and Dillewaard 1999); Group 8 – Subtropical Coastal Floodplain Forest (Keith and Scott 2005); F5 – *Eucalyptus tereticornis*–*Eucalyptus intermedia*–*Lophostmeon suaveolens* tall to very tall open forest (Pressey and Griffith 1992); 304 – Coastal Forest Red Gum Open Forest to Woodland (Kingston *et al.* 2004); Mixed eucalypt spp. (mE2) (Landmark Ecological Services 1999).

### Description

An open forest community of Forest Red Gum (*Eucalyptus tereticornis*), Broad-leaved Paperbark (*Melaleuca quinquenervia*) and Willow Bottlebrush (*Callistemon salignus*) and a middle stratum of Cockspur Thorn (*Machura cochinchinensis*), Camphor Laurel (*Cinnamomum camphora*), Small-leaved Privet (*Ligustrum sinense*) and Lantana (*Lantana camara*). The lower layer comprises Blue Couch (*Cynodon dactylon*), Warrel Grass (*Paspalum wettsteinii*), Harsh Ground Fern (*Hypolepis muelleri*), Native Violet (*Viola banksii*) and *Carex maculata*.



### Distribution and Habitat

**Habitat:** Riparian areas on alluvial floodplain and estuarine saline swamps.

**Disturbance:** There is severe weed infestation at sites, and moderately intense fires (30–40 years perviously). There has been severe clearing and grazing at site BRU29alfl.

**Example locations:** Grays Lane, Tyagarah Road.

### Conservation

**Threats:** Floodplain occurrences of this community are threatened by clearing, grazing and weed infestation.

**Conservation status:** Floodplain occurrences of this community are an example of 'Subtropical Coastal Floodplain Forest of the NSW North Coast bioregion' EEC. The community is probably poorly reserved on the FNC.

**Significant taxa:** None recorded.



## Structure

Layer	Height (m)	Cover (%)
Tallest	10–25	20–35
Middle 1	0–2	10–60
Middle 2	0.5–2	10
Lower 1	0–2	5–95

## Floristics

**Trees:** *Eucalyptus tereticornis* (T), *Callistemon salignus* (T), *Melaleuca quinquenervia* (T), *Ficus obliqua*, *Eucalyptus robusta*.

**Shrubs and small trees:** *Callistemon salignus* (M1), *Ligustrum sinense*\* (M1), *Cinnamomum camphora*\* (M1), *Cupaniopsis anacardioides*, *Lantana camara*\* (M1), *Commersonia bartramia*, *Maclura cochinchinensis* (M1), *Cryptocarya triplinervis* var. *pubens*, *Cyclophyllum longipetalum*, *Ficus coronata*, *Glochidion sumatranum*, *Acacia melanoxylon*, *Acmena smithii*, *Acronychia oblongifolia*, *Bridelia exaltata*, *Croton verreauxii*, *Endiandra discolor*, *Guioa semiglaucula*, *Jagera pseudorhus* var. *pseudorhus* forma *pseudorhus*, *Myrsine howittiana*, *Pittosporum revolutum*, *Rhodomyrtus psidioides*, *Symplocos thwaitesii*, *Wilkiea huegeliana*.

**Climbers:** *Morinda jasminoides*, *Hibbertia scandens*, *Ipomoea cairica*\*, *Parsonsia straminea*, *Geitonoplesium cymosum*, *Melodinus australis*, *Smilax australis*, *Embelia australiana*, *Stephania japonica* var. *discolor*.

**Epiphytes:** *Asplenium australasicum* f. *australasicum*.

**Ferns:** *Hypolepis muelleri* (L1), *Blechnum indicum*, *Lygodium microphyllum*.

**Grasses:** *Axonopus fissifolius*\* (L1), *Paspalum wettsteinii*\* (L1), *Cynodon dactylon* (L1), *Hemarthria uncinata* (L1), *Paspalum dilatatum*\* (L1), *Setaria sphacelata*\*, *Cuphea carthagenensis*\*, *Bothriochloa decipiens*, *Carex appressa*, *Imperata cylindrica* var. *major*, *Leersia hexandra*, *Ottlochloa gracillima*, *Paspalidium distans*.

**Sedges and rushes:** *Cyperus brevifolius*, *Fimbristylis dichotoma*, *Cyperus maculata* (L1), *Cyperus sphaeroides*, *Juncus usitatus*, *Lomandra longifolia*.

**Herbs and shrubs:** *Viola banksii*, *Commelina cyanea*, *Centella asiatica*, *Dichondra repens*, *Ambrosia artemisiifolia*\*, *Lespedeza juncea* subsp. *sericea*, *Pterostylis baptistii*, *Rubus moluccanus* var. *trilobus*, *Sida rhombifolia*\*, *Aster subulatus*\*, *Breynia oblongifolia*, *Cardamine paucijuga*, *Crassocephalum crepidioides*\*, *Dianella caerulea*, *Enydra fluctuans*, *Goodenia paniculata*, *Hypochaeris microcephala* var. *albiflora*\*, *Hypochaeris radicata*\*, *Ochma serrulata*\*, *Persicaria strigosa*, *Pratia purpurascens*, *Senecio madagascariensis*\*, *Solanum pseudocapsicum*\*, *Wikstroemia indica*.

Number of native taxa: 66

Number of taxa per site 32–49 (mean 40 ± 9)

Number of exotic taxa: 19

## Indicator native taxa

Species	Group score	Group frequency	Non-group score)	Non-group frequency	Fidelity class
<i>Callistemon salignus</i>	3	100%	2	16%	positive
<i>Centella asiatica</i>	2	100%	2	12%	positive
<i>Commelina cyanea</i>	2	100%	1	16%	positive
<i>Cyperus brevifolius</i>	3	100%	0	0%	positive
<i>Eucalyptus tereticornis</i>	3	100%	1	10%	positive
<i>Viola banksii</i>	3	100%	2	19%	positive
<i>Bothriochloa decipiens</i>	1	50%	0	0%	positive
<i>Cardamine paucijuga</i>	1	50%	0	0%	positive
<i>Carex maculata</i>	3	50%	2	4%	positive
<i>Cyclophyllum longipetalum</i>	2	50%	1	6%	positive
<i>Cynodon dactylon</i>	3	50%	3	5%	positive
<i>Dichrondra repens</i>	2	50%	2	6%	positive
<i>Hemarthria uncinata</i>	3	50%	2	4%	positive
<i>Hibbertia scandens</i>	3	50%	1	28%	positive
<i>Hypolepis muelleri</i>	3	50%	2	16%	positive
<i>Lespedeza juncea</i> subsp. <i>sericea</i>	2	50%	0	0%	positive
<i>Maclura cochinchinensis</i>	3	50%	2	27%	positive
<i>Melaleuca quinquenervia</i>	4	50%	3	39%	positive
<i>Parsonsia straminea</i>	3	50%	1	44%	positive
<i>Pterostylis baptistii</i>	2	50%	0	0%	positive

## Community 52 Small-leaved Fig–Hard Quandong–Bangalow Palm Subtropical/Littoral Rainforest on Pleistocene Dunes

**Scientific name:** Small-leaved Fig (*Ficus obliqua*), Hard Quandong (*Elaeocarpus obovatus*) and Bangalow Palm (*Archontophoenix cunninghamiana*) Subtropical/Littoral Rainforest on Pleistocene Dunes.

**Sites:** (2) TWE02cbdne, TWE03cbdne.

### Equivalent communities

Rainforest-Subtropical Rainforest (Keith 2006); Qld Regional Ecosystem 12.2.2 Mixed microphyll notophyll rainforest on coastal dunes and beaches (Young and Dillewaard 1999); 101 – Littoral Rainforest (Kingston *et al.* 2004); Subtropical rainforest near the coast – littoral rainforest (Landmark Ecological Services 1999).

### Description

A rainforest community with Small-leaved Fig (*Ficus obliqua*), White Fig (*Ficus virens* var. *sublanceolata*), Hard Quandong (*Elaeocarpus obovatus*) and Pepperberry (*Cryptocarya obovata*) being the most abundant (cover) species of the tallest stratum. A dense sub-canopy of shrubs and small trees is present, including Bangalow Palm (*Archontophoenix cunninghamiana*), Brown Kurrajong (*Commersonia bartramia*), Pink-flowered Doughwood (*Melicope elleryana*), Sandpaper Fig (*Ficus coronata*) and Small-leaved Privet (*Ligustrum sinense*). A shrub layer with Sandpaper Fig, White Supplejack (*Ripogonum album*) and Small-leaved Privet is also present. The lower stratum includes Palm Lily (*Cordyline congesta*), River Lily (*Crinum pedunculatum*), Small-leaved Privet, Prickly Supplejack (*Ripogonum discolor*) and Native Violet (*Viola banksii*).



### Distribution and Habitat

**Habitat:** Old Pleistocene dunes.

**Disturbance:** Sites show evidence of light fire disturbance (40–50 years prior), moderate to severe clearing, light to moderate logging, and moderate to severe weed infestation.

**Example locations:** North of Chinderah Bypass.

### Conservation

**Threats:** This community is threatened by clearing and weed infestation.

**Conservation status:** Subtropical rainforest on dunes are part of the 'Littoral Rainforest in the NSW North Coast, Sydney Basin and South East Corner Bioregions' EEC. Littoral Rainforest is reserved in Ukerebagh NR, Cudgen NR, Wooyung NR and Billinudgel NR in the study area.

**Significant taxa:** *Cordyline congesta* (ROTAP: 2RC-), *Cryptocarya foetida* (TSC: Vulnerable).

## Structure

Layer	Height (m)	Cover (%)
Tallest	20–35	80
Middle 1	10–18	60–70
Middle 2	1–8	50–60
Lower 1	0–1	30–40

## Floristics

**Trees:** *Ficus obliqua* (T), *Melaleuca quinquenervia*, *Elaeocarpus obovatus* (T), *Melicope elleryana*, *Ficus virens* var. *sublanceolata* (T), *Casuarina glauca* (T), *Cupaniopsis anacardioides*, *Schefflera actinophylla*\*, *Cryptocarya obovata* (T), *Cinnamomum camphora*\*, *Cryptocarya foetida*, *Lophostemon suaveolens*, *Dysoxylum mollissimum* subsp. *molle*.

**Shrubs and small trees:** *Ligustrum sinense*\* (M1), *Archontophoenix cunninghamiana* (M1), *Ficus coronata* (M2), *Commersonia bartramia* (M1), *Pouteria chartacea* (M1), *Maclura cochinchinensis*, *Glochidion sumatranum* (M1), *Acacia melanoxylon* (M1), *Diospyros pentamera*, *Lantana camara*\*, *Litsea australis*, *Murraya paniculata*\*, *Syzygium australe*, *Syzygium luehmannii*, *Cryptocarya triplinervis*, *Diospyros fasciculosa*, *Endiandra discolor*, *Mallotus discolor*, *Morus nigra*\*, *Psidium cattleianum* var. *cattleianum*\*, *Myrsine howittiana*, *Psydrax lamprophylla*, *Acmena smithii*, *Alphitonia excelsa*, *Coffea arabica*\*, *Notelaea longifolia*, *Syagrus romanzoffiana*\*.

**Climbers:** *Ripogonum album* (M2), *Smilax australis*, *Flagellaria indica* (M2), *Mucuna gigantea*, *Ripogonum discolor* (L1), *Geitonoplesium cymosum*, *Melodinus australis*, *Trophis scandens*, *Ipomoea cairica*\*, *Parsonsia straminea*, *Hibbertia scandens*, *Passiflora suberosa*\*, *Stephania japonica* var. *discolor*.

**Epiphytes:** *Asplenium australasicum* f. *australasicum*.

**Mistletoes:** *Amylotheca dictyophleba*.

**Ferns:** *Asplenium australasicum* f. *australasicum*, *Christella dentata*.

**Grasses:** *Oplismenus aemulus*.

**Sedges and rushes:** *Carex breviculmis*.

**Herbs and shrubs:** *Senna pendula* var. *glabrata*\* (L1), *Cordyline congesta* (L1), *Ochna serrulata*\*, *Homalanthus populifolius*, *Macaranga tanarius*, *Crinum pedunculatum* (L1), *Alocasia brisbanensis*, *Solanum seafortianum*\*.

