
# The natural vegetation of the Gosford Local Government Area, Central Coast, New South Wales

## Vegetation Community Profiles

Final Report to Gosford City Council

Version 2.0

April 2004

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## Part 2 - Vegetation Community Profiles

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GOSFORD NSW 2250

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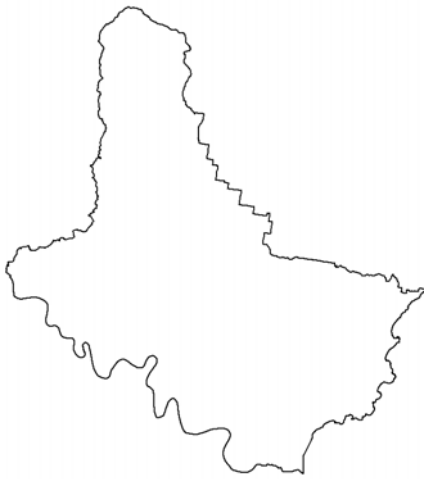

Copies of this document and the associated map may be obtained from Gosford City Council. Suggestions, amendments and improvements to the map are welcomed.

Document cover shows *Schoenus melanostachys, Aotus ericoides, Eriostemon australasius, Carex polyantha* and *Acacia echinula.* [All photographs © S. Bell]

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# Introduction

A vegetation survey, classification and mapping program was undertaken during 2003 within the Gosford LGA on behalf of Gosford City Council. The project was designed to assist strategic planning in the region, and also to form the basis of a new Local Environment Plan for the City shortly to be prepared. A report detailing the background, methodology, results, and conservation significance of this project has been presented as a separate volume (Bell 2004). This current document provides a summary of the vegetation communities resulting from the survey and analysis, and is designed to be used when interpreting the accompanying vegetation map. In essence, this volume acts as a companion to the main report, but with emphasis on the identification of vegetation map units present in Gosford LGA.

# The Profiles

Profiles of each vegetation community present within the City have been developed following the general format used in several recent vegetation mapping programs, particularly those examining large vegetated areas, and those in conservation reserves. The rationale behind the profiles is to assist users in the interpretation of delineated map units, and to allow the general reader with at least some basic knowledge of common plant species to identify the different vegetation types.

*Communities vs sub-communities*

In most cases, documented floristic variations within each community are based on the *PATN* cluster analysis of floristic data, where distinct sub-clusters within the main community group have been identified and tied to a specific environmental feature or other attribute. Some variations are represented by less than three sampling sites, and hence tend to be obscured within the dendrogram. At present, these sub-clusters do not warrant individual community status based on the available data, but may be drawn out as distinct should further sampling occur. Mapping of community variants has generally not been undertaken unless this was reasonably straight forward to do so.

A map showing the distribution of each community or sub-community within Gosford LGA is provided with each profile. It is important to note that not all of the LGA has been mapped to the same level of resolution; national park, state forest and vacant Crown lands not managed by Council are almost totally based on the modelling of NPWS (2000a). Figure 1 below shows the two

levels of effort undertaken during the map preparation phase, and each profile map also shows this distinction.

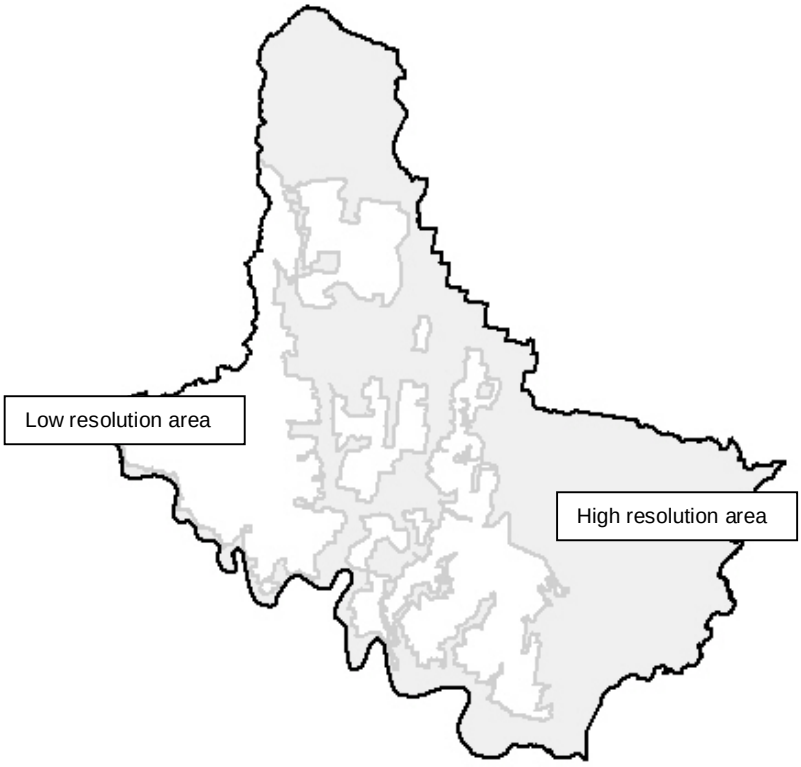


**Figure 1 Gosford LGA, showing high (shaded) & low (unshaded) map resolution areas**.

*Community nomenclature*

As far as possible, vegetation communities described for Gosford LGA are based on the regional classification of NPWS (2000a), to allow consistency within the Central Coast and lower Hunter region. In cases where variations recognised in the field do not readily conform to those described in NPWS (2000a) for a particular community, new sub-community names and profiles have been constructed.

*Structural information*

For each vegetation community or sub-community, a summary of the basic structural makeup of that unit is provided. The compilation of this information is totally reliant on the availability of the necessary structural data accompanying floristic information. In many cases, such data emanating from outside sources was not entered into the database, and could not be used. This proved to be problematic for many of the existing datasets that the entire project was relying upon. Indeed, a

total of 125 existing sites (or ~30% of the total usable dataset) had no structural data available for analysis. As a consequence, readers must bear in mind that the structural information presented with each profile varies in quality, and sample sizes should be noted during interpretations (shown as “n” in the structural tables).

*Diagnostic plant species*

The derivation of diagnostic species for each community has been defined using a purpose built software program (*Fidel*). This program was developed by the NPWS for use in vegetation mapping, and is described in Keith and Bedward (1999). Recent examples of its use include the vegetation classifications of the Lower Hunter and Central Coast REMS region (NPWS 2000a) and Western Sydney (NPWS 2000b).

The *Fidel* program allocates all species to one of four classes based on their frequency of occurrence and median cover abundance value in a target community when compared to all other communities in the dataset. Frequency of occurrence and cover abundance cut points (in this case, 40% frequency and c/a of >= 2, using the modified Braun-Blanquet 1-6 point c/a scale: see main report for details) are selected prior to running the program. The four classes are:

**Positive diagnostic** - species which are more likely to be found in the target community than in other communities;

**Negative diagnostic** - species which are less common in the target community but occur frequently in other communities;

**Constant** - species which occur frequently in several communities including the target community;

**Uninformative** - species which occur infrequently in all communities.

Lists of *Key Diagnostic Species* have been constructed based on the *Fidel* analysis. These lists essentially include all positive, negative and constant diagnostic species. In most cases, uninformative species have also been included where such species occur within greater than 10% of sites within that community, to enable a more rounded description of the community. Specific life forms which naturally occur at low abundances (such as epiphytic ferns, tree ferns, orchids etc) have also been included in many cases to indicate their presence. Most canopy tree species have been retained in the lists to assist interpretation. Where communities or sub-communities are presented by few sites, most or all species have been listed.

Positive diagnostic species which have been recorded in only one community have been re-named ***‘unique’*** species, and indicate that, based on the dataset available, it is unlikely for these

species to occur in any other community than the target community. These species are often but not always formally listed rare plants; many common seasonal species (such as terrestrial orchids and herbs) are included in this group.

Further information on the derivation of vegetation communities, together with detailed discussion on rare and threatened plant species, and conservation planning can be found in the full report.

# References


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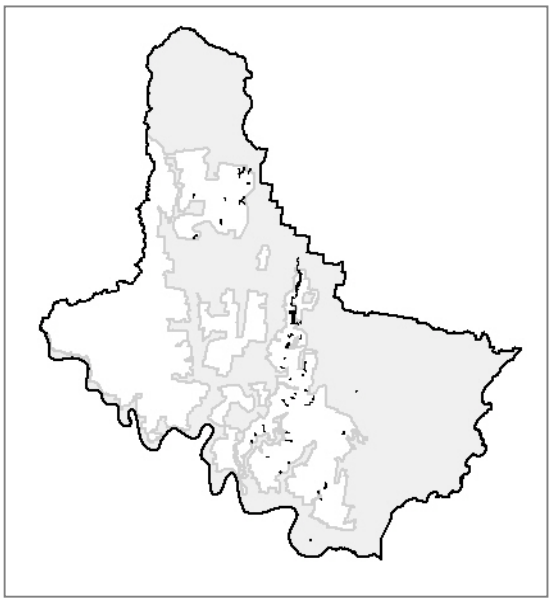
# Coastal Wet Gully Forest Unit E1

## Coastal Warm Temperate – Subtropical Rainforest REMS Unit 1



## General Description:

Coastal Wet Gully Forest is described by NPWS (2000) as a complex of species rich forests dominated by warm temperate suballiances, most often found on the lower slopes and gullies on Narrabeen Sandstone geology. NPWS (2000) identify two distinct sub-units in their description of this vegetation type, one of which equates to Unit E1a in the present work. Generally, Coastal Wet Gully Forest supports tall emergents of *Eucalyptus saligna* and *Syncarpia glomulifera* above a distinctive rainforest canopy (eg: *Acmena smithii, Doryphora sassafras, Cryptocarya glaucescens, Ceratopetalum apetalum, Alphitonia excelsa*) with high (>70%) foliage projective cover. It is currently mapped predominantly within the low resolution areas of Brisbane Water National Park and McPherson State Forest. Although relationships occurring between Coastal Wet Gully Forest and other moist forests within Gosford remain unclear, this unit has been retained until ground truthing is possible in the low resolution areas. It is plausible that areas shown to support this vegetation type in fact represent one or more of the other moist forest units (eg: E6a, E7, E8 or E9).

## Known Floristic/ Structural Variations:

No variants have yet been identified for this community. There is likely to be a gradation of forms throughout the region, dependant on soil moisture, topography and degree of exposure, which will be reflected in the floristic composition of specific stands.

## Distribution:

*Within Gosford LGA* – occurs in valley heads and sheltered lower slopes with deeper alluvial or colluvial soils, mostly within Brisbane Water NP and McPherson SF.

*Within LHCC Region* – NPWS (2000) have mapped 12028ha of their Coastal Wet Gully Forest (Unit 1) as remaining in the region.

*Examples Within Gosford LGA*

- Upper Mooney Mooney Creek, Brisbane Water NP.

## Extent:

*Extant* - 136.40 ha

## Relationship to Other Communities:

Structurally, Coastal Wet Gully Forest is most closely related to other moist forest vegetation types, principally Coastal Narrabeen Moist Forest (Unit E6a) and Sheltered Blue Gum Forest (Unit E8). There are also strong floristic similarities with these units which are yet to be clarified, however the high proportion of rainforest species in Unit E1 relative to other communities is most likely to be important. Species such as *Acmena smithii, Guioa semiglauca, Doryphora sassafras, Cryptocarya microneura*, etc are generally more dominant in Unit E1 than the other types. The Coastal Warm Temperate Rainforest (Unit E1a) is also very similar floristically, but that unit typically has fewer emergent eucalypts and supports a continuous rainforest canopy.

## Equivalent Vegetation Types:

- Benson 1981 (Mangrove Creek): n/a
- Benson & Fallding 1981 (Brisbane Water) (?) Closed forest to Low closed forest (Unit 1)
- Benson 1986 (Gosf-Lake Mac): Closed-Forest (Unit 8a)
- Clarke & Benson 1986 (Dharug): (?) Closed forest (Unit B1.1)
- Strom 1986 (Bouddi Peninsula): (?) Closed forest (Unit 4.1)
- Clarke & Benson 1987 (Mt White/ Mt Olive): (?) Blue Gum Forest (Unit B5)
- McRae 1990 (Bouddi Peninsula): n/a
- Binns 1996 (SF MFD): (?) MORf 12 *Syncarpia glomulifera – Acmena smithii – E. acmenoides – E. saligna*
- Payne 1997 (Cockle Bay/ Bouddi): n/a
- Bell 1998 (Popran NP): (?) Narrabeen Coastal Bluegum Forest (Unit F1)
- Bell 2002 (Wyong LGA): (?) Coastal Ranges Moist Layered Forest (Unit 35)

## Significant Species:

- Undescribed species – *none recorded*
- Threatened (TSC Act) – *Syzygium paniculatum*
- Rare (ROTAP) – *none recorded*

## Community Conservation Status:

*Reserve Representation* - within Gosford, this vegetation type is mapped as being contained within Brisbane Water NP and McPherson SF, although this requires confirmation.

*TSC Act (1995) Status* - not currently listed.

## Mapping Reliability & Included Units:

*High Resolution Area* – a few small patches of this vegetation type remain in the high resolution mapping, although these require ground truthing. It is likely that all or some of these in fact represent any of Units E6a, E7, E8, or E9.

*Low Resolution Area* – areas supporting this community in the low resolution area occur in the REMS mapping of Coastal Wet Gully Forest (Unit 1), and require truthing.