**Number of native taxa:** 55

**Number of taxa per site:** 40–54 (mean  $47 \pm 10$ )

**Number of exotic taxa:** 12

## Indicator native taxa

Species	Group score	Group frequency	Non-group score	Non-group frequency	Fidelity class
<i>Archontophoenix cunninghamiana</i>	4	67%	2	25%	positive
<i>Carex breviculmis</i>	2	67%	3	1%	positive
<i>Commersonia bartramia</i>	3	100%	2	9%	positive
<i>Cordyline congesta</i>	3	67%	1	13%	positive
<i>Cupaniopsis anacardioides</i>	2	100%	1	34%	positive
<i>Elaeocarpus obovatus</i>	4	67%	1	16%	positive
<i>Endiandra discolor</i>	2	67%	1	8%	positive
<i>Ficus coronata</i>	3	100%	2	13%	positive
<i>Ficus obliqua</i>	6	100%	1	5%	positive
<i>Flagellaria indica</i>	3	67%	2	17%	positive
<i>Geitonoplesium cymosum</i>	2	100%	2	41%	positive
<i>Homalanthus populifolius</i>	2	67%	1	7%	positive
<i>Maclura cochinchinensis</i>	2	67%	2	27%	positive
<i>Melaleuca quinquenervia</i>	3	100%	3	39%	positive
<i>Melicope elleryana</i>	3	67%	2	19%	positive
<i>Melodinus australis</i>	2	100%	2	8%	positive
<i>Mucuna gigantea</i>	2	67%	2	3%	positive
<i>Pouteria chartacea</i>	3	67%	2	5%	positive
<i>Ripogonum album</i>	4	67%	2	7%	positive
<i>Smilax australis</i>	3	100%	2	42%	positive
<i>Syzygium australe</i>	2	67%	1	2%	positive
<i>Trophis scandens</i>	2	67%	2	16%	positive
<i>Viola banksii</i>	2	100%	2	19%	positive



## Community 53 Patches Beach Broad-leaved Paperbark–Swamp Oak–Cabbage Tree Palm Swamp Sclerophyll Forest on the Alluvial Plain

**Scientific name:** Patches Beach Broad-leaved Paperbark (*Melaleuca quinquenervia*), Swamp Oak (*Casuarina glauca*) and Cabbage Tree Palm (*Livistona australis*) Swamp Sclerophyll Forest on the Alluvial Plain.

**Sites:** (4) EMP01alsw, EMP02albk, EMP05albk, EMP04albk.

### Equivalent communities

Forested Wetlands-Coastal Swamp Forests, and Coastal Floodplain Wetlands (Keith 2006); Qld Regional Ecosystem 12.3.5 *Melaleuca quinquenervia* on alluvium (Young and Dillewaard 1999); F8 – *Melaleuca quinquenervia* tall to very tall open to closed forest, and F10 – *Casuarina glauca* tall to very tall open to closed forest (Pressey and Griffith 1992); 4099 – *Melaleuca quinquenervia*–*Casuarina glauca* NPWS NSW Coastal Vegetation (Griffith & Wilson 2007); 401 – Broad-leaved Paperbark Closed Forest to Woodland, and 402 – Broad-leaved Paperbark/Swamp Sheoak Closed Forest to Woodland (Kingston *et al.* 2004); Paperbark (PB), Swamp Oak ± Paperbark (sOP) (Landmark Ecological Services 1999); North-east NSW Forest Ecosystems 112 and 143 (NPWS 1999).

### Description

An open forest community with emergent Swamp Oak (*Casuarina glauca*) in one site (EMP02albk).

The tallest stratum is an open swamp sclerophyll forest with a mix of Bangalow Palm (*Archontophoenix cunninghamiana*), Broad-leaved Paperbark (*Melaleuca quinquenervia*) and Swamp Oak. A mid-storey of shrubs and small trees is evident, with Blue Lilly Pilly (*Syzygium oleosum*), Sandpaper Fig (*Ficus coronata*), Brush Muttonwood (*Myrsine howittiana*) and Tuckeroo (*Cupaniopsis anacardioides*). Two lower layers are found, consisting of a sparse to dense cover of Cunjevoi (*Alocasia brisbanensis*), *Ottochloa gracillima*, Blady Grass

(*Imperata cylindrica* var. *major*), *Carex appressa*, *Cyperus trinervis* and *Enydra fluctuans*.



### Distribution and Habitat

**Habitat:** All sites are located on the alluvial plain, in backswamps and swales.

**Disturbance:** Sites show evidence of light to moderate disturbance by weeds.

**Example locations:** All sites are on the alluvial plain adjacent to Holocene dunes at Patches and Beswicks Beaches, south of Ballina.

### Conservation

**Threats:** This community is threatened by clearing, altered drainage patterns and weed infestation.

**Conservation status:** Locally the floodplain forests of Patches Beach have been extensively cleared and what little remains has had its drainage altered by farming of sugar cane. Occurrences of this community on the alluvial plain are examples of the 'Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney

Basin and South East Corner bioregions' EEC. The surveyed sites for Community 53 were not reserved. Griffith (2005) states that floodplain occurrences of both Broad-leaved Paperbark and Swamp Oak forest communities are poorly reserved. Floodplain occurrences of Broad-leaved Paperbark are reserved at Stotts Island NR, Tuckean NR, Bungawalbyn NR, Yarringly SCA and Broadwater NP.

**Significant taxa:** *Cordyline congesta* (ROTAP: 2RC-).

## Structure

Layer	Height (m)	Cover (%)
Emergent	20–25	10
Tallest	15–25	20–60
Middle 1	3–15	5–40
Lower 1	0.5–1.5	10–15
Lower 2	0–2	5–80

## Floristics

**Trees:** *Casuarina glauca* (T), *Cupaniopsis anacardioides* (T), *Melaleuca quinquenervia* (T), *Archontophoenix cunninghamiana* (T), *Cinnamomum camphora*\*, *Livistona australis*, *Cinnamomum virens*, *Clerodendrum tomentosum*, *Corymbia intermedia*, *Elaeocarpus obovatus*, *Eucalyptus tereticornis*, *Ficus macrophylla*, *Ficus watkinsiana*, *Jagera pseudorhus* var. *pseudorhus* forma *pseudorhus*, *Lophostemon suaveolens*.

**Shrubs and small trees:** *Syzygium oleosum* (M1), *Symplocos thwaitesii*, *Myrsine howittiana* (M1), *Livistona australis* (M1), *Maclura cochinchinensis*, *Ficus coronata* (M1), *Acacia melanoxylon*, *Acronychia imperforata*, *Alphitonia excelsa*, *Chrysanthemoides monilifera* subsp. *rotundata*\*, *Cryptocarya triplinervis* var. *triplinervis*, *Diospyros australis*, *Glochidion ferdinandi*, *Guioa semiglaucula*, *Lantana camara*\*, *Mallotus discolor*, *Melicope elleryana*, *Notelaea longifolia*, *Pittosporum revolutum*, *Rhodomyrtus psidioides*, *Schefflera actinophylla*\*.

**Climbers and twiners:** *Ipomoea cairica*\*, *Marsdenia rostrata*, *Cassytha glabella*, *Cayratia clematidea*, *Cissus hypoglauca*, *Convolvulus erubescens*, *Echinostephia aculeata*, *Flagellaria indica*, *Geitonoplesium cymosum*, *Hibbertia scandens*, *Parsonsia straminea*, *Passiflora subpeltata*\*, *Smilax australis*, *Solanum seafortianum*\*, *Stephania japonica* var. *discolor*, *Trophis scandens*.

**Epiphytes:** *Platynerium superbus*, *Platynerium bifurcatum*.

**Mistletoes:** *Amyema cambagei*.

**Ferns:** *Hypolepis muelleri*, *Platynerium superbum*, *Blechnum indicum*, *Platynerium bifurcatum*, *Pteridium esculentum*, *Pyrrosia confluens* var. *confluens*.

**Grasses:** *Imperata cylindrica* var. *major* (L1), *Ottocloa gracillima* (L1), *Panicum pygmaeum*, *Oplismenus aemulus* (L1), *Entolasia marginata*, *Paspalum wettsteinii*\*, *Phragmites australis*.

**Sedges and rushes:** *Carex appressa* (L1), *Cyperus trinervis* (L1), *Gahnia aspera*, *Lomandra longifolia*, *Baumea juncea*.

**Herbs and shrubs:** *Alocasia brisbanensis* (M2), *Cheirostylis notialis*, *Dianella caerulea*, *Rivina humilis*\* (M2), *Viola banksii* (L1), *Enydra fluctuans* (L1), *Ageratum houstonianum*\*, *Alternanthera denticulata*, *Aster subulatus*\*, *Baccharis halimifolia*\*, *Breynia oblongifolia*, *Centella asiatica*, *Commelina cyanea*, *Cryptostylis subulata*, *Cuphea carthagenensis*\*, *Dichondra repens*, *Eclipta prostrata*, *Homalanthus populifolius*, *Ochna serrulata*\*, *Opuntia stricta*\*, *Persicaria hydrophiper*, *Senna pendula* var. *glabrata*\*, *Solanum nigrum*\*, *Wikstroemia indica*, *Xanthium italicum*\*.

**Number of native taxa:** 80

**Number of taxa per site:** 30–37 (mean 34 ± 3)

**Number of exotic taxa:** 19

## Indicator native taxa

Species	Group score	Group frequency	Non-group score	Non-group frequency	Fidelity class
<i>Casuarina glauca</i>	3	100%	3	21%	positive
<i>Cupaniopsis anacardioides</i>	3	100%	1	34%	positive
<i>Livistona australis</i>	3	100%	1	15%	positive
<i>Alocasia brisbanensis</i>	3	75%	1	6%	positive
<i>Archontophoenix cunninghamiana</i>	4	50%	2	25%	positive
<i>Ficus coronata</i>	3	50%	2	13%	positive
<i>Oplismenus aemulus</i>	2	50%	2	15%	positive
<i>Platycerium superbum</i>	2	50%	1	8%	positive
<i>Convolvulus erubescens</i>	1	25%	0	0%	positive
<i>Panicum pygmaeum</i>	3	25%	0	0%	positive

## Community 54 Whalebone Tree–Thorny Pea–Sweet Myrtle Dry Rainforest

**Scientific name:** Whalebone Tree (*Streblus brunonianus*), Croton *verreauxii*, Thorny Pea (*Desmodium acanthocladum*) and Sweet Myrtle (*Gossia fragrantissima*) Dry Rainforest.

**Sites:** (2) WAR39allv, WAR40alfl.

### Equivalent communities

Rainforests-Dry Rainforests (Keith 2006); 103 – Dry Rainforest (Kingston *et al.* 2004); Suballiance 25 – *Streblus–Austromyrtus* (Floyd 1990).

### Description

This community is riparian dry rainforest with emergent Forest Red Gum (*Eucalyptus tereticornis*) and Swamp Oak (*Casuarina glauca*). The tallest stratum is dominated by Whalebone Tree (*Streblus brunonianus*), Rough-leaved Elm (*Aphananthe philippinensis*) and Small-leaved Tuckeroo (*Cupaniopsis parvifolia*). There is a middle stratum of Whalebone Tree, Green Native Cascarilla (*Croton verreauxii*), Thorny Pea (*Desmodium acanthocladum*), Sweet Myrtle (*Gossia fragrantissima*), Cockspur Thorn (*Maclura cochinchinensis*) and Orange Thorn (*Pittosporum multiflorum*). The lower layer is comprised of *Oplismenus imbecillis*, Kidney Weed (*Dichondra repens*) and Pastel Flower (*Pseuderanthemum variabile*).



### Distribution and Habitat

**Habitat:** A riparian rainforest found along stream banks subjected to flooding, on fertile basaltic alluvial soils (Floyd 1990). The presence of Swamp Oak (*Casuarina glauca*) may indicate a subsaline ground-water influence at the site.

**Disturbance:** Sites have been subject to moderate grazing, and light to moderate infestations of weeds.

**Example locations:** Ruthven Recreation Reserve.

### Conservation

**Threats:** Clearing and grazing.

**Conservation status:** This community is 'Lowland Rainforest on Floodplain in NSW North Coast and Sydney Basin Bioregion' EEC. Occurrences of rainforest on the floodplain are poorly reserved and under considerable threat. Suballiance 25 – *Streblus–Austromyrtus* is restricted in occurrence and it is not known to be reserved.

**Significant taxa:** *Gossia fragrantissima* (TSC: Endangered), *Desmodium acanthocladum*, (TSC: Vulnerable), *Syzygium hodgkinsonia*, (TSC: Vulnerable).

## Structure

Layer	Height (m)	Cover (%)
Emergent	20–30	5
Tallest	10–25	15–60
Middle 1	1–12	10–50
Lower 1	1–2	30
Lower 2	0–0.3	5–40

## Floristics

**Trees:** *Streblus brunonianus* (T), *Casuarina glauca* (E), *Aphananthe philippinensis* (T), *Cupaniopsis parvifolia* (T), *Eucalyptus tereticornis* (E).

**Shrubs and small trees:** *Desmodium acanthocladum* (M1), *Croton verreauxii* (M1), *Gossia fragrantissima*, *Pittosporum multiflorum* (M1), *Alchornea ilicifolia*, *Atractocarpus chartaceus*, *Callistemon salignus*, *Cryptocarya triplinervis* var. *triplinervis*, *Cyclophyllum longipetalum*, *Diospyros australis*, *Elaeodendron australe*, *Syzygium hodgkinsoniae*.

**Climbers and twiners:** *Ipomoea cairica*\*, *Maclura cochinchinensis*, *Geitonoplesium cymosum*, *Austrosteenisia glabristyla*, *Macfadyena unguis-cati*\*, *Parsonsia straminea*.

**Grasses:** *Oplismenus imbecillis* (L1), *Oplismenus aemulus* (L1), *Microlaena stipoides* var. *stipoides*.

**Sedges and rushes:** *Isolepis cernua*.

**Herbs and shrubs:** *Pseuderanthemum variabile*, *Jasminum volubile*, *Capparis arborea*, *Commelina cyanea*, *Dichondra repens*, *Eryngium expansum*, *Asparagus plumosus*\*, *Ochna serrulata*\*, *Plectranthus parviflorus*, *Rostellularia obtusa*, *Solanum americanum*\*.

Number of native taxa: 32

Number of taxa per site 25–27 (mean 25.5 ± 2)

Number of exotic taxa: 6



## Indicator native taxa

Species	Group score	Group frequency	Non-group score	Non-group frequency	Fidelity class
<i>Aphananthe philippinensis</i>	3	100%	2	8%	positive
<i>Casuarina glauca</i>	3	100%	3	22%	positive
<i>Croton verreauxii</i>	2	100%	2	8%	positive
<i>Desmodium acanthocladum</i>	4	100%	0	0%	positive
<i>Geitonoplesium cymosum</i>	2	100%	2	41%	positive
<i>Gossia fragrantissima</i>	3	100%	0	0%	positive
<i>Jasminum volubile</i>	2	100%	2	2%	positive
<i>Machura cochinchinensis</i>	3	100%	2	27%	positive
<i>Oplismenus imbecillis</i>	4	100%	2	10%	positive
<i>Pseuderanthemum variabile</i>	2	100%	2	13%	positive
<i>Streblus brunonianus</i>	4	100%	2	7%	positive
<i>Alchornea ilicifolia</i>	2	50%	2	3%	positive
<i>Atractocarpus chartaceus</i>	2	50%	1	1%	positive
<i>Austrosteenisia glabristyla</i>	3	50%	1	1%	positive
<i>Capparis arborea</i>	2	50%	2	5%	positive
<i>Commelina cyanea</i>	2	50%	1	16%	positive
<i>Cupaniopsis parvifolia</i>	3	50%	1	5%	positive
<i>Dichondra repens</i>	2	50%	2	6%	positive
<i>Eryngium expansum</i>	1	50%	0	0%	positive
<i>Pittosporum multiflorum</i>	2	50%	2	6%	positive

## Community 55 Grey Ironbark–Pink Bloodwood–White Mahogany Dry Grassy Open Forest

**Scientific Name:** Grey Ironbark (*Eucalyptus siderophloia*), Pink Bloodwood (*Corymbia intermedia*) and White Mahogany (*Eucalyptus carnea*) Dry Grassy Open Forest.

**Sites:** (9) BYR24cbdne, WAR28cbrdg, CUD04lsrh, CUD17lsrh, POT28 lsrh, CUD10lsrh, WAR16hsrlh, POT32lsrh, WAR53vbrlh.

### Equivalent communities

Wet Sclerophyll Forest-Northern Hinterland Wet Sclerophyll Forest (Keith 2006); Qld Regional Ecosystem 12.11.5 Mixed tall open forest on metasediments (Young and Dillewaard 1999); 3015 – *Eucalyptus intermedia*–*E. siderophloia*–*E. tereticornis* tall to very tall, open to closed forest, and 3509 – *Eucalyptus siderophloia*–*E. propinqua*–*E. acmenoides*/*E. carnea* tall to very tall, open to closed forest NPWS NSW Coastal Vegetation (Griffith & Wilson 2007); 202 – Grey Ironbark/White Mahogany/Grey Gum Open Forest Complex (Kingston *et al.* 2004); Grey Ironbark–Pink Bloodwood (gIB) (Landmark Ecological Services 1999); CASov22.1 *Eucalyptus carnea* *Corymbia intermedia* (Binns 1995b).

### Description

This community is a lower slope dry open forest. Grey Ironbark (*Eucalyptus siderophloia*) is the most abundant canopy species, and is associated with White Mahogany (*Eucalyptus carnea*), Pink Bloodwood (*Corymbia intermedia*), Blackbutt (*Eucalyptus pilularis*) and, occasionally, Brush Box (*Lophostemon confertus*), Swamp Box (*Lophostemon suaveolens*) and, rarely, Small-fruited Grey Gum (*Eucalyptus propinqua*). An understorey of small trees and shrubs includes Forest Oak (*Allocasuarina torulosa*), Brush Box and Red Ash (*Alphitonia excelsa*). The lower stratum includes grasses such as *Ottobachloa gracillima*, Blady Grass (*Imperata cylindrica* var. *major*), *Entolasia stricta*, Kangaroo Grass (*Themeda australis*) and *Oplismenus aemulus*, shrubs (e.g. *Desmodium rhytidophyllum*), lilies (e.g. *Dianella caerulea*), mat-rushes (e.g. *Lepidosperma laterale*, Spiny-headed Mat-rush [*Lomandra longifolia*], *Lomandra multiflora* subsp. *multiflora*), herbs (e.g. Pastel Flower [*Pseuderanthemum variabile*]) and ferns (e.g. Bracken Fern [*Pteridium esculentum*]).

### Distribution and Habitat

**Habitat:** Upper to mid-slopes on low-elevation, rolling coastal hills on shallow soils or exposed aspects on sedimentary low rolling hills and basalt hills in the Blackwall and Burringbar Ranges.

**Disturbance:** Sites show the effects of light to moderate fires (5–30 years previously), light to moderate logging and grazing, and light to moderate infestations by weeds.

**Example locations:** Broken Head Road, Jali Lands at Wardell, Koala Beach, Clothiers Creek Road, Sleepy Hollow, Gahan Road at Wardell, and Wardell Trig.



## Conservation

**Threats:** Clearing and grazing.

**Conservation status:** Probably well reserved, except for lower slope occurrences outside of public land. Survey sites were reserved in Cudgen NR and Cudgera Creek NR.

**Significant taxa:** *Scleria rugosa* (Rare).

## Structure

Layer	Height (m)	Cover (%)
Tallest	10–40	20–70
Middle 1	1–15	5–70
Middle 2	1–3	5
Lower 1	0–1	5–80
Lower 2	0–0.4	30

## Floristics

**Trees:** *Corymbia intermedia* (T), *Eucalyptus siderophloia* (T), *Eucalyptus carnea* (T), *Lophostemon confertus* (T), *Eucalyptus pilularis* (T), *Allocasuarina torulosa* (M1), *Lophostemon suaveolens* (M1), *Corymbia gummifera* (T), *Cinnamomum camphora*\*, *Allocasuarina littoralis* (T), *Flindersia schottiana*, *Mallotus philippensis*, *Eucalyptus microcorys* (M1), *Eucalyptus signata* (T), *Jagera pseudorhus* var. *pseudorhus* forma *pseudorhus*, *Archontophoenix cunninghamiana*, *Clerodendrum tomentosum*, *Elaeocarpus obovatus*, *Ficus macrophylla*, *Syncarpia glomulifera*.

**Shrubs and small trees:** *Lantana camara*\* (M1), *Xanthorrhoea macronema* (M1), *Alphitonia excelsa*, *Elaeocarpus reticulatus* (M1), *Acacia melanoxydon*, *Trochocarpa laurina* (M2), *Notelaea longifolia*, *Bursaria spinosa* (M1), *Cupaniopsis anacardioides*, *Synoum glandulosum* subsp. *glandulosum* (M1), *Acacia disparrima* subsp. *disparrima*, *Chrysanthemoides monilifera* subsp. *rotundata*\*, *Guioa semiglauca*, *Leptospermum polygalifolium* subsp. *cismontanum*, *Melicope elleryana*, *Acacia longissima*, *Archirhodomyrtus beckleri*, *Cyclophyllum longipetalum*, *Denhamia celastroides*, *Endiandra sieberi*, *Ficus coronata*, *Glochidion ferdinandi*, *Jacksonia scoparia*, *Leucopogon juniperinus*, *Maclura cochinchinensis*, *Myrsine variabilis*, *Pittosporum undulatum*, *Psychotria loniceroides*, *Pultenaea villosa*, *Tabernaemontana pandacaqui*, *Trema tomentosa* var. *viridis*.

**Climbers and twiners:** *Smilax australis*, *Hibbertia scandens*, *Hardenbergia violacea*, *Geitonoplesium cymosum*, *Passiflora subpeltata*\*, *Eustrephus latifolius*, *Stephania japonica* var. *discolor*, *Passiflora suberosa*\*, *Morinda jasminoides*, *Parsonia straminea*, *Cynanchum carnosum*, *Glycine clandestina*, *Glycine microphylla*, *Hibbertia dentata*, *Marsdenia rostrata*, *Pandorea pandorana*, *Smilax glycyphylla*, *Cissus hypoglauca*, *Echinostephia aculeata*, *Glycine tabacina*, *\*Ipomoea cairica*, *Passiflora foetida* var. *hispida*\*.

**Epiphytes:** *Psilotum nudum*.

**Ferns:** *Pteridium esculentum* (L1), *Acrostichum speciosum* (M1), *Cheilanthes sieberi*, *Calochlaena dubia*, *Adiantum hispidulum*, *Blechnum cartilagineum*, *Psilotum nudum*, *Schizaea dichotoma*.

**Grasses:** *Themeda australis* (L1), *Imperata cylindrica* var. *major* (L1) *Ottocloa gracillima* (L1), *Entolasia stricta* (L1), *Cymbopogon refractus* (L2), *Oplismenus aemulus*, *Oplismenus imbecillis*, *Paspalum wettsteinii*\*, *Panicum simile*, *Capillipedium parviflorum* (L1), *Aristida vagans*, *Digitaria parviflora*, *Ischaemum australe*, *Melinis minutiflora*\*, *Paspalidium distans*\*, *Paspalidium gracile*, *Echinopogon ovatus*, *Entolasia marginata*, *Eragrostis benthamii*, *Phragmites australis*.

**Sedges and rushes:** *Lomandra longifolia* (L1) *Lomandra multiflora* subsp. *multiflora*, *Lepidosperma laterale* (L1), *Lomandra filiformis* (L2), *Gahnia aspera*, *Lomandra confertifolia* subsp. *pallida*, *Lomandra glauca*.

**Herbs and shrubs:** *Dianella caerulea*, *Desmodium rhytidophyllum* (L2), *Pseuderanthemum variabile* (L1), *Goodenia*

*rotundifolia*, *Hibbertia aspera* (L1), *Austromyrtus dulcis*, *Pratia purpurascens*, *Vernonia cinerea*, *Desmodium gunnii*, *Brenya oblongifolia*, *Brunoniella australis*, *Dodonaea triquetra* (M1), *Senna pendula* var. *glabrata*\*, *Ageratina adenophora*\*, *Alyxia ruscifolia*, *Leucopogon lanceolatus* var. *gracilis* (M1), *Lilaeopsis polyantha* (L1), *Bacopa monnieri* (L1), *Banksia oblongifolia*, *Brunoniella pumilio*, *Chorizema parviflorum*, *Cryptostylis erecta*, *Dampiera stricta*, *Desmodium brachypodium*, *Dipodium variegatum*, *Gomphocarpus fruticosus*\*, *Hybanthus stellarioides*, *Hydrocotyle acutiloba*, *Homalanthus populifolius*, *Lobelia gibbosa*, *Logania pusilla*, *Monotoca scoparia*, *Wikstroemia indica*, *Ageratum houstonianum*\*, *Alternanthera denticulata*, *Apium prostratum*, *Arthrochilus prolixus*, *Bidens pilosa*\*, *Chamaecrista nomame* var. *nomame*, *Cordyline stricta*, *Crinum pedunculatum*, *Cryptostylis subulata*, *Daviesia ulicifolia* subsp. *ulicifolia*, *Dendrobium linguiforme*, *Desmodium varians*, *Dichondra repens*, *Geranium solanderi*, *Gymnostachys anceps*, *Hibbertia linearis*, *Hovea acutifolia*, *Hydrocotyle peduncularis*, *Lomatia silaifolia*, *Macaranga tanarius*, *Oxalis chnoodes*, *Oxalis exilis*, *Patersonia glabrata*, *Patersonia sericea*, *Persoonia stradbrokeensis*, *Plectranthus parviflorus*, *Polyscias sambucifolia*, *Solanum mauritianum*\*, *Solanum nigrum*\*, *Verbena hispida*\*, *Veronica calycina*, *Veronica plebeia*, *Xanthosia pilosa*.