## Vegetation Structure:

No current structural data is available for this community, however information contained in NPWS (2000) has been reproduced below.

| Stratum | Mean height (m) | Min height (m) | Max height (m) | Mean cover (%) | Sdev | n |
|---|---|---|---|---|---|---|
| Emergent | 38.64 | 25.00 | 45.00 | 10 | 5.9 | 11 |
| Tallest | 24.50 | 10.00 | 35.00 | 71 | 15.7 | 20 |
| Middle 1 | 6.55 | 1.00 | 15.00 | 35 | 25.0 | 11 |
| Middle 2 | 12.25 | 5.00 | 15.00 | 46 | 18.4 | 8 |
| Middle 3 | 2.50 | 1.00 | 3.00 | 22 | 12.8 | 8 |
| Lowest | 1.00 | 0.00 | 1.00 | 36 | 25.6 | 19 |

## Key Diagnostic Species [no plots available]:

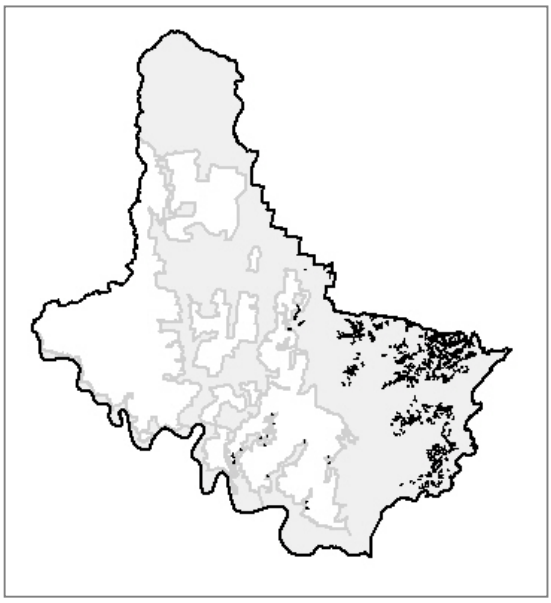
Diagnostic species have not been generated for this community due to a lack of definable plots. As a guide, the following species list has been extracted from the regional REMS profiles (NPWS 2000), but it has not been possible to rationalise this list with communities delineated during the present study.

| Life Form | Species | Community | | All others | | Fidelity |
|---|---|---|---|---|---|---|
| | | c/a | Freq. | c/a | Freq. | |
| Emergent | *Syncarpia glomulifera subsp. glomulifera* | - | - | - | - | - |
| | *Eucalyptus saligna* | - | - | - | - | - |
| | *Eucalyptus deanei* | - | - | - | - | - |
| | *Eucalyptus acmenoides* | - | - | - | - | - |
| | *Angophora floribunda* | - | - | - | - | - |
| | *Eucalyptus scias subsp. scias* | - | - | - | - | - |
| | *Eucalyptus pilularis* | - | - | - | - | - |
| Tree | *Acmena smithii* | - | - | - | - | - |
| | *Doryphora sassafras* | - | - | - | - | - |
| | *Cryptocarya glaucescens* | - | - | - | - | - |
| | *Ceratopetalum apetalum* | - | - | - | - | - |
| | *Cryptocarya microneura* | - | - | - | - | - |
| | *Alectryon subcinereus* | - | - | - | - | - |
| | *Caldcluvia paniculosa* | - | - | - | - | - |
| | *Sarcomelicope simplicifolia subsp. simplicifolia* | - | - | - | - | - |
| | *Mischocarpus australis* | - | - | - | - | - |
| | *Claoxylon australe* | - | - | - | - | - |
| Palm | *Archontophoenix cunninghamiana* | - | - | - | - | - |
| | *Livistona australis* | - | - | - | - | - |
| Small tree | *Guioa semiglauca* | - | - | - | - | - |
| | *Backhousia myrtifolia* | - | - | - | - | - |
| | *Ficus coronata* | - | - | - | - | - |
| | *Neolitsea dealbata* | - | - | - | - | - |
| | *Trochocarpa laurina* | - | - | - | - | - |
| | *Symploccos thwaitesii* | - | - | - | - | - |
| | *Austromyrtus acmenoides* | - | - | - | - | - |
| | *Pisonia umbellifera* | - | - | - | - | - |
| | *Synoum glandulosum subsp. glandulosum* | - | - | - | - | - |
| | *Stenocarpus salignus* | - | - | - | - | - |
| | *Melicope micrococca* | - | - | - | - | - |
| | *Diospyros australis* | - | - | - | - | - |
| | *Planchonella australis* | - | - | - | - | - |
| | *Wilkiea huegeliana* | - | - | - | - | - |
| | ***Syzygium paniculatum* [TSC Vulnerable]** | - | - | - | - | - |
| Shrub | *Eupomatia laurina* | - | - | - | - | - |
| | *Citriobatus pauciflorus* | - | - | - | - | - |
| | *Psychotria loniceroides* | - | - | - | - | - |
| | *Tasmannia insipida* | - | - | - | - | - |
| Herb | *Pseuderanthemum variabile* | - | - | - | - | - |
| | *Pollia crispata* | - | - | - | - | - |
| Grass | *Oplismenus imbecillis* | - | - | - | - | - |
| Graminoid | *Lomandra longifolia* | - | - | - | - | - |
| Ground fern | *Doodia aspera* | - | - | - | - | - |
| | *Lastreopsis microsora subsp. microsora* | - | - | - | - | - |
| | *Adiantum formosum* | - | - | - | - | - |
| | *Polystichun australiense* | - | - | - | - | - |
| | *Adiantum silvaticum* | - | - | - | - | - |
| | *Blechnum cartilagineum* | - | - | - | - | - |
| | *Lastreopsis decomposita* | - | - | - | - | - |
| | *Asplenium attenuatum* | - | - | - | - | - |
| Epiphtyic fern | *Pyrrosia rupestris* | - | - | - | - | - |

| | | | | | | |
|---|---|---|---|---|---|---|
| | *Asplenium australasicum forma australasicum* | - | - | - | - | - |
| Epiphytic orchid | *Dendrobium tetragonum* | - | - | - | - | - |
| | *Bulbophyllum shepherdii* | - | - | - | - | - |
| | *Plectorrhiza tridentata* | - | - | - | - | - |
| Climber | *Morinda jasminoides* | - | - | - | - | - |
| | *Cissus antarctica* | - | - | - | - | - |
| | *Cissus hypoglauca* | - | - | - | - | - |
| | *Ripogonum fawcettianum* | - | - | - | - | - |
| | *Smilax australis* | - | - | - | - | - |
| | *Pandorea pandorana subsp. pandorana* | - | - | - | - | - |
| Sedge/ Rush | *Gymnostachys anceps* | - | - | - | - | - |

# Coastal Warm Temperate Rainforest Unit E1a

## Coastal Warm Temperate – Subtropical Rainforest REMS Unit 1a



## General Description:

Most of the sheltered gullies on Narrabeen Sandstone in the rugged ranges in the east support rainforest vegetation that is largely warm temperate but with some subtropical influences also occurring. A variety of tree species co-dominate these rainforests, although the more typical ones include *Acmena smithii, Doryphora sassafras, Cryptocarya glaucescens, Ceratopetalum apetalum, Eucalyptus saligna, Alphitonia excelsa*, *Syncarpia glomulifera* subsp. *glomulifera, Guioa semiglauca, Neolitsea dealbata, Synoum glandulosum, Sloanea australis, Syzygium oleosum, Wilkea huegeliana, Caldcluvia paniculosa, Polyosma cunninghamii, Dysoxylon rufum*, and *Syzygium australe*. Understorey vegetation is typically sparse although ferns and climbers are normally prominent. Sub-tropical influences are generally in the form of epiphytic species (eg: *Arthropteris tenella, Microsorum pustulatum, Hymenophyllum australe, Asplenium australasicum* forma *australasicum, Microsorum scandens, Platycerium bifurcatum* var. *bifurcatum, Pyrrosia rupestris, Hymenophyllum cupressiform, Plectorrhiza tridentata, Sarcochilus olivaceus, Bulbophyllum exiguum, Dendrobium tetragonum*), tree ferns (*Cyathea leichhardtiana, Cyathea australis*, *Cyathea cooperi*) and palms (*Archontophoenix cunninghamiana, Livistona australis*).

## Known Floristic/ Structural Variations:

(a) Type variant (mapped as E1ai) – the majority of sheltered gullies and lower slopes on Narrabeen Sandstone soils support the type variant. It is likely that floristic gradients exist between those sites where warm temperate rainforest elements overshadow sub-tropical ones, but these have not been delineated here.

(b) Mangrove variant (mapped as E1aii) – one location on private property on the Somersby Plateau adjacent to Wisemans Ferry Road at Mangrove supports an interesting gully of moist forest/ rainforest. Here, a canopy of *Eucalyptus pilularis* occurs over stands of *Livistona australis* and *Archontophoenix cunninghamiana*, together with other rainforest species such as *Ficus coronata*, in an otherwise flat to undulating plateau supporting heathy open forest. The area appears to be fed by spring water and has been augmented by landowner plantings of various species. Further investigation is required at this location, particular in regard to site history and floristics.

(c) Basalt variant (not yet mapped) – on the lower slopes of the Peats Ridge basalt mine, remnants of a perhaps more widespread sub-tropical rainforest occur, where species such as *Toona ciliata* and *Dendrocnide excelsa* were dominant. Other species present include *Planchonella australis, Brachychiton acerifolius, Ficus rubiginosa*, and *Alectryon subcinereus*.

## Distribution:

*Within Gosford LGA* – occurs in valley heads and incised valleys with deeper alluvial or colluvial soils, mostly within the rugged Narrabeen Sandstone landscape in the east of the study area. Variant 1b occurs at Wisemans Ferry Road, Mangrove.

*Within LHCC Region* – NPWS (2000) have mapped 3175ha of their Coastal Warm Temperate-Subtropical Rainforest (Unit 1a) as remaining in the region.

*Examples Within Gosford LGA*

- Wingrove Road, Holgate.
- Maidens Brush Road, Wyoming
- Gullies in Katandra Reserve
- Wisemans Ferry road, Mangrove (variant b)

## Extent:

*Extant* - 738.17 ha

## Relationship to Other Communities:

Structurally, Coastal Warm Temperate Rainforest is most similar to the Sandstone Ranges Warm Temperate Rainforest (Unit E2) in the western parts of the LGA. However, that community is less diverse and tends to be dominated by species such as *Doryphora sassafras, Ceratopetalum apetalum, Backhousia myrtifolia,* and *Acmena smithii*, generally under a eucalypt canopy. Coastal Warm Temperate Rainforest is better developed, has a lower dominance of eucalypt species, and includes palms (*Livistona australis, Archontophoenix cunninghamiana)* and epiphytes. Coastal Sand Littoral Rainforest (Unit E4) occurs only in the protected swales of sand dunes, and is structurally more of a low closed forest or scrub. Dominants here include *Cupaniopsis anacaroides, Polyscias elegans* and *Syzygium paniculatum*, and this form of rainforest lacks many of the species evident in Unit E1a.

## Equivalent Vegetation Types:

- Benson 1981 (Mangrove Creek): n/a
- Benson & Fallding 1981 (Brisbane Water) n/a
- Benson 1986 (Gosf-Lake Mac): Closed-Forest (Unit 8a)
- Clarke & Benson 1986 (Dharug): (?) Closed forest (Unit B1.1)
- Strom 1986 (Bouddi Peninsula): Closed forest (Unit 4.1)
- Clarke & Benson 1987 (Mt White/ Mt Olive): (?) Dry rainforest (Unit B3) & Dry subtropical rainforest (Unit D2)
- McRae 1990 (Bouddi Peninsula): (?) Palm-dominated open-forest (Unit 1.6)
- Binns 1996 (SF MFD): (?) MORf 12 *Syncarpia glomulifera – Acmena smithii – E. acmenoides – E. saligna*
- Payne 1997 (Cockle Bay/ Bouddi): (?) Palm-dominated open-forest (Unit 1.6)
- Bell 1998 (Popran NP): (?) Narrabeen Depauperate Gully Rf (Unit RF2) & Coastal Basalt Dry Sub-tropical Rf (Unit RF4)
- Bell 2002 (Wyong LGA): Narrabeen Warm Temperate – Subtropical Rainforest (Unit 42)

## Significant Species:

- Undescribed species – *none recorded*
- Threatened (TSC Act) – *none recorded*
- Rare (ROTAP) – *Callistemon shiressii*

## Community Conservation Status:

*Reserve Representation* - within Gosford, this vegetation type is contained within Katandra and Kincumber Reserves, as well as Wambina NR, Bouddi NP.

*TSC Act (1995) Status* - not currently listed.

## Mapping Reliability & Included Units:

*High Resolution Area* – this vegetation type has been mapped from aerial photographic interpretation and ground truthing. Some areas of Coastal Narrabeen Moist Forest may be included in the mapping.

*Low Resolution Area* – areas supporting this community in the low resolution area will be included in the REMS

mapping of Coastal Warm Temperate – Subtropical Rainforest (Unit 1a).

## Vegetation Structure:

| Stratum | Mean height (m) | Min height (m) | Max height (m) | Mean cover (%) | Sdev | n |
|---|---|---|---|---|---|---|
| Emergent | 31.25 | 25.00 | 35.00 | 15 | 7.1 | 2 |
| Tallest | 23.64 | 5.00 | 40.00 | 55 | 22.2 | 26 |
| Middle 1 | 6.70 | 0.50 | 20.00 | 41 | 27.4 | 25 |
| Middle 2 | 1.64 | 0.01 | 5.00 | 21 | 19.8 | 9 |
| Middle 3 | - | - | - | - | - | - |
| Lowest | 1.36 | 0.50 | 1.00 | 43 | 31.8 | 35 |

## Key Diagnostic Species [based on 28 plots]:

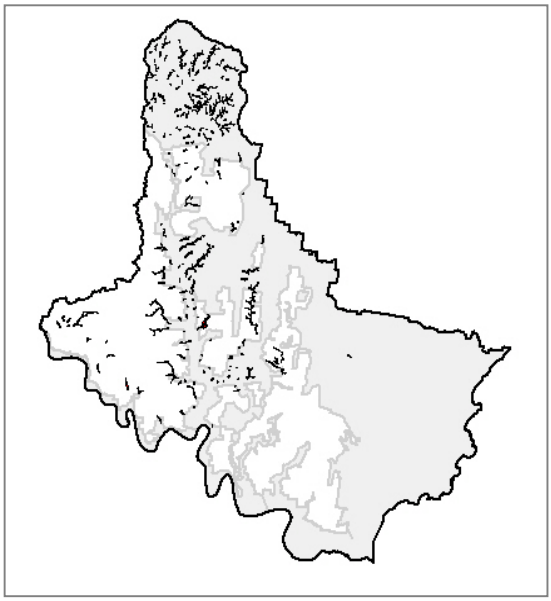
| Life Form | Species | Community | | All others | | Fidelity |
|---|---|---|---|---|---|---|
| | | c/a | Freq. | c/a | Freq. | |
| Emergent | *Syncarpia glomulifera subsp. glomulifera* | 2 | 64% | 2 | 26% | positive |
| | *Eucalyptus saligna* | 3 | 46% | 3 | 5% | positive |
| | *Eucalyptus pilularis* | 3 | 29% | 3 | 13% | uninformative |
| | *Angophora floribunda* | 1 | 25% | 2 | 18% | uninformative |
| | *Eucalyptus acmenoides* | 1 | 11% | 2 | 5% | uninformative |
| | *Eucalyptus globoidea* | 4 | 4% | 2 | 2% | uninformative |
| | *Eucalyptus deanei* | 3 | 4% | 3 | 6% | uninformative |
| | *Eucalyptus piperita* | 2 | 4% | 2 | 14% | uninformative |
| | *Angophora costata* | 1 | 4% | 2 | 33% | uninformative |
| | *Eucalyptus paniculata subsp. paniculata* | 1 | 4% | 3 | 9% | uninformative |
| | *Eucalyptus punctata* | 1 | 4% | 2 | 15% | uninformative |
| Tree | *Acmena smithii* | 2 | 68% | 2 | 10% | positive |
| | *Litsea reticulata* | 1 | 11% | 0 | 0% | unique |
| | *Cinnamomum oliveri* | 1 | 7% | 0 | 0% | unique |
| | *Citronella moorei* | 1 | 7% | 0 | 0% | unique |
| | *Dysoxylum rufum* | 1 | 4% | 0 | 0% | unique |
| | *Ehretia acuminata var acuminata* | 1 | 4% | 0 | 0% | unique |
| | *Emmenosperma alphitonioides* | 3 | 4% | 0 | 0% | unique |
| | *Ceratopetalum apetalum* | 3 | 39% | 2 | 3% | uninformative |
| | *Cryptocarya microneura* | 1 | 39% | 3 | 3% | uninformative |
| | *Allocasuarina torulosa* | 2 | 36% | 3 | 26% | uninformative |
| | *Cryptocarya glaucescens* | 2 | 29% | 2 | 2% | uninformative |
| | *Doryphora sassafras* | 2 | 25% | 3 | 1% | uninformative |
| | *Claoxylon australe* | 1 | 21% | 1 | 2% | uninformative |
| | *Schizomeria ovata* | 2 | 14% | 2 | 1% | uninformative |
| Palm | *Livistona australis* | 2 | 64% | 1 | 12% | positive |
| | *Archontophoenix cunninghamiana* | 3 | 46% | 1 | 2% | positive |
| Small tree | *Glochidion ferdinandii* | 2 | 43% | 2 | 27% | positive |
| | *Synoum glandulosum subsp. glandulosum* | 2 | 71% | 1 | 8% | positive |
| | *Acronychia oblongifolia* | 3 | 7% | 0 | 0% | unique |
| | *Diospyros pentamera* | 1 | 7% | 0 | 0% | unique |
| | *Sloanea australis* | 3 | 29% | 0 | 0% | unique |
| | *Melaleuca sieberi* | 2 | 11% | 0 | 0% | unique |
| | *Polyosma cunninghamii* | 1 | 11% | 0 | 0% | unique |
| | *Melaleuca decora* | 2 | 4% | 0 | 0% | unique |
| | *Polyscias murrayi* | 1 | 4% | 0 | 0% | unique |
| | *Scolopia braunii* | 1 | 4% | 0 | 0% | unique |
| | *Syzygium australe* | 1 | 4% | 0 | 0% | unique |
| | *Wilkiea huegeliana* | 1 | 50% | 1 | 3% | uninformative |