Number of native taxa: 176

Number of taxa per site: 29–67 (mean 41 ± 11)

Number of exotic taxa: 17

### Indicator native taxa

Species	Group score	Group frequency	Non-group score	Non-group frequency	Fidelity class
<i>Austromyrtus dulcis</i>	3	100%	2	15%	positive
<i>Dianella caerulea</i>	2	100%	1	29%	positive
<i>Elaeocarpus reticulatus</i>	4	100%	2	18%	positive
<i>Entolasia stricta</i>	4	100%	2	13%	positive
<i>Goodenia rotundifolia</i>	2	100%	2	1%	positive
<i>Lepidosperma laterale</i>	3	100%	2	2%	positive
<i>Lomandra longifolia</i>	3	100%	2	29%	positive
<i>Lomandra multiflora</i> subsp. <i>multiflora</i>	3	100%	1	7%	positive
<i>Pteridium esculentum</i>	3	100%	2	20%	positive
<i>Smilax australis</i>	2	100%	2	42%	positive
<i>Allocasuarina littoralis</i>	5	50%	1	3%	positive
<i>Aristida vagana</i>	2	50%	2	1%	positive
<i>Banksia oblongifolia</i>	2	50%	2	3%	positive
<i>Brunoniella pumilio</i>	2	50%	2	0%	positive
<i>Corymbia gummifera</i>	3	50%	1	0%	positive
<i>Corymbia intermedia</i>	3	50%	3	16%	positive
<i>Dampiera stricta</i>	2	50%	2	1%	positive
<i>Dodonaea triquetra</i>	2	50%	2	2%	positive
<i>Eucalyptus carnea</i>	3	50%	3	2%	positive
<i>Eucalyptus siderophloia</i>	3	50%	3	9%	positive
<i>Hibbertia aspera</i>	3	50%	1	1%	positive
<i>Leptospermum polygalifolium</i> subsp. <i>cismontanum</i>	2	50%	1	1%	positive
<i>Leucopogon lanceolatus</i> var. <i>gracilis</i>	2	50%	1	7%	positive
<i>Monotoca scoparia</i>	2	50%	1	1%	positive
<i>Smilax glyciphylla</i>	2	50%	1	8%	positive
<i>Synoum glandulosum</i>	3	50%	2	14%	positive
<i>Veronica calycina</i>	1	50%	0	0%	positive



## Community 56 Broad-leaved Paperbark–Swamp Box–Tuckeroo Swamp Sclerophyll Open Forest

**Scientific name:** Broad-leaved Paperbark (*Melaleuca quinquenervia*), Swamp Box (*Lophostemon suaveolens*) and Tuckeroo (*Cupaniopsis anacardioides*) Swamp Sclerophyll Open Forest.

**Sites:** (4) ELL01albk, ELL02alvf, ELL03lsrlh, WAR15lsrh.

### Equivalent communities

Forested Wetlands-Coastal Swamp Forests, and Coastal Floodplain Wetlands (Keith 2006); Qld Regional Ecosystem 12.3.5 *Melaleuca quinquenervia* on alluvium (Young and Dillewaard 1999); 401 – Broad-leaved Paperbark Closed Forest to Woodland (Kingston *et al.* 2004); F8 – *Melaleuca quinquenervia* tall to very tall open to closed forest (Pressey and Griffith 1992); 40031/2 *Melaleuca quinquenervia* forest and woodland (Griffith & Wilson 2007); CASf24, *Lophostemon suaveolens* *Melaleuca quinquenervia*, and CASf25 *Eucalyptus tereticornis* *Lophostemon suaveolens* (Binns 1995b); North-east NSW Forest Ecosystem 112 Paperbark (NPWS 1999).

### Description

This is a swamp sclerophyll forest community with emergent Swamp Oak (*Casuarina glauca*). The tallest stratum comprises Broad-leaved Paperbark (*Melaleuca quinquenervia*), Tuckeroo (*Cupaniopsis anacardioides*), Swamp Oak and Swamp Box (*Lophostemon suaveolens*). There are two middle strata: one is a layer of small trees, the other a layer of shrubs. The dominant species in the mid-strata include Blue Lilly Pilly (*Syzygium oleosum*), Cabbage Tree Palm (*Livistona australis*), Sandpaper Fig (*Ficus coronata*), Buff Hazelwood (*Symplocos thwaitesii*) and Camphor Laurel (*Cinnamomum camphora*). The lower layer of shrubs includes Cunjevoi (*Alocasia brisbanensis*), Coral Berry (*Rivina humilis*), Lantana (*Lantana camara*) and Brush Muttonwood (*Myrsine howittiana*). Grasses (e.g. *Oplismenus aemulus*, *Ottochloa gracillima*), herbs (e.g. *Viola hederacea*) and ferns (e.g. *Hypolepis muelleri*) are dominant in the ground layer.



### Distribution and Habitat

**Habitat:** This community was found at the upper limit of the alluvial backplain of Bora Creek, and also at a site on low sedimentary quartz soils on rolling low hills.

**Disturbance:** The sites have been subject to moderate fire damage (fire 10–30 years previously). light infestations of weeds, and light grazing. There is evidence of light clearing at site WAR15lsrh.

**Example locations:** West of Bora Ridge, and Tuckean Broadwater.

### Conservation

**Threats:** Threatened by clearing.



**Conservation status:** Occurrences of this community on the alluvial plain are examples of 'Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions' EEC. Floodplain occurrences of Broad-leaved Paperbark are poorly reserved (Griffith 2005), but areas are reserved at Stotts Island NR, Tuckean NR, Bungawalbyn NR, Yarringly SCA, and Broadwater NP.

**Significant taxa:** None recorded.

## Structure

Layer	Height (m)	Cover (%)
Emergent	20–25	10
Tallest	15–25	25–60
Middle 1	3–15	5–40
Middle 2	0.5–3	10–20
Lower 1	0–2	5–60

## Floristics

**Trees:** *Melaleuca quinquenervia* (T), *Lophostemon suaveolens* (T), *Eucalyptus tereticornis*, *Eucalyptus pilularis*, *Cupaniopsis anacardioides* (T), *Casuarina glauca* (T), *Archontophoenix cunninghamiana* (T), *Livistona australis* (M1), *Cinnamomum camphora*\* (M1), *Corymbia intermedia*, *Elaeocarpus obovatus*, *Melicope elleryana*.

**Shrubs and small trees:** *Glochidion ferdinandi*, *Acacia disparrima* subsp. *disparrima*, *Alphitonia excelsa*, *Elaeocarpus reticulatus*, *Trochocarpa laurina*, *Leptospermum polygalifolium* subsp. *polygalifolium*, *Callistemon salignus*, *Nematolepis squamea* subsp. *squamea*, *Lantana camara*\* (M2), *Syzygium australe*, *Endiandra sieberi*, *Glochidion sumatranum*, *Acacia melanoxylon*, *Acmena smithii*, *Allocasuarina torulosa*, *Duboisia myoporoides*, *Maclura cochinchinensis*, *Notelaea longifolia*, *Pittosporum undulatum*, *Symplocos stawellii*.

**Climbers:** *Hibbertia scandens*, *Parsonsia straminea*, *Smilax glyciphylla*, *Geitonoplesium cymosum*, *Marsdenia rostrata*, *Smilax australis*.

**Ferns:** *Pteridium esculentum*, *Calochlaena dubia*, *Hypolepis muelleri*, *Blechnum indicum*.

**Grasses:** *Ottocloa gracillima* (L1), *Entolasia stricta*, *Imperata cylindrica* var. *major*, *Axonopus compressus*\*, *Oplismenus aemulus* (L1), *Microlaena stipoides* var. *stipoides*, *Themeda australis*, *Andropogon virginicus*\*, *Cymbopogon refractus*, *Entolasia marginata*, *Eragrostis benthamii*, *Eragrostis leptostachya*, *Paspalidium gracile*, *Paspalum orbiculare*, *Sacciolepis indica*, *Sporobolus sessilis*.

**Sedges and rushes:** *Gahnia clarkei*, *Lomandra longifolia*, *Baloskion tetraphyllum*, *Carex maculata*, *Lomandra multiflora* subsp. *multiflora*.

**Herbs and shrubs:** *Dichondra repens*, *Leucopogon lanceolatus* var. *gracilis*, *Pomax umbellata*, *Stylidium debile* var. *debile*, *Melastoma affine*, *Pratia purpurascens*, *Viola hederacea* (L1), *Viola banksii*, *Austromyrtus dulcis*, *Centella asiatica*, *Alocasia brisbanensis* (M2), *Rivina humilis*\* (M2), *Ageratina adenophora*\*, *Polygala paniculata*\*, *Ageratina riparia*\*, *Babingtonia densifolia*, *Brachyscome microcarpa*, *Breynia oblongifolia*, *Brunoniella australis*, *Caladenia catenata*, *Commelina cyanea*, *Desmodium gunnii*, *Dianella caerulea*, *Gonocarpus chinensis* subsp. *verrucosus*, *Gonocarpus micranthus*, *Hibbertia aspera*, *Hydrocotyle peduncularis*, *Hydrocotyle tripartita*, *Hypochaeris radicata*\*, *Hypoxis hygrometrica* var. *villosisepala*, *Lagenophora gracilis*, *Leucopogon juniperinus*, *Leucopogon margarodes*, *Oxalis exilis*, *Vernonia cinerea* var. *cinerea*.

**Number of native taxa:** 87

**Number of taxa per site** 28–65 (mean 41 ± 16)

**Number of exotic taxa:** 8

## Indicator native taxa

Species	Group score	Group frequency	Non-group score	Non-group frequency	Fidelity class
<i>Entolasia stricta</i>	2	100%	2	11%	positive
<i>Glochidion ferdinandi</i>	2	100%	1	24%	positive
<i>Melaleuca quinquenervia</i>	3	100%	3	38%	positive
<i>Alphitonia excelsa</i>	2	86%	2	25%	positive
<i>Hibbertia scandens</i>	2	86%	1	27%	positive
<i>Imperata cylindrica</i>	2	86%	2	20%	positive
<i>Ottobachloa gracillima</i>	2	86%	2	31%	positive
<i>Gahnia clarkei</i>	3	71%	3	16%	positive
<i>Lophostemon suaveolens</i>	3	71%	2	22%	positive
<i>Pteridium esculentum</i>	2	71%	2	20%	positive
<i>Acacia disparrima</i>	3	57%	3	13%	positive
<i>Geitonoplesium cymosum</i>	2	57%	2	41%	positive
<i>Marsdenia rostrata</i>	2	57%	1	22%	positive
<i>Oplismenus aemulus</i>	2	57%	2	14%	positive
<i>Pomax umbellata</i>	2	57%	2	8%	positive
<i>Hypoxis hygrometrica</i> var. <i>villosisepala</i>	1	29%	0	0%	positive
<i>Babingtonia densifolia</i>	1	14%	0	0%	positive
<i>Caladenia catenata</i>	1	14%	0	0%	positive
<i>Goodenia heterophylla</i>	1	14%	0	0%	positive
<i>Lagenophora gracilis</i>	1	14%	0	0%	positive
<i>Leucopogon lanceolatus</i>	1	14%	0	0%	positive
<i>Pimelea ligustrina</i>	1	14%	0	0%	positive
<i>Sporobolus sessilis</i>	1	14%	0	0%	positive

## Community 57 Red Mahogany–Pink Bloodwood–Swamp Mahogany–Swamp Box Dry Open Forest

**Scientific name:** Red Mahogany (*Eucalyptus resinifera*), Pink Bloodwood (*Corymbia intermedia*), Swamp Mahogany (*Eucalyptus robusta*) and Swamp Box (*Lophostemon suaveolens*) Dry Open Forest.

**Sites:** (3) WOO04alvf, WAR29hsrlh, WAR35cbr.

### Equivalent communities

Swamp sclerophyll forest mixed eucalypt spp. (mE2) (Landmark Ecological Services 1999); 3014 – *Eucalyptus resinifera* subsp. *hemilampra* tall to very tall, open to closed forest, and 3519 – *Eucalyptus resinifera* ssp. *hemilampra* tall to very tall, open to closed forest NPWS NSW Coastal Vegetation (Griffith & Wilson 2007); CASf18 *Eucalyptus robusta* *Eucalyptus resinifera* *Lophostemon suaveolens* (Binns 1995b).

### Description

A dry open forest community in which Red Mahogany (*Eucalyptus resinifera* subsp. *hemilampra*) is abundant and associated with Pink Bloodwood (*Corymbia intermedia*), Swamp Mahogany (*Eucalyptus robusta*), Swamp Box (*Lophostemon suaveolens*) and Willow Bottlebrush (*Callistemon salignus*). There is an open middle layer of shrubs with a variable species composition that includes Salwood (*Acacia disparrima* subsp. *disparrima*), Satinwood (*Nematolepis squamea* subsp. *squamea*), Lantana (*Lantana camara*), Blueberry Ash (*Elaeocarpus reticulatus*) and *Pultenaea villosa*. The lower story comprises Saw Sedge (*Gahnia clarkei*), Weeping Meadow Grass (*Microlaena stipoides* var. *stipoides*), *Ottochloa gracillima*, Bracken Fern (*Pteridium esculentum*) and *Pomax umbellata*.



### Distribution and Habitat

**Habitat:** Moist, lower slope, high sedimentary soils and an alluvial valley flat.

**Disturbance:** Sites show evidence of a recent, moderate fire (3 years previously) and light to moderate infestations of weeds; there has been light grazing and clearing at site WAR35cbr.

**Example locations:** Tuckombil TSR, Jali Lands, and Thurgates Lane.

### Conservation

**Threats:** Clearing.

**Conservation status:** Poorly reserved on the FNC.

**Significant taxa:** *Arthrochilus prolixus* (ROTAP: 3K), *Cordyline congesta* (ROTAP: 2RC-).

## Structure

Layer	Height (m)	Cover (%)
Tallest	10–30	25–35
Middle 1	1–5	10–40
Middle 2	1–3	15
Lower 1	0–1	10–25

## Floristics

**Trees:** *Eucalyptus resinifera* subsp. *hemilampyra* (T), *Acacia disparrima* subsp. *disparrima*, *Corymbia intermedia* (T), *Lophostemon suaveolens* (T), *Melaleuca quinquenervia* (M1), *Acacia longissima*, *Alphitonia excelsa*, *Callistemon salignus* (T), *Eucalyptus robusta* (T), *Livistona australis*, *Eucalyptus tereticornis* (T), *Angophora paludosa*, *Cinnamomum camphora*\*, *Elaeocarpus obovatus*, *Eucalyptus siderophloia*, *Lophostemon confertus*, *Trochocarpa laurina*.

**Shrubs and small trees:** *Lantana camara*\* (M2), *Acacia disparrima* subsp. *disparrima* (M1), *Glochidion ferdinandi*, *Acacia longissima* (M1), *Callistemon salignus*, *Elaeocarpus reticulatus*, *Nematolepis squamea* subsp. *squamea* (M1), *Melaleuca sieberi*, *Endiandra sieberi*, *Viola banksii*, *Oxylobium arborescens* (M1), *Pittosporum revolutum*, *Allocasuarina torulosa*, *Banksia integrifolia* subsp. *integrifolia*, *Duboisia myoporoides*, *Glochidion sumatranum*, *Psychotria loniceroides*.

**Climbers:** *Geitonoplesium cymosum*, *Smilax australis*, *Hibbertia scandens*, *Marsdenia rostrata*, *Parsonsia straminea*, *Kennedia rubicunda* (M1), *Eustrephus latifolius*, *Morinda jasminoides*, *Ripogonum album*, *Stephania japonica* var. *discolor*.

**Ferns:** *Pteridium esculentum* (L1), *Blechnum indicum*, *Hypolepis muelleri*.

**Grasses:** *Microlaena stipoides* var. *stipoides* (M2), *Entolasia stricta* (L1), *Ottochloa gracillima*, *Entolasia marginata* (L1), *Imperata cylindrica* var. *major* (L1), *Oplismenus aemulus*, *Oplismenus imbecillis*, *Paspalidium gracile*, *Paspalum wettsteinii*\*.

**Sedges and rushes:** *Gahnia clarkei* (L1), *Lomandra longifolia*, *Baloskion tetraphyllum*.

**Herbs and shrubs:** *Pultenaea villosa* (M1), *Dianella caerulea*, *Dodonaea triquetra* (M1), *Pomax umbellata* (L1), *Austromyrtus dulcis*, *Brunoniella pumilio*, *Cordyline congesta*, *Persoonia stradbrokeensis*, *Arthrochilus prolixus*, *Bidens pilosa*\*, *Breynia oblongifolia*, *Erechtites valerianifolia*\*, *Gonocarpus teucroides*, *Goodenia heterophylla* subsp. *eglandulosa*, *Hibbertia aspera*, *Hypoxis hygrometrica* var. *villosisepala*, *Leptospermum whitei*, *Leucopogon parviflorus*, *Oxylobium arborescens*, *Pimelea ligustrina*, *Pratia purpurascens*, *Pseuderanthemum variabile*, *Senecio madagascariensis*\*, *Senna pendula* var. *glabrata*\*, *Sida rhombifolia*\*.

Number of native taxa: 74

Number of taxa per site: 32–54 (mean 41 ± 12)

Number of exotic taxa: 7

## Indicator native taxa

Species	Group score	Group frequency	Non-group score	Non-group frequency	Fidelity class
<i>Acacia disparrima</i> subsp. <i>disparrima</i>	3	57%	3	13%	positive
<i>Alphitonia excelsa</i>	2	86%	2	25%	positive
<i>Babingtonia densifolia</i>	1	14%	0	0%	positive
<i>Caladenia catenata</i>	1	14%	0	0%	positive
<i>Entolasia stricta</i>	2	100%	2	11%	positive
<i>Gahnia clarkei</i>	3	71%	3	16%	positive
<i>Geitonoplesium cymosum</i>	2	57%	2	41%	positive
<i>Glochidion ferdinandi</i>	2	100%	1	24%	positive
<i>Goodenia heterophylla</i>	1	14%	0	0%	positive
<i>Hibbertia scandens</i>	2	86%	1	27%	positive
<i>Hypoxis hygrometrica</i> var. <i>villosisepala</i>	1	29%	0	0%	positive
<i>Imperata cylindrica</i>	2	86%	2	20%	positive
<i>Lagenophora gracilis</i>	1	14%	0	0%	positive
<i>Leucopogon parviflorus</i>	1	14%	0	0%	positive
<i>Lophostemon suaveolens</i>	3	71%	2	22%	positive
<i>Marsdenia rostrata</i>	2	57%	1	22%	positive
<i>Melaleuca quinquenervia</i>	3	100%	3	38%	positive
<i>Oplismenus aemulus</i>	2	57%	2	14%	positive
<i>Ottobachloa gracillima</i>	2	86%	2	31%	positive
<i>Pimelea ligustrina</i>	1	14%	0	0%	positive
<i>Polygala paniculata</i>	1	14%	0	0%	positive
<i>Pomax umbellata</i>	2	57%	2	8%	positive
<i>Pteridium esculentum</i>	2	71%	2	20%	positive
<i>Sporobolus sessilis</i>	1	14%	0	0%	positive



## Community 58 Pink Bloodwood–Grey Ironbark–Swamp Box–Forest Red Gum–Blackbutt Tall Dry Open Forest

**Scientific name:** Pink Bloodwood (*Corymbia intermedia*), Grey Ironbark (*Eucalyptus siderophloia*), Swamp Box (*Lophostemon suaveolens*), Forest Red Gum (*Eucalyptus tereticornis*) and Blackbutt (*Eucalyptus pilularis*) Tall Dry Open Forest.

**Sites:** (13) GIB02alrf, GIB03alfl, GIB05alfl, GIB07alfl, WAR52vbrlh, WAR54vbrlh, TAB01sulh, TAB02alrf, TAB03alvf, WAR48hsrlh, WOO22estsswmp, WOO19sulh, WOO03alvf.

### Equivalent communities

Wet Sclerophyll Forest-Northern Hinterland Wet Sclerophyll Forest (Keith 2006); 202 – Grey Ironbark/White Mahogany/Grey Gum Open Forest Complex (Kingston *et al.* 2004); Grey Ironbark–Pink Bloodwood (gIB), and Blackbutt (BB) (Landmark Ecological Services 1999); 3015 – *Corymbia intermedia*–*Eucalyptus siderophloia*–*Eucalyptus tereticornis* wet sclerophyll forest NPWS NSW Coastal Vegetation (Griffith & Wilson 2007); CASf10 – *Eucalyptus moluccana* *Eucalyptus siderophloia* *Corymbia intermedia* *Lophostemon suaveolens*, and CASf25 *Eucalyptus tereticornis* –, *Lophostemon suaveolens* (Binns 1995b).

### Description

A tall, coastal, subtropical, dry open to wet open forest complex occurring on alluvium, basalt and sediments. Sites on alluvium were dominated by Forest Red Gum (*Eucalyptus tereticornis*), Narrow-leaved Red Gum *Eucalyptus seeana*, Grey Ironbark (*Eucalyptus siderophloia*) and Swamp Box (*Lophostemon suaveolens*). Sites on basalt hillslopes were wet sclerophyll forests of Blackbutt (*Eucalyptus pilularis*), Grey Ironbark, Brush Box (*Lophostemon confertus*) and Tallowwood (*Eucalyptus micocrorys*). Drier sites on sediments were dominated by Pink Bloodwood (*Corymbia intermedia*) and *Eucalyptus carnea*. Salwood (*Acacia disparrima* subsp. *disparrima*), Red Ash (*Alphitonia excelsa*) and Willow Bottlebrush (*Callistemon salignus*) form a middle layer of small trees. A second mid-stratum of Lantana (*Lantana camara*), Lilly Pilly (*Acmena smithii*) and Tree Heath (*Trochocarpa laurina*) is present. The lower stratum consists of *Entolasia stricta*, Saw Sedge (*Gahnia aspera*), Blady Grass (*Imperata cylindrica* var. *major*) and Native Violet (*Viola banksii*).

### Distribution and Habitat

**Habitat:** This community occurs in a range of habitats, from the stagnant alluvial plain in the Bungwalbin Catchment, to levees and floodplains on Sandy Creek, to undulating low hills and gently undulating rises on low sedimentary quartz geology in the Tabbimoble Lowlands, as well as on basalt soils on the Blackwall Range.

**Disturbance:** There was no disturbance recorded at sites GIB05alfl and WOO22estsswmp. Elsewhere, infestations of weeds was light to moderate and there had been light to moderate levels of grazing at a few sites. Severe logging was recorded at site TAB01sulh, and moderate levels of clearing recorded at sites TAB03alvf and WOO03alvf.

**Example locations:** Tuckombil TSR, Boggy Creek Road, Brandy Arm Creek, Bagotville Wardell Road, New Italy



Swan Bay Road, Wardell Trig, Bungawalbyn SCA, and Sandy Crossing TSR.

## Conservation

**Threats:** Clearing and logging.

**Conservation status:** This community is probably adequately reserved. One survey site was in Bundjalung SCA. An equivalent community is recorded in Bundjalung NP (Griffith and Wilson 2007).

**Significant taxa:** *Cordyline congesta* (ROTAP: 2RC-), *Oberonia complanata* (TSC: Endangered), *Oberonia titania* (TSC: Vulnerable).

## Structure

Layer	Height (m)	Cover (%)
Tallest	20–40	10–40
Middle 1	5–20	20–40
Middle 2	1–5	10–40
Lower 1	0–2	10–80
Lower 2	0–0.2	20

## Floristics

**Trees:** *Alphitonia excelsa* (T), *Eucalyptus siderophloia* (T), *Corymbia intermedia* (T), *Lophostemon suaveolens* (T), *Eucalyptus tereticornis* (T), *Eucalyptus pilularis* (T), *Livistona australis* (M1), *Glochidion ferdinandi*, *Archontophoenix cunninghamiana* (M1), *Lophostemon confertus* (T), *Angophora subvelutina* (T), *Eucalyptus seeana* (T), *Eucalyptus microcorys* (T), *Eucalyptus carnea* (T), *Eucalyptus acmenoides* (T), *Waterhousea floribunda* (M1), *Casuarina glauca* (M1), *Elaeocarpus obovatus*, *Melaleuca styphelioides*, *Eucalyptus signata* (T), *Corymbia henryi*, *Cupaniopsis anacardioides*, *Eucalyptus propinqua*, *Eucalyptus resinifera* subsp. *hemilampra*, *Polyscias elegans*.