| | | | | | | |
|---|---|---|---|---|---|---|
| | *Ficus coronata* | 1 | 32% | 2 | 3% | uninformative |
| | *Trochocarpa laurina* | 1 | 32% | 1 | 8% | uninformative |
| | *Guioa semiglauca* | 1 | 29% | 1 | 3% | uninformative |
| | *Alphitonia excelsa* | 1 | 21% | 1 | 8% | uninformative |
| | *Neolitsea dealbata* | 1 | 21% | 1 | 1% | uninformative |
| | *Acacia prominens* | 1 | 18% | 2 | 5% | uninformative |
| | *Backhousia myrtifolia* | 3 | 14% | 3 | 5% | uninformative |
| | *Diospyros australis* | 2 | 14% | 1 | 1% | uninformative |
| | *Acacia maidenii* | 1 | 14% | 1 | 4% | uninformative |
| | *Callicoma serratifolia* | 3 | 11% | 2 | 4% | uninformative |
| | *Cassine australis var australis* | 2 | 11% | 1 | 1% | uninformative |
| | *Endiandra discolor* | 2 | 11% | 1 | 0% | uninformative |
| | *Stenocarpus salignus* | 1 | 11% | 1 | 2% | uninformative |
| | *Syzygium oleosum* | 1 | 11% | 2 | 0% | uninformative |
| | ***Melaleuca biconvexa* [TSC Vulnerable]** | **1** | **4%** | **4** | **3%** | **uninformative** |
| Shrub | *Alpinia arundelliana* | 1 | 7% | 0 | 0% | unique |
| | *Breynia oblongifolia* | 1 | 46% | 1 | 32% | uninformative |
| | *Eupomatia laurina* | 1 | 46% | 1 | 5% | uninformative |
| | *Notelaea longifolia* | 1 | 46% | 1 | 14% | uninformative |
| | *Pittosporum multiflorum* | 1 | 46% | 1 | 2% | uninformative |
| | *Rhodamnia rubescens* | 1 | 39% | 2 | 6% | uninformative |
| | *Pittosporum undulatum* | 2 | 29% | 1 | 13% | uninformative |
| | *Clerodendrum tomentosum* | 1 | 29% | 1 | 10% | uninformative |
| | *Pittosporum revolutum* | 1 | 29% | 1 | 11% | uninformative |
| | *Psychotria loniceroides* | 1 | 21% | 1 | 2% | uninformative |
| | *Elaeocarpus reticulatus* | 1 | 18% | 1 | 9% | uninformative |
| | *Tasmannia insipida* | 1 | 18% | 4 | 1% | uninformative |
| | *Omalanthus populifolius* | 1 | 14% | 1 | 4% | uninformative |
| | *Astrotricha latifolia* | 1 | 11% | 2 | 2% | uninformative |
| | *Canthium coprosmoides* | 1 | 11% | 1 | 1% | uninformative |
| | *Persoonia linearis* | 1 | 11% | 1 | 27% | uninformative |
| | *Rapanea variabilis* | 1 | 11% | 1 | 16% | uninformative |
| Tree fern | *Cyathea leichhardtiana* | 2 | 18% | 0 | 0% | unique |
| | *Cyathea australis* | 1 | 7% | 1 | 1% | uninformative |
| | *Cyathea cooperi* | 2 | 4% | 1 | 1% | uninformative |
| Herb | *Peperomia tetraphylla* | 1 | 4% | 0 | 0% | unique |
| | *Pollia crispata* | 1 | 4% | 0 | 0% | unique |
| | *Schelhammera undulata* | 1 | 39% | 2 | 6% | uninformative |
| | *Pseuderanthemum variabile* | 2 | 25% | 2 | 16% | uninformative |
| | *Viola hederacea* | 2 | 25% | 2 | 12% | uninformative |
| | *Pratia purpurascens* | 1 | 14% | 2 | 21% | uninformative |
| Grass | *Notodanthonia longifolia* | 1 | 4% | 0 | 0% | unique |
| | *Entolasia stricta* | 1 | 29% | 2 | 55% | negative |
| | *Flagellaria indica* | 1 | 25% | 1 | 0% | uninformative |
| | *Oplismenus imbecillis* | 1 | 18% | 2 | 17% | uninformative |
| Graminoid | *Dianella caerulea* | 1 | 43% | 1 | 51% | uninformative |
| | *Lomandra longifolia* | 1 | 29% | 2 | 46% | negative |
| Ground fern | *Blechnum cartilagineum* | 2 | 68% | 2 | 12% | positive |
| | *Doodia aspera* | 2 | 57% | 2 | 10% | positive |
| | *Calochlaena dubia* | 4 | 46% | 3 | 16% | positive |
| | *Adiantum silvaticum* | 4 | 18% | 0 | 0% | unique |
| | *Lastreopsis acuminata* | 2 | 4% | 0 | 0% | unique |
| | *Doodia media* | 1 | 4% | 0 | 0% | unique |
| | *Lastreopsis microsora subsp. microsora* | 2 | 36% | 2 | 1% | uninformative |
| | *Adiantum hispidulum* | 2 | 32% | 1 | 5% | uninformative |
| | *Adiantum formosum* | 1 | 32% | 2 | 2% | uninformative |
| | *Blechnum nudum* | 3 | 25% | 2 | 1% | uninformative |
| | *Pteridium esculentum* | 2 | 18% | 2 | 44% | negative |

| | | | | | | |
|---|---|---|---|---|---|---|
| | *Adiantum aethiopicum* | 1 | 18% | 2 | 12% | uninformative |
| | *Hypolepis muelleri* | 1 | 11% | 3 | 6% | uninformative |
| | *Sticherus flabellatus var flabellatus* | 1 | 11% | 2 | 2% | uninformative |
| Epiphtyic fern | *Microsorum scandens* | 1 | 11% | 0 | 0% | unique |
| | *Asplenium australasicum forma australasicum* | 1 | 4% | 0 | 0% | unique |
| | *Dictymia brownii* | 2 | 4% | 0 | 0% | unique |
| | *Microsorum pustulatum* | 2 | 4% | 0 | 0% | unique |
| | *Asplenium flabellifolium* | 2 | 4% | 1 | 3% | uninformative |
| | *Davallia solida var pyxidata* | 1 | 4% | 1 | 1% | uninformative |
| | *Platycerium bifurcatum* | 1 | 4% | 1 | 1% | uninformative |
| Epiphytic orchid | *Plectorrhiza tridentata* | 1 | 4% | 0 | 0% | unique |
| | *Sarcochilus olivaceus* | 1 | 4% | 0 | 0% | unique |
| | *Dendrobium linguiforme* | 1 | 4% | 1 | 0% | uninformative |
| Climber | *Smilax australis* | 2 | 79% | 1 | 18% | positive |
| | *Ripogonum fawcettianum* | 2 | 61% | 1 | 2% | positive |
| | *Cephalaralia cephalobotrys* | 1 | 11% | 0 | 0% | unique |
| | *Trophis scandens* | 1 | 4% | 0 | 0% | unique |
| | *Morinda jasminoides* | 1 | 82% | 1 | 10% | uninformative |
| | *Geitonoplesium cymosum* | 1 | 68% | 1 | 21% | uninformative |
| | *Dioscorea transversa* | 1 | 61% | 2 | 7% | uninformative |
| | *Pandorea pandorana subsp. pandorana* | 1 | 57% | 1 | 21% | uninformative |
| | *Cissus hypoglauca* | 1 | 54% | 1 | 15% | uninformative |
| | *Smilax glyciphylla* | 1 | 50% | 1 | 17% | uninformative |
| | *Parsonsia straminea* | 1 | 43% | 1 | 18% | uninformative |
| | *Cissus antarctica* | 2 | 36% | 1 | 8% | uninformative |
| | *Stephania japonica var discolor* | 1 | 36% | 1 | 16% | uninformative |
| | *Marsdenia rostrata* | 1 | 32% | 1 | 3% | uninformative |
| | *Sarcopetalum harveyanum* | 1 | 32% | 1 | 10% | uninformative |
| | *Rubus moluccanus var trilobus* | 1 | 29% | 1 | 6% | uninformative |
| | *Palmeria scandens* | 2 | 25% | 1 | 1% | uninformative |
| | *Rubus rosifolius* | 1 | 14% | 1 | 1% | uninformative |
| | *Rubus nebulosus* | 2 | 11% | 1 | 0% | uninformative |
| | *Cayratia clematidea* | 1 | 11% | 1 | 6% | uninformative |
| | *Rubus moorei* | 1 | 11% | 1 | 1% | uninformative |
| Sedge/ Rush | *Gymnostachys anceps* | 2 | 79% | 2 | 8% | positive |
| | *Carex longebrachiata* | 2 | 4% | 0 | 0% | unique |

# Sandstone Ranges Gully Rainforest Unit E2

## Sandstone Ranges Warm Temperate Rainforest REMS Unit 2



## General Description:

Sandstone Ranges Gully Rainforest is relatively widespread in the study area, occupying many of the deeper protected gullies in the western half of the LGA. Characteristic species in the canopy of this community include *Acacia elata, Ceratopetalum apetalum*, *Backhousia myrtifolia, Doryphora sassafras,* and *Acmena smithii*, with shrubs and small trees such as *Callicoma serratifolia, Ceratopetalum gummiferum,* and *Lomatia myricoides* common. Ferns are conspicuous in the ground layer, including *Asplenium aethiopicum, Blechnum ambiguum, Sticherus flabellatus, Todea barbara,* and *Cyathea leichhardtiana*. Emergent species such as *Eucalyptus saligna, Eucalyptus deanei, Syncarpia glomulifera* subsp. *glomulifera,* and *Eucalyptus acmenoides* are present within most stands. In particularly dry gullies, the rainforest canopy can be almost solely represented by *Backhousia myrtifolia* with only minor components of *Acmena smithii* and *Ceratopetalum apetalum*. Previous studies in the region have recognised these variations as distinct communities, but the current data set is not conclusive.

## Known Floristic/ Structural Variations:

No variants have yet been identified for this community. Dryer gullies tend to be dominated by *Backhousia myrtifolia* under a eucalypt overstorey, which can also invade sheltered lower slope positions in the absence of fire. Clarke & Benson (1987) and Bell (1998) discuss a rocky littoral rainforest at "The Vines" along the Hawkesbury River, where several littoral rainforest species (such as *Cassine australe, Guioa semiglauca*) occur. Further investigation is required to ascertain the significance of these small stands.

## Distribution:

*Within Gosford LGA* – occurs in the relatively dryer parts of the Hawkesbury-Narrabeen Sandstone complex, generally in gullies west of Brisbane Water.

*Within LHCC Region* – NPWS (2000) have mapped 404ha of their Sandstone Ranges Warm Temperate Rainforest (Unit 2) as remaining in the region.

*Examples Within Gosford LGA*

- Ironbark Creek, Popran NP
- Most protected gullies in Dharug NP

## Extent:

*Extant* - 739.90 ha

## Relationship to Other Communities:

Sandstone Ranges Gully Rainforest shares several species with the Coastal Warm Temperate Rainforest (Unit E1a), although that community is generally floristically more diverse and occurs in higher rainfall areas. Species such as *Callicoma serratifolia*, *Ceratopetalum apetalum*, and *Acacia elata* are generally uncommon or form minor components in Unit E1a, while a host of other species occur there but not in Unit E2 (eg: *Toona ciliata, Guioa semiglauca, Neolitsea dealbata, Synoum glandulosum, Sloanea australis, Syzygium oleosum*, *Wilkea huegeliana, Caldcluvia paniculosa, Polyosma cunninghamii, Dysoxylon rufum*, *Syzygium australe, Cryptocarya glaucescens, Cryptocarya microneura, Alectryon subcinereus, Guioa semiglauca, Choricarpa leptopetala, Melicope micrococca, Daphnandra* sp. *A, Ehretia acuminata, Symplocos stawellii,* and *Symplocos thwaitesii*). Subtropical influences are generally absent from the Sandstone Ranges Gully Rainforest.

## Equivalent Vegetation Types:

- Benson 1981 (Mangrove Creek): n/a
- Benson & Fallding 1981 (Brisbane Water) n/a
- Benson 1986 (Gosf-Lake Mac): Closed-Forest (Unit 8a)
- Clarke & Benson 1986 (Dharug): (?) Littoral/ depauperate rainforest (Unit B1.2)
- Strom 1986 (Bouddi Peninsula): n/a
- Clarke & Benson 1987 (Mt White/ Mt Olive): (?) Rocky littoral rainforest (Unit B1)
- McRae 1990 (Bouddi Peninsula): n/a
- Binns 1996 (SF MFD): (?) MORf 12 *Syncarpia glomulifera – Acmena smithii – E. acmenoides – E. saligna &* MORF 13 *Doryphora sassafras – Ceratopetalum apetalum – Acmena smithii*
- Payne 1997 (Cockle Bay/ Bouddi): n/a
- Bell 1998 (Popran NP): (?) Narrabeen Coastal Dry Rainforest (Unit RF1)
- Bell 2002 (Wyong LGA): Hawkesbury Warm Temperate Gully Rf (Unit 39) & Narrabeen Hunter Ranges Gully Dry Rf (Unit 41)

## Significant Species:

- Undescribed species – *none recorded*
- Threatened (TSC Act) – *none recorded*
- Rare (ROTAP) – *none recorded*

## Community Conservation Status:

*Reserve Representation* - within Gosford, this vegetation type is known from Brisbane Water, Popran and Dharug NP's.

*TSC Act (1995) Status* - not currently listed.

## Mapping Reliability & Included Units:

*High Resolution Area* – this vegetation type is not expected in the high resolution area.

*Low Resolution Area* – modelling of this community has occurred within the Sandstone Ranges Warm Temperate Rainforest (their Unit 2) of NPWS (2000).