**Shrubs and small trees:** *Acacia disparrima* subsp. *disparrima* (T), *Lantana camara*\* (M2), *Trochocarpa laurina* (M1), *Notelaea longifolia* (M2), *Endiandra sieberi* (M2), *Callistemon salignus* (M1), *Acmena smithii* (M1), *Claoxylon australe* (M2), *Croton verreauxii* (M2), *Jagera pseudorhus* var. *pseudorhus* forma *pseudorhus*, *Pittosporum revolutum*, *Psychotria loniceroides*, *Cryptocarya microneura* (M1), *Cupaniopsis parvifolia*, *Maclura cochinchinensis*, *Myrsine howittiana*, *Babingtonia similis* (M2), *Cinnamomum camphora*\*, *Commersonia bartramia*, *Glochidion sumatranum*, *Leptospermum petersonii* (M1), *Rhodomyrtus psidioides* (M1), *Melaleuca styphelioides* (M1), *Myrsine variabilis*, *Synoum glandulosum* subsp. *glandulosum* (M2), *Tabernaemontana pandacaqui*, *Acacia irrorata* subsp. *irrorata* (M2), *Cyclophyllum longipetalum*, *Denhamia celastroides*, *Endiandra pubens*, *Endiandra discolor*, *Melaleuca linariifolia*, *Pittosporum multiflorum*, *Pittosporum undulatum*, *Psydrax odorata*, *Wilkiea huegeliana*, *Acronychia oblongifolia*, *Duboisia myoporoides*, *Elaeocarpus reticulatus*, *Geijera salicifolia*, *Guioa semiglaucula*, *Hakea florulenta*, *Leptospermum polygalifolium*, *Maytenus silvestris*, *Olea paniculata*, *Polyscias sambucifolia*, *Rhodamnia rubescens*.

**Climbers and twiners:** *Geitonoplesium cymosum*, *Morinda jasminoides* (L1), *Smilax australis*, *Parsonsia straminea*, *Hibbertia scandens*, *Cissus hypoglauca*, *Eustrephus latifolius*, *Echinostephia aculeata*, *Calystegia marginata*, *Dioscorea transversa*, *Flagellaria indica*, *Pandorea pandorana*, *Plectorrhiza tridentata*, *Embelia australiana*, *Marsdenia rostrata*, *Passiflora suberosa*\*, *Cayratia clematidea*, *Cissus antarctica*, *Glycine clandestina*, *Glycine microphylla*, *Passiflora edulis*\*, *Passiflora herbertiana*, *Ripogonum elseyanum*, *Smilax glycyphylla*, *Stephania japonica* var. *discolor*.

**Epiphytes:** *Platynerium bifurcatum*, *Asplenium australasicum* f. *australasicum*, *Cymbidium suave*, *Dendrobium aemulum*, *Oberonia complanata*.

**Mistletoes:** *Notothixos incanus*.

**Ferns:** *Adiantum aethiopicum* (L1), *Doodia aspera* (L1), *Blechnum cartilagineum* (L1), *Platynerium bifurcatum*, *Pteridium esculentum*, *Adiantum hispidulum*, *Asplenium australasicum* f. *australasicum*, *Cheilanthes sieberi* subsp. *sieberi*, *Pyrrhosia confluens* var. *confluens*, *Davallia solida* var. *pyxidata*, *Pellaea paradoxa*, *Pyrrhosia rupestris*.

**Grasses:** *Ottochloa gracillima* (L1), *Imperata cylindrica* var. *major*, *Entolasia stricta* (L1), *Oplismenus imbecillis*, *Microlaena stipoides* var. *stipoides* (L1), *Entolasia marginata*, *Axonopus compressus*\*, *Cymbopogon refractus*, *Oplismenus aemulus*, *Paspalum wettsteinii*\*, *Themeda australis*.

**Sedges and rushes:** *Gahnia aspera* (L1), *Lomandra longifolia* (L1), *Lomandra multiflora* subsp. *multiflora*, *Lomandra filiformis* subsp. *filiformis*, *Cyperus enervis*, *Lomandra hystrix*, *Gahnia clarkei* (L1), *Carex appressa*, *Lepidosperma laterale*.

**Herbs and shrubs:** *Acacia concurrens* (M1), *Dianella caerulea* (L1), *Breynia oblongifolia*, *Viola banksii* (L1), *Pratia purpurascens*, *Vernonia cinerea*, *Dichondra repens*, *Aneilema acuminatum*, *Desmodium gunnii*, *Pseuderanthemum variabile*, *Oxalis exilis*, *Commelina cyanea*, *Pomax umbellata*, *Gymnostachys anceps*, *Hybanthus stellarioides*, *Jasminum volubile*, *Leucopogon juniperinus*, *Pterostylis pedunculata*, *Ageratina riparia*\*, *Alyxia ruscifolia*, *Bursaria spinosa*, *Cordyline congesta*, *Cordyline petiolaris*, *Desmodium rhytidophyllum*, *Hydrocotyle peduncularis*, *Persoonia stradbrokeensis*, *Veronica plebeia*, *Alpinia arundelliana*, *Ambrosia artemisiifolia*\*, *Austromyrtus dulcis*, *Bidens pilosa*\*, *Brunoniella australis*, *Cordyline stricta*, *Dianella revoluta* var. *revoluta*, *Eupomatia laurina*, *Homalanthus populifolius*, *Hydrocotyle acutiloba*, *Leucopogon lanceolatus* var. *gracilis*, *Lomatia silaifolia*, *Melaleuca nodosa*, *Melaleuca sieberi*, *Plectranthus parviflorus*, *Poranthera microphylla*, *Rubus moluccanus* var. *trilobus*, *Senna septemtrionalis*\*, *Solanum densevestitum*.

**Number of native taxa:** 167

**Number of taxa per site:** 24–52 (mean 39 ± 9)

**Number of exotic taxa:** 11

## Indicator native taxa

Species	Group score	Group frequency	Non-group score	Non-group frequency	Fidelity class
<i>Acacia disparrima</i> subsp. <i>disparrima</i>	3	88%	2	10%	positive
<i>Alphitonia excelsa</i>	2	94%	1	23%	positive
<i>Arthropodium minus</i>	1	13%	0	0%	positive
<i>Asperula gemella</i>	1	6%	0	0%	positive
<i>Babingtonia similis</i>	3	6%	0	0%	positive
<i>Carex inversa</i>	1	6%	0	0%	positive
<i>Corymbia henryi</i>	3	19%	0	0%	positive
<i>Dendrobium aemulum</i>	1	6%	0	0%	positive
<i>Dianella caerulea</i>	2	50%	1	28%	positive
<i>Dianella revoluta</i>	1	19%	0	0%	positive
<i>Entolasia stricta</i>	2	63%	2	11%	positive
<i>Gahnia aspera</i>	2	56%	2	9%	positive
<i>Geijera salicifolia</i>	1	6%	0	0%	positive
<i>Geitonoplesium cymosum</i>	2	100%	2	38%	positive
<i>Hakea florulenta</i>	1	6%	0	0%	positive
<i>Imperata cylindrica</i>	2	63%	2	19%	positive
<i>Leptospermum petersonii</i>	3	6%	0	0%	positive
<i>Lophostemon suaveolens</i>	2	75%	3	20%	positive
<i>Maytenus silvestrus</i>	1	6%	0	0%	positive
<i>Melaleuca linariifolia</i>	2	6%	0	0%	positive
<i>Morinda jasminoides</i>	2	69%	2	25%	positive
<i>Oberonia complanata</i>	1	6%	0	0%	positive
<i>Oberonia titania</i>	1	6%	0	0%	positive
<i>Ottochloa gracillima</i>	3	94%	2	29%	positive
<i>Pellaea paradoxa</i>	1	6%	0	0%	positive
<i>Psydrax odorata</i>	1	13%	0	0%	positive
<i>Pteridium pedunculatum</i>	1	19%	0	0%	positive
<i>Smilax australis</i>	2	56%	2	42%	positive
<i>Solanum densevestitum</i>	1	19%	0	0%	positive



## Community 59 Large-fruited Spotted Gum–Grey Ironbark–Small-fruited Grey Gum Dry Grassy Open Forest

**Scientific name:** Large-fruited Spotted Gum (*Corymbia henryi*), Grey Ironbark (*Eucalyptus siderophloia*) and Small-fruited Grey Gum (*Eucalyptus propinqua*) Dry Grassy Open Forest.

**Sites:** (3) WOO07hsur, WOO01alvf, WOO18lsulh.

### Equivalent communities

Grassy Woodlands-Coastal Valley Grassy Woodlands (Keith 2006); Qld Regional Ecosystem 12.11.5 Mixed Tall Open Forest on metasediments (Young and Dillewaard 1999); CASf8 *Corymbia intermedia* *Corymbia henryi* (Binns 1995b); North-east NSW Forest Ecosystem 24 – Clarence Lowlands Spotted Gum (NPWS 1999).

### Description

A dry grassy open forest with Large-fruited Spotted Gum (*Corymbia henryi*) and Grey Gum (*Eucalyptus propinqua*) as the dominant tallest strata species. Occasional canopy species include Grey Ironbark (*Eucalyptus siderophloia*), Forest Red Gum (*Eucalyptus tereticornis*), *Eucalyptus tindaliae* and Broad-leaved Paperbark (*Melaleuca quinquenervia*). There is a middle stratum of shrubs and small trees including Salwood (*Acacia disparrima* subsp. *disparrima*), Red Ash (*Alphitonia excelsa*) and a second mid-stratum of shrubs such as Lantana (*Lantana camara*) and *Pultenaea spinosa*. The grassy lower stratum contains *Ottochloa gracillima*, Barbwire Grass (*Cymbopogon refractus*), Blady Grass (*Imperata cylindrica* var. *major*) and *Lomandra multiflora* subsp. *multiflora*.

### Distribution and Habitat

**Habitat:** This community is found on high sedimentary quartz, low hills and undulating rises on the Tabbimoble Plains.

**Disturbance:** Sites have light to severe infestations of weeds, and light to moderate levels of grazing. There is evidence of clearing at site WOO07hsur.

**Example Locations:** Tuckombil TSR, New Italy Swan Bay Road, and Boggy Creek Road.

### Conservation

**Threats:** Clearing, logging and weed infestation.

**Conservation status:** This community is related to North-east NSW Forest Ecosystem 24 – Clarence Lowlands Spotted Gum, which was considered highly inadequately reserved and is a private land priority (NPWS 1999).

**Significant taxa:** *Asperula gemella*.





## Structure

Layer	Height (m)	Cover (%)
Tallest	20–35	20–25
Middle 1	4–15	10–20
Middle 2	0.5–3	10–40
Lower 1	0–1	10–60

## Floristics

**Trees:** *Corymbia henryi* (T), *Eucalyptus propinqua* (T), *Lophostemon suaveolens*, *Eucalyptus siderophloia* (T), *Melaleuca quinquenervia* (M1), *Melaleuca styphelioides* (M1), *Jagera pseudorhus* var. *pseudorhus* forma *pseudorhus*, *Eucalyptus tereticornis* (T), *Corymbia intermedia*, *Cupaniopsis anacardioides*, *Eucalyptus tindaliae*, *Glochidion ferdinandi*.

**Shrubs and small trees:** *Acacia disparrima* subsp. *disparrima* (M1), *Lantana camara*\* (M2), *Alphitonia excelsa* (M1), *Notelaea longifolia*, *Pultenaea spinosa* (M2), *Acacia maidenii*, *Cyclophyllum longipetalum*, *Maclura cochinchinensis*, *Myrsine variabilis*, *Pittosporum revolutum*.

**Climbers and twiners:** *Geitonoplesium cymosum*, *Eustrephus latifolius*, *Glycine clandestina*, *Glycine microphylla*, *Hardenbergia violacea*, *Hibbertia scandens*, *Morinda jasminoides*, *Pandorea pandorana*, *Parsonsia straminea*.

**Epiphytes:** *Dendrobium linguiforme*.

**Grasses:** *Ottocloa gracillima* (L1), *Cymbopogon refractus* (L1), *Imperata cylindrica* var. *major* (L1), *Entolasia stricta* (L1), *Microlaena stipoides* var. *stipoides*, *Aristida vagans*, *Digitaria parviflora*, *Axonopus compressus*\*, *Oplismenus aemulus*.