## Vegetation Structure:

No structural data is yet available for this community.

## Key Diagnostic Species [based on 7 plots]:

| Life Form | Species | Community | | All others | | Fidelity |
|---|---|---|---|---|---|---|
| | | c/a | Freq. | c/a | Freq. | |
| Tree | *Eucalyptus deanei* | 2 | 71% | 3 | 5% | positive |
| | *Ceratopetalum apetalum* | 3 | 57% | 2 | 4% | positive |
| | *Doryphora sassafras* | 3 | 57% | 2 | 2% | positive |

| | | | | | | |
|---|---|---|---|---|---|---|
| | *Acmena smithii* | 2 | 57% | 2 | 13% | positive |
| | *Allocasuarina torulosa* | 2 | 43% | 2 | 27% | positive |
| | *Syncarpia glomulifera subsp. glomulifera* | 2 | 43% | 2 | 28% | positive |
| | *Angophora floribunda* | 4 | 29% | 2 | 19% | uninformative |
| | *Claoxylon australe* | 2 | 29% | 1 | 3% | uninformative |
| | *Cryptocarya glaucescens* | 2 | 29% | 2 | 3% | uninformative |
| | *Schizomeria ovata* | 5 | 14% | 2 | 1% | uninformative |
| | *Eucalyptus saligna* | 5 | 14% | 3 | 7% | uninformative |
| | *Ficus rubiginosa* | 2 | 14% | 1 | 3% | uninformative |
| | *Eucalyptus umbra* | 1 | 14% | 2 | 10% | uninformative |
| | *Melicope micrococca* | 1 | 14% | 1 | 2% | uninformative |
| Palm | *Livistona australis* | 3 | 14% | 1 | 15% | uninformative |
| Small tree | *Backhousia myrtifolia* | 3 | 71% | 2 | 4% | positive |
| | *Tristaniopsis laurina* | 2 | 71% | 1 | 1% | positive |
| | *Acacia prominens* | 4 | 57% | 2 | 5% | positive |
| | *Acacia elata* | 3 | 57% | 2 | 6% | positive |
| | *Callicoma serratifolia* | 3 | 57% | 2 | 3% | positive |
| | *Ficus coronata* | 2 | 57% | 1 | 4% | positive |
| | *Stenocarpus salignus* | 2 | 57% | 1 | 1% | positive |
| | *Synoum glandulosum subsp. glandulosum* | 2 | 57% | 1 | 12% | positive |
| | *Trochocarpa laurina* | 2 | 57% | 1 | 9% | positive |
| | *Wilkiea huegeliana* | 1 | 43% | 1 | 5% | uninformative |
| | *Glochidion ferdinandii* | 2 | 29% | 2 | 28% | uninformative |
| | *Rhodomyrtus psidioides* | 1 | 29% | 2 | 0% | uninformative |
| | *Alphitonia excelsa* | 2 | 14% | 1 | 9% | uninformative |
| | *Ceratopetalum gummiferum* | 1 | 14% | 2 | 5% | uninformative |
| Shrub | *Tasmannia insipida* | 4 | 43% | 1 | 1% | positive |
| | *Austromyrtus tenuifolia* | 2 | 43% | 1 | 0% | positive |
| | *Lomatia myricoides* | 2 | 14% | 0 | 0% | unique |
| | *Notelaea longifolia* | 1 | 71% | 1 | 15% | uninformative |
| | *Elaeocarpus reticulatus* | 1 | 43% | 1 | 9% | uninformative |
| | *Eupomatia laurina* | 1 | 43% | 1 | 7% | uninformative |
| | *Acacia longifolia* | 2 | 29% | 1 | 11% | uninformative |
| | *Dodonaea triquetra* | 2 | 29% | 1 | 17% | uninformative |
| | *Rapanea variabilis* | 2 | 29% | 1 | 15% | uninformative |
| | *Rhodamnia rubescens* | 2 | 29% | 2 | 8% | uninformative |
| | *Astrotricha floccosa* | 1 | 29% | 1 | 5% | uninformative |
| | *Breynia oblongifolia* | 1 | 29% | 1 | 33% | uninformative |
| | *Clerodendrum tomentosum* | 1 | 29% | 1 | 11% | uninformative |
| | *Gompholobium latifolium* | 1 | 29% | 1 | 15% | uninformative |
| | *Persoonia linearis* | 1 | 29% | 1 | 26% | uninformative |
| | *Pittosporum multiflorum* | 1 | 29% | 1 | 5% | uninformative |
| | *Platysace lanceolata* | 1 | 29% | 2 | 16% | uninformative |
| | *Pultenaea flexilis* | 1 | 29% | 2 | 11% | uninformative |
| | *Duboisia myoporoides* | 2 | 14% | 1 | 6% | uninformative |
| | *Pittosporum revolutum* | 2 | 14% | 1 | 12% | uninformative |
| | *Acacia myrtifolia* | 1 | 14% | 1 | 11% | uninformative |
| | *Asterolasia correifolia* | 1 | 14% | 2 | 2% | uninformative |
| | *Lomatia silaifolia* | 1 | 14% | 1 | 12% | uninformative |
| | *Olearia tomentosa* | 1 | 14% | 1 | 1% | uninformative |
| | *Omalanthus populifolius* | 1 | 14% | 1 | 5% | uninformative |
| | *Podolobium ilicifolium* | 1 | 14% | 2 | 12% | uninformative |
| | *Polyscias sambucifolia* | 1 | 14% | 1 | 18% | uninformative |
| | *Trema tomentosa var viridis* | 1 | 14% | 1 | 2% | uninformative |
| Sub-shrub | *Zieria pilosa* | 2 | 14% | 1 | 1% | uninformative |
| | *Solanum prinophyllum* | 1 | 14% | 1 | 2% | uninformative |
| Herb | *Pratia purpurascens* | 2 | 43% | 2 | 20% | positive |
| | *Fieldia australis* | 1 | 14% | 0 | 0% | unique |
| | *Pseuderanthemum variabile* | 1 | 43% | 2 | 16% | uninformative |
| | *Dichondra repens* | 2 | 29% | 2 | 6% | uninformative |
| | *Sigesbeckia orientalis subsp. orientalis* | 1 | 29% | 1 | 5% | uninformative |
| | *Galium binifolium* | 2 | 14% | 2 | 3% | uninformative |
| | *Geranium homeanum* | 2 | 14% | 2 | 4% | uninformative |

| | | | | | | |
|---|---|---|---|---|---|---|
| | *Hydrocotyle laxiflora* | 2 | 14% | 2 | 8% | uninformative |
| | *Hypericum gramineum* | 1 | 14% | 1 | 2% | uninformative |
| | *Plectranthus parviflorus* | 1 | 14% | 1 | 5% | uninformative |
| Grass | *Oplismenus imbecillis* | 2 | 71% | 2 | 16% | positive |
| | *Imperata cylindrica var major* | 5 | 29% | 2 | 29% | uninformative |
| | *Themeda australis* | 1 | 14% | 2 | 24% | uninformative |
| | *Entolasia stricta* | 0 | 0% | 2 | 54% | negative |
| Graminoid | *Dianella caerulea* | 1 | 71% | 1 | 50% | uninformative |
| | *Lomandra longifolia* | 2 | 29% | 2 | 45% | negative |
| Ground fern | *Blechnum cartilagineum* | 5 | 57% | 2 | 15% | positive |
| | *Calochlaena dubia* | 5 | 57% | 3 | 18% | positive |
| | *Todea barbara* | 2 | 57% | 2 | 1% | positive |
| | *Adiantum aethiopicum* | 3 | 43% | 2 | 12% | positive |
| | *Adiantum hispidulum* | 2 | 43% | 2 | 6% | positive |
| | *Sticherus flabellatus var flabellatus* | 2 | 43% | 2 | 2% | positive |
| | *Schizaea rupestris* | 1 | 14% | 0 | 0% | unique |
| | *Blechnum nudum* | 2 | 29% | 2 | 2% | uninformative |
| | *Pteridium esculentum* | 1 | 29% | 2 | 43% | negative |
| | *Blechnum ambiguum* | 2 | 14% | 1 | 0% | uninformative |
| | *Doodia aspera* | 2 | 14% | 2 | 13% | uninformative |
| | *Doodia caudata* | 2 | 14% | 5 | 0% | uninformative |
| | *Lindsaea linearis* | 2 | 14% | 2 | 15% | uninformative |
| | *Pellaea falcata* | 2 | 14% | 2 | 2% | uninformative |
| | *Polystichum proliferum* | 1 | 14% | 3 | 0% | uninformative |
| Epiphtyic fern | *Pyrrosia rupestris* | 2 | 29% | 0 | 0% | unique |
| | *Asplenium flabellifolium* | 1 | 43% | 2 | 2% | uninformative |
| | *Platycerium bifurcatum* | 1 | 14% | 1 | 1% | uninformative |
| Epiphytic orchid | *Bulbophyllum exiguum* | 1 | 14% | 1 | 0% | uninformative |
| | *Dendrobium aemulum* | 1 | 14% | 1 | 0% | uninformative |
| | *Dendrobium linguiforme* | 1 | 14% | 1 | 0% | uninformative |
| | *Dendrobium speciosum* | 1 | 14% | 1 | 1% | uninformative |
| Climber | *Hibbertia dentata* | 2 | 43% | 1 | 9% | positive |
| | *Hibbertia scandens* | 2 | 43% | 1 | 14% | positive |
| | *Smilax australis* | 1 | 71% | 2 | 21% | uninformative |
| | *Clematis aristata* | 1 | 57% | 1 | 9% | uninformative |
| | *Smilax glyciphylla* | 1 | 43% | 1 | 19% | uninformative |
| | *Cissus hypoglauca* | 4 | 29% | 1 | 18% | uninformative |
| | *Tylophora barbata* | 3 | 29% | 1 | 4% | uninformative |
| | *Parsonsia straminea* | 2 | 29% | 1 | 20% | uninformative |
| | *Sarcopetalum harveyanum* | 2 | 29% | 1 | 11% | uninformative |
| | *Eustrephus latifolius* | 1 | 29% | 1 | 25% | uninformative |
| | *Morinka jasminoides* | 1 | 29% | 1 | 15% | uninformative |
| | *Cissus antarctica* | 1 | 29% | 1 | 10% | uninformative |
| | *Palmeria scandens* | 1 | 29% | 2 | 2% | uninformative |
| | *Rubus moluccanus var trilobus* | 1 | 29% | 1 | 7% | uninformative |
| | *Desmodium rhytidophyllum* | 2 | 14% | 2 | 7% | uninformative |
| | *Desmodium varians* | 2 | 14% | 2 | 11% | uninformative |
| | *Kennedia rubicunda* | 2 | 14% | 1 | 11% | uninformative |
| | *Billardiera scandens* | 1 | 14% | 1 | 29% | uninformative |
| | *Geitonoplesium cymosum* | 1 | 14% | 1 | 24% | uninformative |
| | *Marsdenia suaveolens* | 1 | 14% | 1 | 2% | uninformative |
| | *Pandorea pandorana subsp. pandorana* | 1 | 14% | 1 | 24% | uninformative |
| | *Rubus moorei* | 1 | 14% | 1 | 1% | uninformative |
| | *Rubus rosifolius* | 1 | 14% | 1 | 2% | uninformative |
| Sedge/ Rush | *Gymnostachys anceps* | 4 | 29% | 2 | 13% | uninformative |
| | *Lepidosperma laterale* | 1 | 14% | 2 | 27% | uninformative |

# Coastal Sand Littoral Rainforest — Unit E4

## Littoral Rainforest — REMS Unit 4

## General Description:

Coastal Sand Littoral Rainforest occurs in coastal areas on Quaternary Pleistocene Sand deposits, in sheltered but well drained areas. The largest stands occur within the Wamberal Lagoon Nature Reserve area in the north-east of the LGA. Mesic rainforest species comprise this community, including *Alphitonia excelsa, Cupaniopsis anacardioides, Polyscias elegans, Endiandra sieberi, Livistona australis, Acacia maidenii,* and *Glochidion ferdinandi* var. *ferdinandi*. Emergent species present may include *Banksia integrifolia* subsp. *integrifolia, Melaleuca quinquenervia,* or *Banksia serrata*.

## Known Floristic/ Structural Variations:

Variation within this community is dependant on relative position in the landscape, and is not well defined. Areas with slightly more impeded drainage may support *Melaleuca quinquenervia* in the canopy, while locations in close proximity to past disturbance may support extensive areas of Bitou Bush (*Chrysanthemoides monilifera*). There is also considerable variation in structure, but floristic composition in the rainforest components is relatively consistent.

## Distribution:

*Within Gosford LGA* – occurs in sheltered aspects on sand in the Wamberal Lagoon NR area.

*Within LHCC Region* – NPWS (2000) have mapped 185ha of their Littoral Rainforest (Unit 4) remaining in the region.

*Examples Within Gosford LGA*

- Behind Wamberal Beach, Wamberal Lagoon NR

## Extent:

*Extant* - 4.33 ha

## Relationship to Other Communities:

Coastal Sand Littoral Rainforest shares several species with the Coastal Sand Scrub (Unit E50), and the two may form broad ecotones where there occur together. However, the dominance of true littoral rainforest species such as *Cupaniopsis anacardioides, Polyscias elegans,* and *Endiandra sieberi* in Unit E4 separate the two. Other rainforest communities within the study area (eg: Unit E1a) differ markedly in floristics and position in the landscape.

## Equivalent Vegetation Types:

- Benson 1981 (Mangrove Creek): n/a
- Benson & Fallding 1981 (Brisbane Water) n/a
- Benson 1986 (Gosf-Lake Mac): Low Closed-Forest (Unit 21b)
- Clarke & Benson 1986 (Dharug): n/a
- Strom 1986 (Bouddi Peninsula): n/a
- Clarke & Benson 1987 (Mt White/ Mt Olive): n/a
- McRae 1990 (Bouddi Peninsula): n/a
- Binns 1996 (SF MFD): n/a
- Payne 1997 (Cockle Bay/ Bouddi): n/a
- Bell 1998 (Popran NP): n/a
- Bell 2002 (Wyong LGA): Coastal Sand Scrub-Littoral Rainforest (Unit 11) & Coastal Sand Littoral Rainforest (Unit 12)

## Significant Species:

- Undescribed species – *none recorded*
- Threatened (TSC Act) – *Syzygium paniculatum*
- Rare (ROTAP) – *none recorded*

## Community Conservation Status:

*Reserve Representation* - within Gosford, most areas of this vegetation type are present in Wamberal Lagoon NR.

*TSC Act (1995) Status* - not currently listed.

## Mapping Reliability & Included Units:

*High Resolution Area* – this vegetation type has been mapped from aerial photographic interpretation and ground truthing.

*Low Resolution Area* – no occurrence within the low resolution area expected.