**Sedges and rushes:** *Lomandra multiflora* subsp. *multiflora*, *Lomandra filiformis* subsp. *filiformis* (L1), *Lomandra confertifolia* subsp. *pallida*, *Carex inversa*, *Juncus usitatus*.

**Herbs and shrubs:** *Pratia purpurascens*, *Oxalis exilis*, *Vernonia cinerea*, *Viola banksii*, *Arthropodium minus*, *Dichondra repens*, *Rostellularia adscendens* subsp. *adscendens*, *Solanum densevestitum*, *Arthropodium milleflorum*, *Asparagus aethiopicus*\*, *Asperula gemella*, *Brachyscome microcarpa*, *Commelina cyanea*, *Daviesia ulicifolia* subsp. *ulicifolia*, *Desmodium gunnii*, *Desmodium rhytidophyllum*, *Dianella revoluta* var. *revoluta*, *Goodenia hederacea* subsp. *hederacea*, *Hybanthus stellarioides*, *Lagenophora stipitata*, *Laxmannia gracilis*, *Pseuderanthemum variabile*, *Senna pendula* var. *glabrata*\*.

Number of native taxa: 65

Number of taxa per site: 29–34 (mean 26 ± 18)

Number of exotic taxa: 4

## Indicator native taxa

Species	Group score	Group frequency	Non-group score	Non-group frequency	Fidelity class
<i>Acacia disparrima</i> subsp. <i>disparrima</i>	3	88%	2	10%	positive
<i>Alphitonia excelsa</i>	2	94%	1	23%	positive
<i>Arthropodium minus</i>	1	13%	0	0%	positive
<i>Asperula gemella</i>	1	6%	0	0%	positive
<i>Carex inversa</i>	1	6%	0	0%	positive
<i>Corymbia henryi</i>	3	19%	0	0%	positive
<i>Dianella caerulea</i>	2	50%	1	28%	positive
<i>Dianella revoluta</i>	1	19%	0	0%	positive
<i>Entolasia stricta</i>	2	63%	2	11%	positive
<i>Eucalyptus tindaliae</i>	1	6%	0	0%	positive
<i>Gahnia aspera</i>	2	56%	2	9%	positive
<i>Geitonoplesium cymosum</i>	2	100%	2	38%	positive
<i>Hakea florulenta</i>	1	6%	0	0%	positive
<i>Imperata cylindrica</i>	2	63%	2	19%	positive
<i>Leptospermum petersonii</i>	3	6%	0	0%	positive
<i>Lophostemon suaveolens</i>	2	75%	3	20%	positive
<i>Maytenus silvestrus</i>	1	6%	0	0%	positive
<i>Melaleuca linarifolia</i>	2	6%	0	0%	positive
<i>Morinda jasmonoides</i>	2	69%	2	25%	positive
<i>Ottochloa gracillima</i>	3	94%	2	29%	positive
<i>Pultenea spinosa</i>	3	6%	0	0%	positive
<i>Rostellularia adscendens</i> subsp. <i>adscendens</i>	1	19%	0	0%	positive
<i>Smilax australis</i>	2	56%	2	42%	positive
<i>Solanum densevestitum</i>	1	19%	0	0%	positive

## Community 60 Grey Ironbark–Thin-leaved Stringybark–Pink Bloodwood–Swamp Box Dry Open Grassy Forest

**Scientific name:** Grey Ironbark (*Eucalyptus siderophloia*), Thin-leaved Stringybark (*Eucalyptus eugenioides*), Pink Bloodwood (*Corymbia intermedia*) and Swamp Box (*Lophostemon suaveolens*) Dry Open Grassy Forest.

**Sites:** (2) ELL07hsur, GIB10laf1.

### Equivalent communities

Wet Sclerophyll Forest-Northern Hinterland Wet Sclerophyll Forest (Keith 2006); Qld Regional Ecosystem 12.9/10.7 Tall Open Forests on sediments (Young and Dillewaard 1999); 202 – Grey Ironbark/White Mahogany/Grey Gum Open Forest Complex (Kingston *et al.* 2004); Gey Ironbark–Pink Bloodwood (gIB) (Landmark Ecological Services 1999); 3538 – *Eucalyptus eugenioides*–*E. siderophloia*–*E. intermedia* tall to very tall, open forest NPWS NSW Coastal Vegetation (Griffith & Wilson 2007); North-east NSW Forest Ecosystem 73 – Lowland Red Gum (NPWS 1999).

### Description

A dry grassy open forest in which Grey Ironbark (*Eucalyptus siderophloia*) occurs with or without Thin-leaved Stringybark (*Eucalyptus eugenioides*). The middle stratum of small trees includes Pink Bloodwood (*Corymbia intermedia*), Forest Oak (*Allocasuarina torulosa*), Rough-barked Apple (*Angophora subvelutina*) and Swamp Box (*Lophostemon suaveolens*). Lower strata consist of a sparse lower layer of shrubs (including *Acacia concurrens*, *Alphitonia excelsa*) and a ground cover of *Entolasia stricta*, *Gahnia aspera*, Blady Grass (*Imperata cylindrica* var. *major*), Spiny-headed Mat-rush (*Lomandra longifolia*), *Ottochloa gracillima* and Kangaroo Grass (*Themeda australis*).



### Distribution and Habitat

**Habitat:** This community is located on a stagnant alluvial plain and on gently undulating rises on high sedimentary quartz parent material in the Tabbimoble Lowlands.

**Disturbance:** Sites have been affected by light to moderate fires (5–10 years prior), light logging and light disturbance by weeds.

**Example locations:** Mothersoles Road and Bungawalbyn Creek SCA.

### Conservation

**Threats:** Lower slope occurrences of this community are threatened by logging and clearing.

**Conservation status:** Site GIB10laf1 was within Bungawalbyn Creek SCA. Lower slope occurrences on private land are probably a priority for reservation.

**Significant taxa:** None recorded.

## Structure

Layer	Height (m)	Cover (%)
Tallest	20–35	20–25
Middle 1	10–15	10–20
Middle 2	1–5	10
Lower 1	0–1	15–20

## Floristics

**Trees:** *Eucalyptus siderophloia* (T), *Eucalyptus eugenoides* (T), *Eucalyptus tereticornis* (T).

**Shrubs and small trees:** *Alphitonia excelsa* (M2), *Acacia concurrens* (M2), *Lophostemon suaveolens* (M1), *Angophora subvelutina* (M1), *Allocasuarina torulosa* (M1), *Corymbia intermedia* (M1), *Callistemon salignus*, *Lantana camara*\*, *Melaleuca alternifolia*, *Melaleuca quinquenervia*.

**Climbers and twiners:** *Eustrephus latifolius*, *Calystegia marginata*, *Geitonoplesium cymosum*, *Glycine clandestina*, *Glycine microphylla*, *Hibbertia scandens*, *Parsonsia straminea*.

**Ferns:** *Pteridium esculentum*, *Cheilanthes sieberi* subsp. *sieberi*.

**Grasses:** *Entolasia stricta* (L1), *Imperata cylindrica* var. *major*, *Themeda australis* (L1), *Eragrostis leptostachya*, *Ottochloa gracillima* (L1), *Lomandra longifolia*, *Lomandra multiflora* subsp. *multiflora*, *Aristida vagans*, *Oplismenus aemulus*, *Panicum effusum*.

**Sedges and rushes:** *Lomandra longifolia* (L1), *Gahnia aspera* (L1), *Lomandra filiformis* subsp. *filiformis*, *Cyperus trinervis*.

**Herbs and shrubs:** *Desmodium varians*, *Hibbertia diffusa*, *Dianella longifolia*, *Hypericum gramineum*, *Phyllanthus virgatus*, *Poranthera microphylla*, *Pratia purpurascens*, *Vernonia cinerea* var. *cinerea*, *Brunoniella australis*, *Daviesia ulicifolia* subsp. *stenophylla*, *Desmodium rhytidophyllum*, *Dianella caerulea*, *Goodenia paniculata*, *Hydrocotyle tripartita*, *Indigofera australis*, *Lagenophora stipitata*, *Laxmannia gracilis*, *Leucopogon lanceolatus* var. *gracilis*, *Persoonia stradbokensis*, *Pultenaea myrtooides*.

**Number of native taxa:** 56

**Number of taxa per site:** 34–42 (mean 38 ± 6)

**Number of exotic taxa:** 4

## Indicator native taxa

Species	Group score	Group frequency	Non-group score	Non-group frequency	Fidelity class
<i>Imperata cylindrica</i>	3	100%	2	19%	positive
<i>Lophostemon suaveolens</i>	3	100%	2	21%	positive
<i>Themeda australis</i>	3	100%	2	6%	positive
<i>Alphitonia excelsa</i>	2	88%	1	25%	positive
<i>Melaleuca quinquenervia</i>	3	88%	3	38%	positive
<i>Pratia purpurascens</i>	2	88%	2	14%	positive
<i>Entolasia stricta</i>	2	75%	2	12%	positive
<i>Goodenia paniculata</i>	2	75%	2	3%	positive
<i>Phyllanthus virgatus</i>	1	75%	0	0%	positive
<i>Brunoniella australis</i>	2	63%	1	1%	positive
<i>Oplismenus aemulus</i>	2	50%	2	14%	positive
<i>Panicum effusum</i>	2	50%	0	0%	positive
<i>Pultenaea myrtoidea</i>	1	25%	0	0%	positive
<i>Daviesia ulicifolia</i> subsp. <i>stenophylla</i>	1	13%	0	0%	positive
<i>Eucalyptus eugenioides</i>	3	13%	0	0%	positive
<i>Hibbertia diffusa</i>	2	13%	0	0%	positive
<i>Indigofera australis</i>	1	13%	0	0%	positive



## Community 61 Broad-leaved Paperbark–Narrow-leaved Rough-barked Apple–Swamp Box–Pink Bloodwood Dry Grassy Alluvial Open Forest

**Scientific name:** Broad-leaved Paperbark (*Melaleuca quinquenervia*), Narrow-leaved Rough-barked Apple (*Angophora paludosa*), Swamp Box (*Lophostemon suaveolens*) and Pink Bloodwood (*Corymbia intermedia*) Dry Grassy Alluvial Open Forest.

**Sites:** (6) ELL08alfl, TAT02alfl, TAT03alfl, TAT01alfl, ELL10alfl, ELL09alvf.

### Equivalent communities

Forested Wetlands-Coastal Floodplain Wetlands (Keith 2006); Qld Regional Ecosystem 12.3.5 *Melaleuca quinquenervia* on alluvium (Young and Dillewaard 1999); F5 – *Eucalyptus tereticornis*–*C. intermedia*–*Lophostemon suaveolens* (Pressey and Griffith 1992); 3569 – *Angophora paludosa* Dry Sclerophyll Forest and Woodland (Griffith & Wilson 2007); 301 – Coastal Pink Bloodwood Open Forest to Woodland, 309 – Coastal Swamp Box Open Forest to Woodland, and 401 – Broad-leaved Paperbark Closed Forest to Woodland (Kingston *et al.* 2004); Mixed Eucalypt spp. (mE2) Swamp Sclerophyll Forest (Landmark Ecological Services 1999); North-east NSW Forest Ecosystems 46 – Eastern Red Gums, and 73 – Lowland Red Gum (NPWS 1999).

The occurrence of Narrow-leaved Rough-barked Apple (*Angophora paludosa*) as a dominant canopy is not commonly recorded in the literature.

### Description

A grassy, dry, open alluvial forest in which Broad-Leaved Paperbark (*Melaleuca quinquenervia*), Narrow-leaved Rough-barked Apple (*Angophora paludosa*), Swamp Box (*Lophostemon suaveolens*), Pink Bloodwood (*Corymbia intermedia*) and Forest Red Gum (*Eucalyptus tereticornis*) dominate.

Small trees and shrubs form an open middle stratum. Common species in the mid-storey include Salwood (*Acacia disparrima* subsp. *disparrima*), Red Ash (*Alphitonia excelsa*) and Cheese Tree (*Glochidion ferdinandi*). A second middle stratum of Salwood, Swamp Box, Lantana (*Lantana camara*) and Cheese Tree is sometimes evident. The grassy lower stratum comprises Kangaroo Grass (*Themeda australis*), Australian Vetiver (*Chrysopogon filipes*), Blady Grass (*Imperata cylindrica* var. *major*), *Axonopus compressus*, *Brunoniella australis*, *Centella asiatica*, *Entolasia stricta* and White Root (*Pratia purpurascens*).