## Vegetation Structure:

| Stratum | Mean height (m) | Min height (m) | Max height (m) | Mean cover (%) | Sdev | n |
|---|---|---|---|---|---|---|
| Emergent | | | | | | |
| Tallest | 7.75 | 6.00 | 10.00 | 78 | 16.1 | 3 |
| Middle 1 | 2.25 | 2.00 | 4.00 | 18 | 7.6 | 3 |
| Middle 2 | 0.10 | 0.10 | 1.00 | 10 | | 1 |
| Middle 3 | | | | | | |
| Lowest | 0.78 | 0.10 | 1.00 | 35 | 27.8 | 3 |

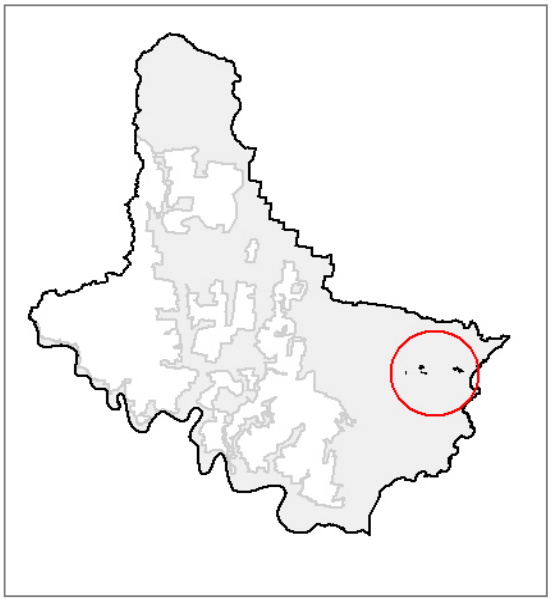
## Key Diagnostic Species [based on 3 plots]:

| Life Form | Species | Community | | All others | | Fidelity |
|---|---|---|---|---|---|---|
| | | c/a | Freq. | c/a | Freq. | |
| Tree | *Acmena smithii* | 2 | 100% | 2 | 14% | positive |
| | *Claoxylon australe* | 2 | 33% | 1 | 3% | uninformative |
| | *Elaeocarpus obovatus* | 1 | 33% | 1 | 0% | uninformative |
| **Small tree** | ***Syzygium paniculatum* [TSC Vulnerable]** | **3** | **100%** | **1** | **0%** | **positive** |
| | *Cupaniopsis anacardioides* | 2 | 100% | 1 | 1% | positive |
| | *Guioa semiglauca* | 2 | 67% | 1 | 4% | positive |
| | *Polyscias elegans* | 1 | 33% | 0 | 0% | unique |
| | *Synoum glandulosum subsp. glandulosum* | 4 | 33% | 1 | 12% | uninformative |
| | *Glochidion ferdinandii* | 3 | 33% | 2 | 28% | uninformative |
| | *Rhodomyrtus psidioides* | 2 | 33% | 1 | 1% | uninformative |

| | | | | | | |
|---|---|---|---|---|---|---|
| | *Syzygium oleosum* | 2 | 33% | 1 | 1% | uninformative |
| | *Banksia serrata* | 1 | 33% | 2 | 25% | uninformative |
| | *Cassine australis var australis* | 1 | 33% | 2 | 1% | uninformative |
| Shrub | *Clerodendrum tomentosum* | 2 | 67% | 1 | 11% | positive |
| | *Pittosporum undulatum* | 2 | 67% | 1 | 14% | positive |
| | *Alchornea ilicifolia* | 1 | 33% | 0 | 0% | unique |
| | *Banksia integrifolia subsp. integrifolia* | 1 | 100% | 1 | 6% | uninformative |
| | *Notelaea longifolia* | 1 | 100% | 1 | 15% | uninformative |
| | *Rapanea variabilis* | 1 | 100% | 1 | 15% | uninformative |
| | *Pittosporum revolutum* | 1 | 67% | 1 | 12% | uninformative |
| | *Elaeocarpus reticulatus* | 2 | 33% | 1 | 10% | uninformative |
| | *Leptospermum laevigatum* | 2 | 33% | 3 | 2% | uninformative |
| | *Breynia oblongifolia* | 1 | 33% | 1 | 33% | uninformative |
| | *Crinum pedunculatum* | 1 | 33% | 1 | 0% | uninformative |
| | *Maytenus silvestris* | 1 | 33% | 1 | 9% | uninformative |
| | *Zieria smithii* | 1 | 33% | 1 | 4% | uninformative |
| Herb | *Viola hederacea* | 2 | 67% | 2 | 13% | positive |
| | *Commelina cyanea* | 2 | 33% | 1 | 7% | uninformative |
| Grass | *Oplismenus imbecillis* | 5 | 67% | 0 | 0% | unique |
| | *Imperata cylindrica var major* | 2 | 33% | 2 | 29% | uninformative |
| | *Oplismenus imbecillis* | 1 | 33% | 2 | 17% | uninformative |
| | *Entolasia stricta* | 0 | 0% | 2 | 54% | negative |
| Graminoid | *Dianella caerulea* | 2 | 67% | 1 | 51% | positive |
| | *Lomandra longifolia* | 2 | 100% | 2 | 44% | constant |
| Ground fern | *Pteridium esculentum* | 1 | 33% | 2 | 42% | negative |
| Climber | *Cissus antarctica* | 3 | 100% | 1 | 10% | positive |
| | *Marsdenia rostrata* | 2 | 67% | 1 | 5% | positive |
| | *Smilax glyciphylla* | 2 | 67% | 1 | 19% | positive |
| | *Stephania japonica var discolor* | 2 | 67% | 1 | 17% | positive |
| | *Eustrephus latifolius* | 1 | 67% | 1 | 24% | uninformative |
| | *Hibbertia scandens* | 1 | 67% | 1 | 14% | uninformative |
| | *Pandorea pandorana subsp. pandorana* | 2 | 33% | 1 | 24% | uninformative |
| | *Cassytha pubescens* | 1 | 33% | 1 | 8% | uninformative |
| | *Cissus hypoglauca* | 1 | 33% | 1 | 18% | uninformative |
| | *Dioscorea transversa* | 1 | 33% | 1 | 11% | uninformative |
| | *Geitonoplesium cymosum* | 1 | 33% | 1 | 24% | uninformative |
| | *Trophis scandens subsp. scandens* | 1 | 33% | 1 | 2% | uninformative |
| | *Tylophora barbata* | 1 | 33% | 1 | 5% | uninformative |
| Sedge/ Rush | *Lepidosperma laterale* | 2 | 33% | 2 | 27% | uninformative |

# Alluvial Bluegum-Paperbark Forest — Unit E5a

## Alluvial Tall Moist Forest — REMS Unit 5



## General Description:

Occurring along some moister alluvial flats and creeklines of the Narrabeen series, Alluvial Bluegum-Paperbark Forest is typified by an emergent layer of Bluegums (*Eucalyptus deanei, Eucalyptus saligna*) and *Syncarpia glomulifera*, over a dense small tree layer of *Melaleuca biconvexa, Melaleuca styphelioides, Callistemon salignus,* and *Livistona australis*. The understorey is characterised by mesic rainforest species such as *Synoum glandulosum, Acmena smithii, Ficus coronata, Pittosporum revolutum* and *Glochidion ferdinandi* var. *ferdinandi*. *Gahnia clarkei* and ferns such as *Calochlaena dubia* dominate the ground layer, although in most cases this is quite sparse. This vegetation type is more prevalent in Wyong Shire.

## Known Floristic/ Structural Variations:

No variants have been identified, although the extent of *Gahnia clarkei* in the ground layer is dependant on drainage and this species may be locally dominant or sparse. In some sites, *Livistona australis* or *Melaleuca biconvexa* can be almost monospecific.

## Distribution:

*Within Gosford LGA* – along major tributaries of some creek systems in protected gully flats.

*Within LHCC Region* – NPWS (2000) have mapped 4565ha of their Alluvial Tall Moist Forest (Unit 5) remaining in the region, which includes this community.

*Examples Within Gosford LGA*

- Willoughby Road, Wamberal
- The Entrance Road, Erina

## Extent:

*Extant* - 20.57 ha

## Relationship to Other Communities:

This vegetation type is most closely related to the Alluvial Paperbark Sedge Forest (Unit E37a) through a sharing of *Melaleuca biconvexa* and other paperbarks, and *Livistona australis*. However, the two can be separated by the presence of *Eucalyptus robusta* and the absence of *Syncarpia glomulifera, Eucalyptus deanei* and *E. saligna* in the canopy of Unit

E37a. The mesic elements in Unit E5a (eg: *Ficus coronata, Acmena smithii, Synoum glandulosum, Cryptocarya microneura*) are also replaced by more swampy ones in Unit E37a. *Gahnia clarkei* is normally only sparsely distributed in this community, while it often forms monospecific dense stands in Unit E37a.

## Equivalent Vegetation Types:

- Benson 1981 (Mangrove Creek): n/a
- Benson & Fallding 1981 (Brisbane Water) n/a
- Benson 1986 (Gosf-Lake Mac): (?) Closed Forest (Unit 8b)
- Clarke & Benson 1986 (Dharug): n/a
- Strom 1986 (Bouddi Peninsula): n/a
- Clarke & Benson 1987 (Mt White/ Mt Olive): n/a
- McRae 1990 (Bouddi Peninsula): n/a
- Binns 1996 (SF MFD): (?) MORf 12 *Syncarpia glomulifera – Acmena smithii – E. acmenoides – E. saligna*
- Payne 1997 (Cockle Bay/ Bouddi): n/a
- Bell 1998 (Popran NP): n/a
- Bell 2002 (Wyong LGA): Alluvial Bluegum-Paperbark Mesic-Palm Forest (Unit 16)

## Significant Species:

- Undescribed species – *none recorded*
- Threatened (TSC Act) – *Melaleuca biconvexa*
- Rare (ROTAP) – *none recorded*

## Community Conservation Status:

*Reserve Representation* - within Gosford, this vegetation type is unknown in reservation.

*TSC Act (1995) Status* - not currently listed.

## Mapping Reliability & Included Units:

*High Resolution Area* – this vegetation type has been mapped from aerial photographic interpretation and ground truthing.

*Low Resolution Area* – possibly included in the REMS mapping of Alluvial Tall Moist Forest (Unit 5).

## Vegetation Structure:

| Stratum | Mean height (m) | Min height (m) | Max height (m) | Mean cover (%) | Sdev | n |
|---|---|---|---|---|---|---|
| Emergent | | | | | | |
| Tallest | 25.83 | 20.00 | 30.00 | 25 | 17.3 | 3 |
| Middle 1 | 17.33 | 10.00 | 20.00 | 32 | 11.5 | 3 |
| Middle 2 | 2.67 | 1.00 | 5.00 | 22 | 28.9 | 3 |
| Middle 3 | | | | | | |
| Lowest | 0.55 | 0.10 | 1.00 | 18 | 2.9 | 3 |

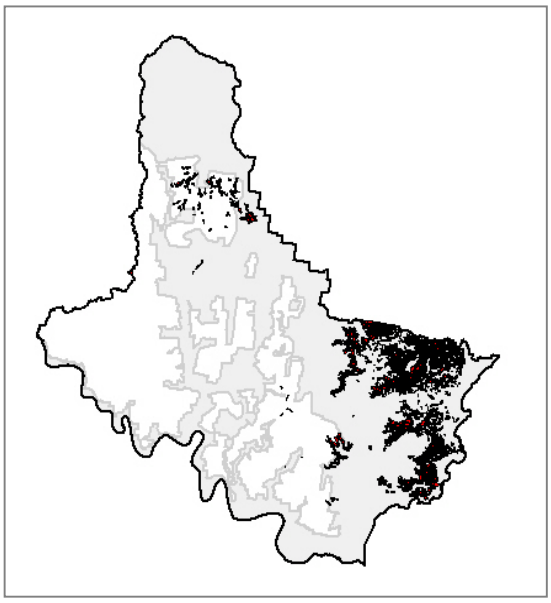
## Key Diagnostic Species [based on 3 plots]:

| Life Form | Species | Community | | All others | | Fidelity |
|---|---|---|---|---|---|---|
| | | c/a | Freq. | c/a | Freq. | |
| Tree | *Acmena smithii* | 2 | 100% | 2 | 14% | positive |
| | *Eucalyptus robusta* | 2 | 100% | 3 | 7% | positive |
| | *Eucalyptus saligna* | 4 | 67% | 3 | 7% | positive |
| | *Eucalyptus saligna X botryoides* | 3 | 33% | 4 | 0% | uninformative |

| | | | | | | |
|---|---|---|---|---|---|---|
| | *Syncarpia glomulifera subsp. glomulifera* | 3 | 33% | 2 | 28% | uninformative |
| | *Cryptocarya microneura* | 3 | 33% | 2 | 5% | uninformative |
| | *Eucalyptus paniculata subsp. paniculata* | 2 | 33% | 3 | 9% | uninformative |
| | *Eucalyptus pilularis* | 2 | 33% | 3 | 14% | uninformative |
| Palm | *Livistona australis* | 1 | 100% | 1 | 15% | uninformative |
| | *Archontophoenix cunninghamiana* | 1 | 33% | 2 | 4% | uninformative |
| Small tree | *Melaleuca styphelioides* | 4 | 100% | 1 | 3% | positive |
| | ***Melaleuca biconvexa* [TSC Vulnerable]** | **3** | **100%** | **4** | **2%** | **positive** |
| | *Acacia schinoides* | 1 | 67% | 2 | 3% | uninformative |
| | *Alphitonia excelsa* | 1 | 67% | 1 | 9% | uninformative |
| | *Glochidion ferdinandii* | 1 | 67% | 2 | 28% | uninformative |
| | *Guioa semiglauca* | 1 | 67% | 1 | 4% | uninformative |
| | *Synoum glandulosum subsp. glandulosum* | 1 | 67% | 1 | 12% | uninformative |
| | *Callistemon salignus* | 2 | 33% | 2 | 3% | uninformative |
| Shrub | *Omalanthus populifolius* | 2 | 67% | 1 | 5% | positive |
| | *Pittosporum revolutum* | 2 | 67% | 1 | 12% | positive |
| | *Pittosporum undulatum* | 1 | 100% | 1 | 13% | uninformative |
| | *Breynia oblongifolia* | 1 | 67% | 1 | 32% | uninformative |
| | *Hymenosporum flavum* | 1 | 33% | 1 | 1% | uninformative |
| | *Senna coronilloides* | 1 | 33% | 1 | 0% | uninformative |
| Herb | *Commelina cyanea* | 3 | 67% | 1 | 7% | positive |
| | *Pseuderanthemum variabile* | 2 | 33% | 2 | 16% | uninformative |
| | *Viola hederacea* | 2 | 33% | 2 | 13% | uninformative |
| Grass | *Entolasia marginata* | 3 | 67% | 2 | 16% | positive |
| | *Oplismenus imbecillis* | 2 | 33% | 2 | 17% | uninformative |
| | *Entolasia stricta* | 0 | 0% | 2 | 54% | negative |
| Graminoid | *Dianella caerulea* | 1 | 100% | 1 | 50% | uninformative |
| | *Dianella longifolia* | 1 | 67% | 1 | 1% | uninformative |
| | *Lomandra longifolia* | 0 | 0% | 2 | 45% | negative |
| Ground fern | *Blechnum cartilagineum* | 1 | 33% | 2 | 16% | uninformative |
| | *Hypolepis muelleri* | 1 | 33% | 2 | 6% | uninformative |
| | *Pteridium esculentum* | 1 | 67% | 2 | 42% | negative |
| Climber | *Parsonsia straminea* | 4 | 100% | 1 | 19% | positive |
| | *Morinda jasminoides* | 3 | 100% | 1 | 14% | positive |
| | *Kennedia rubicunda* | 2 | 67% | 1 | 11% | positive |
| | *Cissus antarctica* | 1 | 100% | 1 | 10% | uninformative |
| | *Geitonoplesium cymosum* | 1 | 100% | 1 | 23% | uninformative |
| | *Stephania japonica var discolor* | 1 | 100% | 1 | 17% | uninformative |
| | *Smilax australis* | 1 | 67% | 2 | 21% | uninformative |
| | *Smilax glyciphylla* | 2 | 33% | 1 | 19% | uninformative |
| | *Dioscorea transversa* | 2 | 33% | 1 | 11% | uninformative |
| | *Cissus hypoglauca* | 1 | 33% | 1 | 18% | uninformative |
| | *Pandorea pandorana subsp. pandorana* | 1 | 33% | 1 | 24% | uninformative |
| | *Ripogonum fawcettianum* | 1 | 33% | 1 | 6% | uninformative |
| Sedge/ Rush | *Carex appressa* | 3 | 67% | 2 | 4% | positive |
| | *Lepidosperma elatius* | 2 | 33% | 1 | 2% | uninformative |
| | *Carex maculata* | 1 | 33% | 1 | 1% | uninformative |

# Coastal Narrabeen Moist Forest — Unit E6a

## Coastal Narrabeen Moist Forest — REMS Unit 6



## General Description:

Coastal Narrabeen Moist Forest is the dominant vegetation type principally within the Erina Hills region to the east of Gosford City, where it intersects with the Coastal Warm Temperate Rainforest (Unit E1a) of the gullies and protected slopes. It is characterised by a tall moist forest dominated by *Eucalyptus saligna, Allocasuarina torulosa* and *Syncarpia glomulifera*, and to a lesser extent *Eucalyptus acmenioides* and *Eucalyptus pilularis*. Understorey vegetation is comprised of a range of mesic shrub species, with ferns prominent in the ground layer. This vegetation type occupies the high rainfall areas on Narrabeen Sandstone, and in many places has been subject to selective logging. NPWS (2000) have also modelled this community within parts of McPherson State Forest, but this requires confirmation.

## Known Floristic/ Structural Variations:

(a) Type variant (mapped as E6ai) – in undisturbed areas, understorey vegetation can be quite complex, with several layers present. Small trees such as *Rhodamnia rubescens* and *Acacia filicifolia* may occur over a dense shrub layer of *Synoum glandulosum*, *Choricarpa leptopetala, Glochidion ferdinandi, Podolobium ilicifolium*, and *Rapanea variabilis*, with a well developed herb layer of species such as *Pseuderanthemum variabile, Pratia purpurascens, Microlaena stipoides* var. *stipoides, Oplismenus imbecillis, Desmodium varians,* and *Viola hederacea*.

(b) Basalt variant (mapped as E6aii) – at Mangrove Mountain, a small amount of vegetation remains associated with a basalt mine. Vegetation here comprises a tall forest moist where *Eucalyptus saligna* and *Eucalyptus pilularis* are prominent, in a landscape otherwise dominated by dry heathy forests and woodlands. Further survey is required to clarify the status of this vegetation type.

(c) Past disturbance variant (mapped as E6aiii) – in a number of locations on ridgetops running off The Ridgeway, partial clearing or fire disturbance to the type variant decades previously has resulted in a modified forest type where a dense sub-canopy of wattle species (*Acacia schinoides, Acacia filicifolia, Acacia decurrens*) has developed, amongst a scattering of canopy trees. On aerial photographs, these areas have a fine textural appearance reminiscent of hanging swamps or wet heaths.

## Distribution:

*Within Gosford LGA* – occurs on slopes and ridges of the coastal ranges on Narrabeen Sandstone geology, principally in the east of the LGA.

*Within LHCC Region* – NPWS (2000) have mapped 28434ha in their Coastal Narrabeen Moist Forest (Unit 6) as remaining in the region.

*Examples Within Gosford LGA*
- The Ridgeway (variants a & c)
- Southern slopes of Katandra Reserve
- basalt quarry, Mangrove Mountain (variant b)

## Extent:

*Extant* - 4168.48 ha

## Relationship to Other Communities:

Coastal Narrabeen Moist Forest can be difficult to separate from Coastal Warm Temperate Rainforest (Unit E1a), with which broad ecotonal zones exist in lower slope and gully positions. In general, the prominence of *Eucalyptus saligna* and *Syncarpia glomulifera* in the canopy of Unit E6a, together with the scarcity of true rainforest tree species (such as *Doryphora sassafras, Ceratopetalum apetalum, Claoxylon australe, Crptocarya microneura*) can distinguish the two. Coastal Wet Gully Forest is essentially more of a rainforest-dominated community, while the Coastal Narrabeen Moist Forest tends to structurally form an open forest. There may also be some confusion between this sub-community and the Coastal Narrabeen Ironbark Forest (Unit E6b) as several understorey species are shared. However, that sub-community supports *Eucalyptus paniculata* subsp*. paniculata, Eucalyptus punctata* and *Eucalyptus acmenioides* prominently in the canopy, which are otherwise rare or absent from Unit E6a.

## Equivalent Vegetation Types:

| | |
|---|---|
| • Benson 1981 (Mangrove Creek): | n/a |
| • Benson & Fallding 1981 (Brisbane Water) | (?) Closed forest to Low closed forest (Unit 1) |
| • Benson 1986 (Gosf-Lake Mac): | Open-Forest (Unit 9h) |
| • Clarke & Benson 1986 (Dharug): | n/a |
| • Strom 1986 (Bouddi Peninsula): | Tall open forest (Unit 4.2) & (?) Open forest (Unit 4.3.3) |
| • Clarke & Benson 1987 (Mt White/ Mt Olive): | n/a |
| • McRae 1990 (Bouddi Peninsula): | n/a |
| • Binns 1996 (SF MFD): | MORf Units 6 to 9 |
| • Payne 1997 (Cockle Bay/ Bouddi): | n/a |
| • Bell 1998 (Popran NP): | n/a |
| • Bell 2002 (Wyong LGA): | Coastal Ranges Moist Layered Forest (Unit 35) |

## Significant Species:

- Undescribed species – *none recorded*
- Threatened (TSC Act) – *Prostanthera askania*
- Rare (ROTAP) – *Callistemon shiressii*

## Community Conservation Status:

*Reserve Representation* - within Gosford, this vegetation type is present in Wambina NR, Bouddi NP, and Katandra Reserve.

*TSC Act (1995) Status* - not currently listed.

## Mapping Reliability & Included Units:

*High Resolution Area* – this vegetation type has been mapped from aerial photographic interpretation and ground truthing. Elements of the Coastal Narrabeen Ironbark Forest (E6b) and Coastal Warm Temperate Rainforest (Unit E1a) may be included in this mapping.

*Low Resolution Area* – included in the REMS mapping of Coastal Narrabeen Moist Forest (Unit 6).

## Vegetation Structure:

| Stratum | Mean height (m) | Min height (m) | Max height (m) | Mean cover (%) | Sdev | n |
|---|---|---|---|---|---|---|
| Emergent | 32.50 | 30.00 | 35.00 | 30 | | 1 |
| Tallest | 26.15 | 18.00 | 35.00 | 38 | 4.9 | 10 |
| Middle 1 | 9.20 | 1.00 | 20.00 | 28 | 18.7 | 10 |
| Middle 2 | 2.75 | 1.00 | 7.00 | 33 | 21.9 | 6 |
| Middle 3 | | | | | | |
| Lowest | 0.77 | 0.10 | 4.00 | 45 | 17.4 | 11 |

## Key Diagnostic Species [based on 11 plots]:

| Life Form | Species | Community | | All others | | Fidelity |
|---|---|---|---|---|---|---|
| | | c/a | Freq. | c/a | Freq. | |
| Tree | *Allocasuarina torulosa* | 2 | 100% | 2 | 25% | positive |
| | *Syncarpia glomulifera subsp. glomulifera* | 3 | 82% | 2 | 27% | positive |
| | *Cryptocarya microneura* | 3 | 73% | 1 | 4% | positive |
| | *Eucalyptus pilularis* | 3 | 73% | 3 | 12% | positive |
| | *Eucalyptus saligna* | 3 | 55% | 3 | 6% | positive |
| | *Angophora floribunda* | 3 | 45% | 2 | 18% | positive |
| | *Eucalyptus acmenoides* | 3 | 45% | 2 | 5% | positive |
| | *Acmena smithii* | 2 | 36% | 2 | 14% | uninformative |
| | *Eucalyptus paniculata subsp. paniculata* | 1 | 27% | 3 | 9% | uninformative |
| | *Angophora costata* | 3 | 18% | 2 | 31% | uninformative |
| | *Claoxylon australe* | 2 | 18% | 1 | 3% | uninformative |
| | *Cryptocarya glaucescens* | 2 | 18% | 2 | 3% | uninformative |
| | *Eucalyptus punctata* | 1 | 18% | 2 | 14% | uninformative |
| | *Melicope micrococca* | 1 | 18% | 1 | 2% | uninformative |
| Palm | *Livistona australis* | 1 | 82% | 1 | 14% | uninformative |
| | *Archontophoenix cunninghamiana* | 1 | 27% | 2 | 4% | uninformative |
| Small tree | *Glochidion ferdinandii* | 2 | 73% | 2 | 27% | positive |
| | *Alphitonia excelsa* | 2 | 55% | 1 | 8% | positive |
| | *Synoum glandulosum subsp. glandulosum* | 2 | 55% | 1 | 11% | positive |
| | *Trochocarpa laurina* | 2 | 55% | 1 | 8% | positive |
| | *Baloghia inophylla* | 1 | 9% | 0 | 0% | unique |
| | *Acacia maidenii* | 1 | 36% | 1 | 4% | uninformative |
| | *Wilkiea huegeliana* | 2 | 27% | 1 | 5% | uninformative |
| | *Guioa semiglauca* | 2 | 18% | 1 | 4% | uninformative |
| | *Diospyros australis* | 2 | 18% | 1 | 2% | uninformative |
| | *Acacia irrorata subsp. irrorata* | 1 | 18% | 1 | 2% | uninformative |
| | *Ficus coronata* | 1 | 18% | 2 | 4% | uninformative |
| | *Tristaniopsis laurina* | 1 | 18% | 2 | 2% | uninformative |
| Shrub | *Breynia oblongifolia* | 2 | 100% | 1 | 31% | positive |
| | *Rhodamnia rubescens* | 2 | 73% | 1 | 7% | positive |
| | *Polyscias sambucifolia* | 2 | 55% | 1 | 17% | positive |
| | *Howittia trilocularis* | 2 | 9% | 0 | 0% | unique |
| | *Maytenus silvestris* | 1 | 73% | 1 | 8% | uninformative |
| | *Clerodendrum tomentosum* | 1 | 64% | 1 | 9% | uninformative |
| | *Notelaea longifolia* | 1 | 64% | 1 | 15% | uninformative |
| | *Persoonia linearis* | 1 | 64% | 1 | 25% | uninformative |
| | *Rapanea variabilis* | 1 | 55% | 1 | 14% | uninformative |
| | *Pittosporum revolutum* | 2 | 36% | 1 | 11% | uninformative |
| | *Phyllanthus gunnii* | 1 | 36% | 1 | 1% | uninformative |
| | *Elaeocarpus reticulatus* | 2 | 27% | 1 | 9% | uninformative |
| | *Eupomatia laurina* | 2 | 27% | 1 | 7% | uninformative |
| | *Pittosporum undulatum* | 2 | 27% | 1 | 14% | uninformative |
| | *Platylobium formosum* | 2 | 27% | 1 | 9% | uninformative |
| | *Psychotria loniceroides* | 1 | 27% | 1 | 3% | uninformative |

| | | | | | | |
|---|---|---|---|---|---|---|
| | *Acacia ulicifolia* | 1 | 18% | 1 | 24% | uninformative |
| | *Astrotricha floccosa* | 3 | 18% | 1 | 5% | uninformative |
| | *Astrotricha latifolia* | 2 | 18% | 1 | 2% | uninformative |
| | *Pittosporum multiflorum* | 2 | 18% | 1 | 5% | uninformative |
| | *Dodonaea triquetra* | 1 | 18% | 1 | 17% | uninformative |
| | *Indigofera australis* | 1 | 18% | 1 | 4% | uninformative |
| | *Leptospermum polygalifolium* | 1 | 18% | 2 | 24% | uninformative |
| | *Ozothamnus diosmifolius* | 1 | 18% | 1 | 4% | uninformative |
| | *Platysace lanceolata* | 1 | 18% | 2 | 16% | uninformative |
| Herb | *Pseuderanthemum variabile* | 2 | 82% | 2 | 15% | positive |
| | *Pratia purpurascens* | 2 | 73% | 2 | 19% | positive |
| | *Schelhammera undulata* | 2 | 55% | 2 | 7% | positive |
| | *Viola hederacea* | 2 | 45% | 2 | 12% | positive |
| | *Senecio amygdalifolius* | 1 | 18% | 0 | 0% | unique |
| | *Senecio diaschides* | 1 | 9% | 0 | 0% | unique |
| | *Senecio vagus* | 2 | 9% | 0 | 0% | unique |
| | *Hydrocotyle laxiflora* | 2 | 27% | 2 | 7% | uninformative |
| | *Hydrocotyle peduncularis* | 2 | 27% | 2 | 3% | uninformative |
| | *Oxalis perennans* | 2 | 27% | 1 | 1% | uninformative |
| | *Dichondra repens* | 2 | 18% | 2 | 6% | uninformative |
| | *Geranium homeanum* | 2 | 18% | 2 | 4% | uninformative |
| | *Correa reflexa* | 1 | 18% | 1 | 5% | uninformative |
| Grass | *Oplismenus imbecillis* | 2 | 91% | 2 | 15% | positive |
| | *Poa affinis* | 2 | 55% | 2 | 5% | positive |
| | *Entolasia marginata* | 3 | 45% | 2 | 16% | positive |
| | *Imperata cylindrica var major* | 2 | 45% | 2 | 29% | positive |
| | *Digitaria ramularis* | 2 | 18% | 2 | 3% | uninformative |
| | *Microlaena stipoides var stipoides* | 2 | 18% | 2 | 10% | uninformative |
| | *Entolasia stricta* | 2 | 18% | 2 | 54% | negative |
| Graminoid | *Lomandra longifolia* | 2 | 91% | 2 | 43% | constant |
| | *Dianella caerulea* | 1 | 91% | 1 | 50% | uninformative |
| Ground fern | *Calochlaena dubia* | 3 | 82% | 3 | 17% | positive |
| | *Blechnum cartilagineum* | 2 | 82% | 2 | 14% | positive |
| | *Doodia aspera* | 2 | 73% | 2 | 11% | positive |
| | *Botrychium australe* | 1 | 9% | 0 | 0% | unique |
| | *Pteridium esculentum* | 2 | 45% | 2 | 42% | constant |
| | *Adiantum hispidulum* | 2 | 36% | 2 | 6% | uninformative |
| | *Polystichum australiense* | 2 | 36% | 2 | 1% | uninformative |
| | *Adiantum aethiopicum* | 2 | 18% | 2 | 12% | uninformative |
| | *Adiantum formosum* | 2 | 18% | 1 | 3% | uninformative |
| Ground orchid | *Pterostylis pedunculata* | 1 | 9% | 1 | 0% | uninformative |
| Epiphytic orchid | *Cymbidium suave* | 1 | 18% | 1 | 5% | uninformative |
| Climber | *Geitonoplesium cymosum* | 2 | 91% | 1 | 22% | positive |
| | *Dioscorea transversa* | 2 | 82% | 1 | 9% | positive |
| | *Smilax australis* | 2 | 82% | 1 | 20% | positive |
| | *Cissus antarctica* | 2 | 64% | 1 | 9% | positive |
| | *Morinka jasminoides* | 2 | 64% | 1 | 14% | positive |
| | *Glycine clandestina* | 2 | 55% | 2 | 22% | positive |
| | *Pandorea pandorana subsp. pandorana* | 1 | 100% | 1 | 22% | uninformative |
| | *Cissus hypoglauca* | 1 | 82% | 1 | 16% | uninformative |
| | *Eustrephus latifolius* | 1 | 82% | 1 | 23% | uninformative |
| | *Hibbertia dentata* | 1 | 73% | 1 | 8% | uninformative |
| | *Rubus moluccanus var trilobus* | 1 | 73% | 1 | 6% | uninformative |
| | *Stephania japonica var discolor* | 1 | 73% | 1 | 16% | uninformative |
| | *Parsonsia straminea* | 1 | 64% | 1 | 18% | uninformative |
| | *Ripogonum fawcettianum* | 1 | 55% | 1 | 5% | uninformative |
| | *Sarcopetalum harveyanum* | 1 | 55% | 1 | 10% | uninformative |
| | *Cayratia clematidea* | 1 | 45% | 1 | 6% | uninformative |
| | *Desmodium varians* | 2 | 36% | 2 | 10% | uninformative |
| | *Kennedia rubicunda* | 2 | 36% | 1 | 11% | uninformative |
| | *Smilax glyciphylla* | 2 | 36% | 1 | 19% | uninformative |
| | *Clematis glycinoides var glycinoides* | 1 | 36% | 1 | 5% | uninformative |
| | *Billardiera scandens* | 2 | 27% | 1 | 29% | uninformative |