### Distribution and Habitat

**Habitat:** Located on a wide alluvial drainage plain on gently undulating rises on Sandy Creek in the Bungawalbin Catchment.

**Disturbance:** Sites showed evidence of light to moderate fires (5–10 years previously) and light to moderate grazing. There had also been light logging at site TAT03alfl.

**Example locations:** Mothersoles Road and Tatham Myrtle Creek Road.

## Conservation

**Threats:** Clearing and logging.

**Conservation status:** Community 62 is an example of 'Sub-tropical Coastal Floodplain Forest of the NSW North Coast bioregion' EEC. This community was located in the Tatham area and is possibly poorly reserved. None of the survey sites was in reserves. Griffith and Wilson (2007) record an association of Narrow-leaved Rough-barked Apple (*Angophora paludosa*) with Pink Bloodwood (*Corymbia intermedia*) as a minor associate in Yuraygir NP.

## Structure

Layer	Height (m)	Cover (%)
Tallest	15–35	15–35
Middle 1	2–15	10–40
Middle 2	1–5	5–25
Lower 1	0–1	15–80

## Floristics

**Trees:** *Melaleuca quinquenervia* (T), *Lophostemon suaveolens* (T), *Corymbia intermedia* (T), *Angophora paludosa* (T), *Eucalyptus tereticornis* (T), *Callistemon salignus* (T), *Eucalyptus siderophloia* (T), *Eucalyptus seeana* (T).

**Shrubs and small trees:** *Glochidion ferdinandi* (M2), *Alphitonia excelsa*, *Acacia disparrima* subsp. *disparrima* (M1), *Callistemon salignus* (M1), *Lantana camara*\*, *Acacia concurrens*, *Acacia irrorata* subsp. *irrorata*, *Allocasuarina littoralis*, *Melaleuca alternifolia*, *Trochocarpa laurina*.

**Climbers and twiners:** *Paspalidium gausum*, *Parsonsia straminea*, *Glycine microphylla*, *Calystegia marginata*.

**Ferns:** *Botrychium australe*.

**Grasses:** *Imperata cylindrica* var. *major* (L1), *Themeda australis* (L1), *Axonopus compressus*\* (L1), *Chrysopogon filipes* (L1), *Entolasia stricta* (L1), *Oplismenus aemulus*, *Panicum effusum*, *Cymbopogon refractus*, *Digitaria parviflora*, *Ottolochloa gracillima* (L1), *Eragrostis leptostachya*, *Aristida vagans*, *Cynodon dactylon*, *Dichelachne micrantha*, *Eragrostis leptostachya*, *Paspalidium distans*\*, *Paspalidium gausum* (L1), *Microlaena stipoides* var. *stipoides*.

**Sedges and rushes:** *Lomandra longifolia*, *Lomandra multiflora* subsp. *multiflora*, *Cyperus sphaeroideus*, *Cyperus trinervis*, *Juncus usitatus*, *Lomandra filiformis* subsp. *filiformis*, *Schoenus apogon*.

**Herbs and shrubs:** *Pratia purpurascens*, *Brunoniella australis*, *Goodenia paniculata*, *Pimelea linifolia* subsp. *collina*, *Centella asiatica*, *Hydrocotyle tripartita*, *Viola betonicifolia*, *Dichondra repens*, *Hypoxis hygrometrica*, *Polygala japonica*, *Lagenophora stipitata*, *Vernonia cinerea* var. *cinerea*, *Hypericum japonicum*, *Mitrasacme paludosa*, *Phyllanthus virgatus*, *Breynia oblongifolia*, *Desmodium gunnii*, *Murdannia graminea*, *Persoonia stradbrokeensis*, *Poranthera microphylla*, *Tricoryne elatior*, *Dianella brevipedunculata*, *Dianella caerulea*, *Dianella longifolia*, *Caesia parviflora* var. *parviflora*, *Cirsium vulgare*\*, *Hydrocotyle peduncularis*, *Hypochaeris radicata*\*, *Senecio madagascariensis*\*, *Ambrosia artemisiifolia*\*, *Arthropodium milleflorum*, *Desmodium rhytidophyllum*, *Desmodium varians*, *Gamochaeta spicata*, *Gonocarpus tetragynus*, *Goodenia hederacea* subsp. *hederacea*, *Haloragis heterophylla*, *Hibbertia empetrifolia* subsp. *empetrifolia*, *Laxmannia gracilis*, *Pseuderanthemum variabile*, *Pultenaea myrtoides*, *Stylidium debile* var. *debile*, *Viola banksii*.

**Number of native taxa:** 56

**Number of taxa per site:** 34–42 (mean 38 ± 6)

**Number of exotic taxa:** 4

## Indicator native taxa

Species	Group score	Group frequency	Non-group score	Non-group frequency	Fidelity class
<i>Alphitonia excelsa</i>	2	88%	1	25%	positive
<i>Angophora paludosa</i>	3	50%	2	1%	positive
<i>Botrychium australe</i>	1	13%	0	0%	positive
<i>Brunoniella australis</i>	2	63%	1	1%	positive
<i>Caesia parviflora</i> var. <i>parviflora</i>	1	25%	0	0%	positive
<i>Centella asiatica</i>	2	50%	2	12%	positive
<i>Chrysopogon filipes</i>	2	63%	0	0%	positive
<i>Dianella brevipedunculata</i>	2	13%	0	0%	positive
<i>Dichelachne micrantha</i>	1	25%	0	0%	positive
<i>Entolasia stricta</i>	2	75%	2	12%	positive
<i>Gamochoeta spicata</i>	1	13%	0	0%	positive
<i>Glochidion ferdinandi</i>	2	63%	1	24%	positive
<i>Goodenia paniculata</i>	2	75%	2	3%	positive
<i>Hibbertia empetrifolia</i> subsp. <i>empetrifolia</i>	1	13%	0	0%	positive
<i>Hypoxis hygrometrica</i>	1	38%	0	0%	positive
<i>Imperata cylindrica</i>	3	100%	2	19%	positive
<i>Lophostmeon suaveolens</i>	3	100%	2	21%	positive
<i>Melaleuca quinquenervia</i>	3	88%	3	38%	positive
<i>Mitrasacme paludosa</i>	2	25%	0	0%	positive
<i>Oplismenus aemulus</i>	2	50%	2	14%	positive
<i>Panicum effusum</i>	2	50%	0	0%	positive
<i>Phyllanthus virgatus</i>	1	75%	0	0%	positive
<i>Pimelea linifolia</i> subsp. <i>collina</i>	1	63%	0	0%	positive
<i>Pratia purpurascens</i>	2	88%	2	14%	positive
<i>Schoenus apogon</i>	1	13%	0	0%	positive
<i>Themeda australis</i>	3	100%	2	6%	positive
<i>Viola betonicifolia</i>	2	50%	2	1%	positive

## Community 62 River Mangrove–Grey Mangrove–Black Mangrove–Milky Mangrove–Spider Mangrove Forest to Shrubland

**Scientific name:** Grey Mangrove (*Avicennia marina*), Black Mangrove (*Bruguiera gymnorhiza*), Milky Mangrove (*Excoecaria agallocha*), River Mangrove (*Aegiceras corniculata*) and Spider Mangrove (*Rhizophora stylosa*) Forest to Shrubland.

**Sites:** (13) BALL12estsswp, BRU13estsw, TWE07estcl, BALL13estsswp, BALL15estsswp, BIL10albk, BIL08albk, TWE08estcl, TWE13estsswp, TWE10estdf, TWE18estcbb, TWE29cslg, BRU20estsswp.

### Equivalent communities

Saline Wetlands-Mangroves (Keith 2006); Qld Regional Ecosystem 12.1.3 Mangrove Shrubland to low closed forest on Quaternary estuarine deposits (Young and Dillewaard 1999); 602 – Mangrove Low Closed Forest to Woodland (Kingston *et al.* 2004); Grey Mangrove/River Mangrove (M) (Landmark Ecological Services 1999); 5302 – *Avicennia marina* var. *australasica* mangrove shrubland, and 2502 – *Avicennia marina* var. *australasica* mangrove forest and woodland NPWS NSW Coastal Vegetation (Griffith & Wilson 2007); *Excoecaria agallocha* forest and woodlands, *Rhizophora stylosa* forest and woodland, and *Bruguiera gymnorhiza* forest and woodland (Robinson and Benson 1990); North-east NSW Forest Ecosystem 77 – Mangrove (NPWS 1999).

### Description

Predominantly a mangrove-dominated open to closed shrubland to a low open forest of Grey Mangrove (*Avicennia marina* subsp. *australasica*), Black Mangrove (*Bruguiera gymnorhiza*), Milky Mangrove (*Excoecaria agallocha*) and Cottonwood Hibiscus (*Hibiscus tilaceus*), and associated with Spider Mangrove (*Rhizophora stylosa*) and River Mangrove (*Aegiceras corniculatum*).

Site BALL12estsswp has an open forest structure. Four sub-groups are defined, based on presence of understorey vegetation and mangrove species present: (1) Sites with an understorey of saw sedges, rushes and mangrove fern at the upper tidal limit. The remaining three groups are more frequently inundated sites without an understorey,

with groups based on the combination of mangrove species present: (2) Sites dominated by Grey Mangrove in which River Mangrove also occurs. (3) Sites with abundant River Mangrove co dominant with Black Mangrove and Grey Mangrove and with Milky Mangrove and Spider Mangrove occasionally present. (4) Sites with Black Mangrove, River Mangrove, Grey Mangrove and Milky Mangrove co dominant with a dense layer of Mangrove Fern (*Acrostichum speciosum*) and Saltwater Couch (*Sporobolus virginicus*).



### Distribution and Habitat

**Habitat:** Sites subject to regular tidal influence fringing coastal lagoons, estuarine to alluvial tidal deltas and low-level tidal flats on Quaternary marine and fluvial sediments. Associated with the Burns Point and Ukerebagh soil landscapes.



**Disturbance:** No disturbance was recorded.

**Example Locations:** Brunswick Heads, Fingal north of Ballina Racecourse, Chickiba Creek at Ballina, Cobaki Broadwater, Fingal Head, Ukererabagh NR, Tweed Heads Golf Club and Tweed River.

## Conservation

**Threats:** Filling, draining and rises in sea level.

**Conservation status:** Mangrove Forests are reserved in the Tweed Estuary NR, Ukerebagh NR, Cudgen NR, Wooyung NR, Billinudgel NR, Brunswick Heads NR, Bundjalung NP, Marshalls Creek NR, Tyagarah NR, Ballina NR and Richmond River NR.

**Significant taxa:** *Amyema mackayense* subsp. *mackayense*.

## Structure

Layer	Height (m)	Cover (%)
Emergent	4–7	10
Tallest	1–25	15–90
Middle 1	0–10	10–70
Lower 1	0.2–2	10–50

## Floristics

**Trees:** *Aegiceras corniculatum* (M1), *Avicennia marina* subsp. *australasica* (T), *Bruguiera gymnorrhiza* (T), *Excoecaria agallocha* (T), *Hibiscus tiliaceus* (T), *Rhizophora stylosa* (M1).

**Shrubs and small trees:** *Clerodendrum inerme* (M1).

**Climbers and twiners:** *Cynanchum carnosum* (L1), *Ipomoea cairica*\*.

**Mistletoes:** *Amyema cambagei*, *Amyema mackayense* subsp. *mackayense*.

**Ferns:** *Acrostichum speciosum* (M2), *Lygodium microphyllum*.

**Grasses:** *Hemarthria uncinata*, *Sporobolus virginicus* (L1).

**Sedges and rushes:** *Juncus usitatus* (M2), *Carex maculata*, *Cyperus brevifolius*, *Cyperus sphaeroideus*, *Fimbristylis dichotoma*.

**Herbs and shrubs:** *Gahnia clarkei* (L1), *Suaeda australis* (L1), *Cyperus lucidus* (L1).

**Number of native taxa:** 26

**Number of taxa per site:** 2–10 (mean 9 ± 13)

**Number of exotic taxa:** 1





## Indicator native taxa

Species	Group score	Group frequency	Non-group score	Non-group frequency	Fidelity class
<i>Aegiceras corniculatum</i>	4	100%	1	3%	positive
<i>Avicennia marina</i> subsp. <i>australasica</i>	4	100%	2	2%	positive
<i>Bruguiera gymnorhiza</i>	3	62%	1	1%	positive
<i>Clerodendrum inerme</i>	3	8%	0	0%	positive
<i>Rhizophora stylosa</i>	2	23%	0	0%	positive