| | | | | | | |
|---|---|---|---|---|---|---|
| | *Hibbertia scandens* | 1 | 27% | 1 | 14% | uninformative |
| | *Marsdenia rostrata* | 1 | 27% | 1 | 5% | uninformative |
| | *Tylophora paniculata* | 1 | 27% | 1 | 1% | uninformative |
| | *Cassytha pubescens* | 2 | 18% | 1 | 8% | uninformative |
| | *Melodinus australis* | 2 | 18% | 3 | 0% | uninformative |
| Mistletoe | *Amyema congener subsp. congener* | 1 | 9% | 1 | 0% | uninformative |
| Sedge/ Rush | *Gymnostachys anceps* | 2 | 82% | 2 | 11% | positive |
| | *Carex brunnea* | 3 | 9% | 0 | 0% | unique |
| | *Carex breviculmis* | 1 | 9% | 0 | 0% | unique |
| | *Lepidosperma laterale* | 2 | 27% | 2 | 27% | uninformative |
| | *Gahnia melanocarpa* | 2 | 18% | 1 | 4% | uninformative |

# Coastal Narrabeen Ironbark Forest Unit E6b

## Coastal Narrabeen Moist Forest REMS Unit 6

## General Description:

Coastal Narrabeen Ironbark Forest occurs on the dryer and more exposed ridgetops of the Erina Hills-northern Bouddi Peninsula area, where it merges with the Coastal Narrabeen Moist Forest (Unit E6a). Canopy species here are dominated by *Eucalyptus paniculata* subsp*. paniculata, Eucalyptus punctata, Syncarpia glomulifera* subsp*. glomulifera,* and *Eucalyptus acmenioides*. Understorey components include *Synoum glandulosum, Persoonia linearis, Macrozamia communis, Maytenus silvestris, Breynia oblongifolia, Entolasia stricta, Poa affinis*, and *Hibbertia dentata*. In general, this sub-community can be considered a dryer variant of the Coastal Narrabeen Moist Forest (Unit E6a), which consistently occurs downslope of this sub-community. The invasive *Lantana camara* is becoming problematic in some areas.

## Known Floristic/ Structural Variations:

No variants have been recognised for this sub-community, although local dominance or absence of some canopy species is to be expected, as is increasing prominence of *Eucalyptus saligna* approaching community boundaries. In one location adjacent to Cockrone Lake, *Eucalyptus botryoides* is present in the canopy, attributable to the nearby occurrence of this species on coastal sands.

## Distribution:

*Within Gosford LGA* – occurs on higher ridges of the eastern coastal ranges on Narrabeen Sandstone geology.

*Within LHCC Region* – NPWS (2000) have mapped 28434ha in their Coastal Narrabeen Moist Forest (Unit 6) as remaining in the region.

*Examples Within Gosford LGA*

- Island View Drive, Kincumber
- Taylors Road, Lisarow
- Paroo Road – The Ridgeway

## Extent:

*Extant* - 341.27 ha

## Relationship to Other Communities:

Coastal Narrabeen Ironbark Forest effectively represents a dryer form of the Coastal Narrabeen Moist Forest, with which its distribution is closely linked. However, the presence of *Eucalyptus paniculata* subsp*. paniculata, Eucalyptus punctata* and *Eucalyptus acmenioides* in the canopy of E6b, and the low diversity of mesic understorey shrubs, separates the two. Coastal Narrabeen Ironbark Forest can also be similar to the Holgate Spotted Gum-Ironbark Forest, however the domineering presence of *Corymbia maculata*, and the generally more mesic understorey in that community are diagnostic. The Wagstaff Spotted Gum Forest (Unit E15b) also supports a strong element of *Corymbia maculata*, and understorey composition is floristically simple.

## Equivalent Vegetation Types:

- Benson 1981 (Mangrove Creek): n/a
- Benson & Fallding 1981 (Brisbane Water) n/a
- Benson 1986 (Gosf-Lake Mac): Open-Forest (Unit 9h)
- Clarke & Benson 1986 (Dharug): n/a
- Strom 1986 (Bouddi Peninsula): (?) Open forest (Units 4.3.1, 4.3.4 & 4.3.5) & Low open forest (Unit 4.4.2)
- Clarke & Benson 1987 (Mt White/ Mt Olive): n/a
- McRae 1990 (Bouddi Peninsula): n/a
- Binns 1996 (SF MFD): MORf Units 6 to 9
- Payne 1997 (Cockle Bay/ Bouddi): (?) Open forest on ridges, slopes & gullies (Unit 1.7)
- Bell 1998 (Popran NP): n/a
- Bell 2002 (Wyong LGA): (?) Coastal Ranges Moist Layered Forest (Unit 35)

## Significant Species:

- Undescribed species – *none recorded*
- Threatened (TSC Act) – *none recorded*
- Rare (ROTAP) – *Callistemon shiressii*

## Community Conservation Status:

*Reserve Representation* - within Gosford, this vegetation type is present in Katandra and Kincumber Reserves, but no formal conservation reserves.

*TSC Act (1995) Status* - not currently listed.

## Mapping Reliability & Included Units:

*High Resolution Area* – this vegetation type has been mapped from aerial photographic interpretation and ground truthing. Elements of the Coastal Narrabeen Moist Forest (E6a) may be included in this mapping.

*Low Resolution Area* – not expected to be present, but if so included in the REMS mapping of Coastal Narrabeen Moist Forest (Unit 6).

## Vegetation Structure:

| Stratum | Mean height (m) | Min height (m) | Max height (m) | Mean cover (%) | Sdev | n |
|---|---|---|---|---|---|---|
| Emergent | | | | | | |
| Tallest | 22.87 | 18.00 | 30.00 | 57 | 17.8 | 11 |
| Middle 1 | 5.69 | 5.00 | 14.00 | 67 | 35.1 | 10 |
| Middle 2 | 2.58 | 1.50 | 5.00 | 25 | 17.8 | 4 |
| Middle 3 | | | | | | |
| Lowest | 0.79 | 0.10 | 3.00 | 17 | 19.7 | 14 |

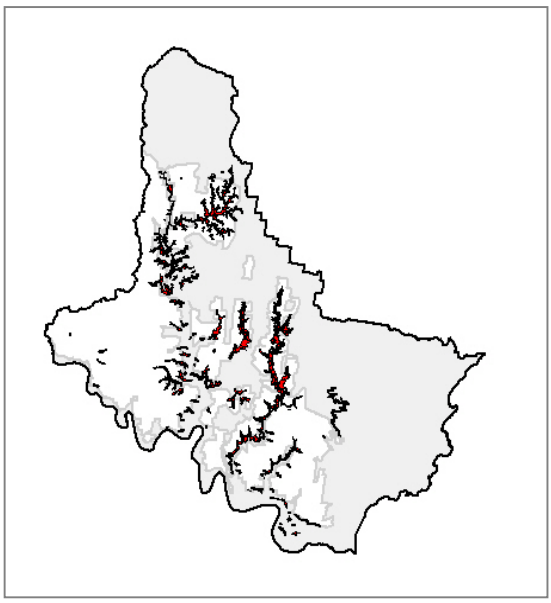
## Key Diagnostic Species [based on 10 plots]:

| Life Form | Species | Community | | All others | | Fidelity |
|---|---|---|---|---|---|---|
| | | c/a | Freq. | c/a | Freq. | |
| Tree | *Eucalyptus paniculata subsp. paniculata* | 2 | 90% | 3 | 7% | positive |
| | *Syncarpia glomulifera subsp. glomulifera* | 2 | 90% | 2 | 27% | positive |
| | *Eucalyptus punctata* | 2 | 80% | 2 | 13% | positive |
| | *Eucalyptus acmenoides* | 2 | 60% | 2 | 4% | positive |
| | *Eucalyptus pilularis* | 2 | 40% | 3 | 13% | positive |
| | *Cryptocarya rigida* | 1 | 20% | 0 | 0% | unique |
| | *Allocasuarina torulosa* | 1 | 30% | 2 | 27% | uninformative |
| | *Angophora floribunda* | 2 | 20% | 2 | 19% | uninformative |
| | *Angophora costata* | 1 | 20% | 2 | 31% | uninformative |
| | *Corymbia gummifera* | 1 | 10% | 2 | 31% | uninformative |
| | *Eucalyptus saligna* | 1 | 10% | 3 | 7% | uninformative |
| | *Eucalyptus umbra* | 1 | 10% | 2 | 10% | uninformative |
| | *Euroschinus falcata var falcata* | 1 | 10% | 1 | 0% | uninformative |
| Palm | *Livistona australis* | 1 | 20% | 1 | 15% | uninformative |
| Small tree | *Glochidion ferdinandii* | 1 | 30% | 2 | 28% | uninformative |
| | *Guioa semiglauca* | 4 | 20% | 1 | 4% | uninformative |
| | *Synoum glandulosum subsp. glandulosum* | 2 | 10% | 1 | 13% | uninformative |
| | *Acacia irrorata subsp. irrorata* | 2 | 10% | 1 | 2% | uninformative |
| | *Acacia schinoides* | 1 | 10% | 2 | 3% | uninformative |
| | *Diospyros australis* | 1 | 10% | 1 | 2% | uninformative |
| | *Trochocarpa laurina* | 1 | 10% | 1 | 9% | uninformative |
| Shrub | *Macrozamia communis* | 2 | 100% | 2 | 9% | positive |
| | *Maytenus silvestris* | 2 | 70% | 1 | 8% | positive |
| | *Dodonaea triquetra* | 5 | 60% | 1 | 16% | positive |
| | *Podolobium ilicifolium* | 3 | 60% | 2 | 11% | positive |
| | *Acacia floribunda* | 2 | 50% | 1 | 4% | positive |
| | *Persoonia linearis* | 2 | 40% | 1 | 25% | positive |
| | *Breynia oblongifolia* | 1 | 70% | 1 | 32% | uninformative |
| | *Notelaea longifolia* | 1 | 70% | 1 | 15% | uninformative |
| | *Pittosporum undulatum* | 1 | 40% | 1 | 13% | uninformative |
| | *Astrotricha floccosa* | 2 | 30% | 1 | 5% | uninformative |
| | *Rapanea variabilis* | 2 | 30% | 1 | 15% | uninformative |
| | *Pittosporum revolutum* | 1 | 30% | 1 | 12% | uninformative |
| | *Polyscias sambucifolia* | 1 | 30% | 1 | 17% | uninformative |
| | *Rhodamnia rubescens* | 1 | 30% | 2 | 8% | uninformative |
| | *Zieria smithii* | 2 | 20% | 1 | 3% | uninformative |
| | *Eupomatia laurina* | 1 | 20% | 1 | 7% | uninformative |
| | *Ozothamnus diosmifolius* | 1 | 20% | 1 | 4% | uninformative |
| | *Persoonia levis* | 2 | 10% | 1 | 34% | uninformative |
| | *Pittosporum multiflorum* | 2 | 10% | 1 | 5% | uninformative |
| | *Platylobium formosum* | 2 | 10% | 2 | 10% | uninformative |
| | *Xanthorrhoea macronema* | 2 | 10% | 2 | 3% | uninformative |
| | *Xanthorrhoea media* | 2 | 10% | 2 | 15% | uninformative |
| | *Acacia falcata* | 1 | 10% | 1 | 1% | uninformative |
| | *Acacia implexa* | 1 | 10% | 1 | 4% | uninformative |
| | *Asterolasia correifolia* | 1 | 10% | 2 | 2% | uninformative |
| | *Canthium coprosmoides* | 1 | 10% | 1 | 1% | uninformative |
| | *Clerodendrum tomentosum* | 1 | 10% | 1 | 11% | uninformative |
| | *Exocarpos cupressiformis* | 1 | 10% | 1 | 5% | uninformative |
| | *Gompholobium huegelii* | 1 | 10% | 1 | 1% | uninformative |
| | *Goodenia ovata* | 1 | 10% | 1 | 3% | uninformative |
| | *Indigofera australis* | 1 | 10% | 1 | 4% | uninformative |
| | *Leucopogon lanceolatus var lanceolatus* | 1 | 10% | 1 | 5% | uninformative |
| Herb | *Pseuderanthemum variabile* | 1 | 70% | 2 | 15% | uninformative |
| | *Correa reflexa* | 1 | 30% | 1 | 5% | uninformative |
| | *Pratia purpurascens* | 2 | 10% | 2 | 21% | uninformative |
| | *Schelhammera undulata* | 2 | 10% | 2 | 8% | uninformative |
| | *Viola hederacea* | 1 | 10% | 2 | 13% | uninformative |
| | *Opercularia aspera* | 1 | 10% | 1 | 5% | uninformative |
| Grass | *Imperata cylindrica var major* | 2 | 40% | 2 | 29% | positive |
| | *Entolasia stricta* | 2 | 70% | 2 | 53% | constant |

| | | | | | | |
|---|---|---|---|---|---|---|
| | *Poa affinis* | 3 | 10% | 2 | 7% | uninformative |
| | *Themeda australis* | 2 | 10% | 2 | 25% | uninformative |
| | *Entolasia marginata* | 2 | 10% | 2 | 17% | uninformative |
| | *Oplismenus aemulus* | 1 | 10% | 2 | 5% | uninformative |
| Graminoid | *Dianella caerulea* | 1 | 60% | 1 | 50% | uninformative |
| | *Lomandra longifolia* | 1 | 60% | 2 | 44% | negative |
| Ground fern | *Doodia aspera* | 2 | 50% | 2 | 12% | positive |
| | *Blechnum cartilagineum* | 2 | 40% | 2 | 16% | positive |
| | *Adiantum aethiopicum* | 2 | 30% | 2 | 12% | uninformative |
| | *Calochlaena dubia* | 2 | 20% | 3 | 18% | uninformative |
| | *Adiantum formosum* | 2 | 10% | 2 | 3% | uninformative |
| | *Pellaea falcata* | 2 | 10% | 2 | 2% | uninformative |
| | *Pellaea paradoxa* | 1 | 10% | 2 | 1% | uninformative |
| | *Polystichum australiense* | 1 | 10% | 2 | 2% | uninformative |
| | *Pteridium esculentum* | 2 | 20% | 2 | 43% | negative |
| Epiphytic orchid | *Dendrobium aemulum* | 1 | 10% | 1 | 0% | uninformative |
| Climber | *Eustrephus latifolius* | 2 | 100% | 1 | 23% | positive |
| | *Smilax australis* | 2 | 70% | 1 | 21% | positive |
| | *Geitonoplesium cymosum* | 2 | 60% | 1 | 23% | positive |
| | *Dioscorea transversa* | 2 | 50% | 1 | 10% | positive |
| | *Stephania japonica var discolor* | 2 | 50% | 1 | 17% | positive |
| | *Cissus antarctica* | 2 | 40% | 1 | 9% | positive |
| | *Pandorea pandorana subsp. pandorana* | 1 | 80% | 1 | 22% | uninformative |
| | *Glycine clandestina* | 1 | 70% | 2 | 21% | uninformative |
| | *Billardiera scandens* | 1 | 40% | 1 | 29% | uninformative |
| | *Hibbertia dentata* | 2 | 30% | 1 | 9% | uninformative |
| | *Morinka jasminoides* | 1 | 30% | 1 | 15% | uninformative |
| | *Smilax glyciphylla* | 5 | 20% | 1 | 19% | uninformative |
| | *Cissus hypoglauca* | 1 | 20% | 1 | 18% | uninformative |
| | *Clematis aristata* | 1 | 20% | 1 | 10% | uninformative |
| | *Desmodium brachypodum* | 1 | 20% | 1 | 0% | uninformative |
| | *Cassytha spp.* | 5 | 10% | 3 | 0% | uninformative |
| | *Aphanopetalum resinosum* | 3 | 10% | 1 | 1% | uninformative |
| | *Kennedia rubicunda* | 2 | 10% | 1 | 11% | uninformative |
| | *Cayratia clematidea* | 1 | 10% | 1 | 7% | uninformative |
| | *Clematis glycinoides var glycinoides* | 1 | 10% | 1 | 6% | uninformative |
| | *Desmodium rhytidophyllum* | 1 | 10% | 2 | 8% | uninformative |
| | *Glycine tabacina* | 1 | 10% | 2 | 2% | uninformative |
| | *Hardenbergia violacea* | 1 | 10% | 1 | 10% | uninformative |
| | *Trophis scandens subsp. scandens* | 1 | 10% | 1 | 2% | uninformative |
| | *Tylophora barbata* | 1 | 10% | 1 | 5% | uninformative |
| Sedge/ Rush | *Gymnostachys anceps* | 1 | 60% | 2 | 12% | uninformative |
| | *Carex maculata* | 2 | 10% | 1 | 1% | uninformative |
| | *Gahnia clarkei* | 1 | 10% | 2 | 11% | uninformative |
| | *Lepidosperma laterale* | 1 | 10% | 2 | 27% | uninformative |

# Sheltered Rough-barked Apple Forest Unit E7

## Sheltered Rough-barked Apple Forest REMS Unit 7



## General Description:

Sheltered Rough-barked Apple Forest is a moist tall open forest occurring on sheltered slopes and gullies on the Narrabeen Sandstone series. It is very closely related to the Sheltered Blue Gum Forest, both of which have been delineated by NPWS (2000) and share a range of common species. The current study could not sufficiently distinguish floristic differences within the Gosford area, but as the main area of occurrence is within the low resolution mapping, the NPWS (2000) classification has been adopted. Sheltered Rough-barked Apple Forest is characterised by the dominance of *Angophora floribunda, Syncarpia glomulifera, Eucalyptus deanei,* and *Allocasuarina torulosa* in the canopy, over a moist understorey with some mesic elements (such as *Breynia oblongifolia, Trochocarpa laurina, Duboisia myporoides*, and a range of ground ferns and herbs). Climbing plants, such as *Cissus hypoglauca* and *Stephania japonica* var. *discolor*, are common.

## Known Floristic/ Structural Variations:

No variants have yet been identified for this community.

## Distribution:

*Within Gosford LGA* – NPWS (2000) have modelled this community as occurring within most Narrabeen gullies and sheltered slopes on the sandstone plateaus.

*Within LHCC Region* – NPWS (2000) have mapped 4898ha of their Sheltered Rough-barked Apple Forest (Unit 7) as remaining in the region.

*Examples Within Gosford LGA*

- Popran Creek
- Mooney Mooney Creek
- Bedlam Creek

## Extent:

*Extant* - 3707.12 ha

## Relationship to Other Communities:

Sheltered Rough-barked Apple Forest is very similar to the Sheltered Blue Gum Forest (Unit E8), and the Coastal Ranges Open Forest (Unit E9). All three of these communities have been delineated by NPWS (2000) as a series of moist sheltered forests found on Narrabeen soils. Floristically, the three share many common canopy and understorey species, and the current classification could not detect discernible differences within the Gosford LGA area. Unit E7 perhaps supports greater proportions of *Angophora floribunda* than either of the other two, but all have *Eucalyptus deanei, Syncarpia glomulifera* and *Allocasuarina torulosa* as prominent components. Understorey components each share a range of mesic shrubs and small trees, ferns and herbs. This community is also superficially similar to the Dharug Footslopes Apple-Redgum Forest (Unit E20), but that community is much drier, with species such as *Eucalyptus tereticornis* and *Eucalyptus paniculata* subsp*. paniculata* in the canopy.

## Equivalent Vegetation Types:

- Benson 1981 (Mangrove Creek): (?)*Eucalyptus deanei-Angophora floribunda* tall open forest
- Benson & Fallding 1981 (Brisbane Water) Open-forest (Unit 2A)
- Benson 1986 (Gosf-Lake Mac): (?) Open-Forest (Unit 9h)
- Clarke & Benson 1986 (Dharug): n/a
- Strom 1986 (Bouddi Peninsula): n/a
- Clarke & Benson 1987 (Mt White/ Mt Olive): n/a
- McRae 1990 (Bouddi Peninsula): n/a
- Binns 1996 (SF MFD): n/a
- Payne 1997 (Cockle Bay/ Bouddi): n/a
- Bell 1998 (Popran NP): Narrabeen Coastal Bluegum Forest (Unit F1)
- Bell 2002 (Wyong LGA): (?) Coastal Ranges Moist Layered Forest (Unit 35)

## Significant Species:

- Undescribed species – *none recorded*
- Threatened (TSC Act) – *none recorded*
- Rare (ROTAP) – *Callistemon shiressii*

## Community Conservation Status:

*Reserve Representation* - within Gosford, this vegetation type is mapped for Brisbane Water, Dharug and Popran NP's.

*TSC Act (1995) Status* - not currently listed.

## Mapping Reliability & Included Units:

*High Resolution Area* – this vegetation type has been mapped from aerial photographic interpretation and ground truthing for a small area immediately west of Brisbane Water near Tascott. It is possible that some areas of Coastal Narrabeen Moist Forest (Unit E6a) may be included in this mapping.

*Low Resolution Area* – NPWS (2000) have modelled this vegetation type for many gullies and sheltered lower slopes throughout the western sandstone plateaus. Inclusion of either of the other moist forests on Narrabeen (Units E8 E9) may have occurred.

## Vegetation Structure:

| Stratum | Mean height (m) | Min height (m) | Max height (m) | Mean cover (%) | Sdev | n |
|---|---|---|---|---|---|---|
| Emergent | | | | | | |
| Tallest | 11.75 | 4.00 | 20.00 | 38 | 17.7 | 2 |
| Middle 1 | 2.75 | 1.00 | 6.00 | 55 | 7.1 | 2 |
| Middle 2 | | | | | | |
| Middle 3 | | | | | | |
| Lowest | 0.50 | 0.01 | 1.00 | 42 | 47.4 | 2 |

## Key Diagnostic Species [based on 7 plots]:

| Life Form | Species | Community | | All others | | Fidelity |
|---|---|---|---|---|---|---|
| | | c/a | Freq. | c/a | Freq. | |
| Tree | *Angophora floribunda* | 3 | 86% | 2 | 18% | positive |
| | *Allocasuarina torulosa* | 3 | 86% | 2 | 26% | positive |
| | *Syncarpia glomulifera subsp. glomulifera* | 2 | 57% | 2 | 28% | positive |
| | *Acmena smithii* | 2 | 43% | 2 | 14% | positive |
| | *Eucalyptus punctata* | 2 | 43% | 2 | 14% | positive |
| | *Eucalyptus deanei* | 3 | 29% | 3 | 6% | uninformative |
| | *Eucalyptus piperita* | 2 | 29% | 2 | 13% | uninformative |
| | *Ficus rubiginosa* | 1 | 29% | 1 | 2% | uninformative |
| | *Ceratopetalum apetalum* | 3 | 14% | 2 | 5% | uninformative |
| | *Schizomeria ovata* | 2 | 14% | 2 | 1% | uninformative |
| | *Angophora costata* | 1 | 14% | 2 | 31% | uninformative |
| | *Eucalyptus globoidea* | 1 | 14% | 2 | 2% | uninformative |
| Palm | *Livistona australis* | 1 | 43% | 1 | 15% | uninformative |
| Small tree | *Glochidion ferdinandii* | 3 | 43% | 2 | 28% | positive |
| | *Acacia elata* | 2 | 43% | 2 | 6% | positive |
| | *Backhousia myrtifolia* | 2 | 43% | 3 | 5% | positive |
| | *Trochocarpa laurina* | 2 | 43% | 1 | 9% | positive |
| | *Synoum glandulosum subsp. glandulosum* | 2 | 29% | 1 | 12% | uninformative |
| | *Acacia decurrens* | 2 | 14% | 1 | 1% | uninformative |
| | *Alphitonia excelsa* | 2 | 14% | 1 | 9% | uninformative |
| | *Acacia prominens* | 2 | 14% | 2 | 6% | uninformative |
| | *Acacia schinoides* | 2 | 14% | 1 | 3% | uninformative |
| | *Acacia maidenii* | 1 | 14% | 1 | 5% | uninformative |
| | *Allocasuarina littoralis* | 1 | 14% | 2 | 14% | uninformative |
| | *Melaleuca styphelioides* | 1 | 14% | 2 | 3% | uninformative |
| | *Stenocarpus salignus* | 1 | 14% | 1 | 2% | uninformative |
| Shrub | *Leptospermum polygalifolium* | 2 | 43% | 2 | 24% | positive |
| | *Rapanea variabilis* | 2 | 43% | 1 | 15% | positive |
| | *Bossiaea lenticularis* | 1 | 14% | 0 | 0% | unique |
| | *Pomaderris discolor* | 1 | 14% | 0 | 0% | unique |
| | *Breynia oblongifolia* | 1 | 100% | 1 | 32% | uninformative |
| | *Acacia filicifolia* | 1 | 43% | 2 | 1% | uninformative |
| | *Persoonia linearis* | 1 | 43% | 1 | 26% | uninformative |
| | *Duboisia myoporoides* | 3 | 29% | 1 | 5% | uninformative |
| | *Elaeocarpus reticulatus* | 2 | 29% | 1 | 9% | uninformative |
| | *Dodonaea triquetra* | 2 | 29% | 1 | 17% | uninformative |
| | *Platysace lanceolata* | 2 | 29% | 1 | 16% | uninformative |
| | *Ozothamnus diosmifolius* | 1 | 29% | 1 | 4% | uninformative |
| | *Persoonia levis* | 1 | 29% | 1 | 34% | uninformative |
| | *Pittosporum revolutum* | 1 | 29% | 1 | 12% | uninformative |
| | *Pomaderris ferruginea* | 1 | 29% | 2 | 2% | uninformative |
| | *Bursaria spinosa subsp. spinosa* | 1 | 29% | 2 | 3% | uninformative |
| | *Clerodendrum tomentosum* | 1 | 29% | 1 | 11% | uninformative |
| | *Doryanthes excelsa* | 1 | 29% | 2 | 12% | uninformative |
| | *Eupomatia laurina* | 1 | 29% | 1 | 7% | uninformative |
| | *Goodenia ovata* | 1 | 29% | 1 | 3% | uninformative |
| | *Leucopogon juniperinus* | 4 | 14% | 1 | 1% | uninformative |
| | *Logania albiflora* | 3 | 14% | 2 | 1% | uninformative |
| | *Notelaea longifolia* | 3 | 14% | 1 | 16% | uninformative |
| | *Persoonia oblongata* | 3 | 14% | 1 | 1% | uninformative |
| | *Pittosporum undulatum* | 3 | 14% | 1 | 14% | uninformative |
| | *Pomaderris intermedia* | 3 | 14% | 1 | 1% | uninformative |
| | *Zieria smithii* | 2 | 14% | 1 | 4% | uninformative |

| | | | | | | |
|---|---|---|---|---|---|---|
| | *Acacia ulicifolia* | 1 | 14% | 1 | 24% | uninformative |
| | *Banksia ericifolia subsp. ericifolia* | 1 | 14% | 3 | 16% | uninformative |
| | *Gompholobium latifolium* | 1 | 14% | 1 | 15% | uninformative |
| | *Hakea salicifolia* | 1 | 14% | 1 | 1% | uninformative |
| | *Lasiopetalum macrophyllum* | 1 | 14% | 4 | 0% | uninformative |
| | *Notelaea venosa* | 1 | 14% | 1 | 1% | uninformative |
| | *Persoonia isophylla* | 1 | 14% | 1 | 14% | uninformative |
| | *Pimelea linifolia* | 1 | 14% | 1 | 20% | uninformative |
| | *Podolobium ilicifolium* | 1 | 14% | 2 | 12% | uninformative |
| | *Polyscias sambucifolia* | 1 | 14% | 1 | 18% | uninformative |
| | *Trema tomentosa var viridis* | 1 | 14% | 1 | 2% | uninformative |
| Sub-shrub | *Hibbertia serpyllifolia* | 2 | 14% | 2 | 0% | uninformative |
| | *Zieria pilosa* | 1 | 14% | 1 | 1% | uninformative |
| Herb | *Pseuderanthemum variabile* | 2 | 71% | 2 | 16% | positive |
| | *Geranium homeanum* | 2 | 43% | 2 | 3% | positive |
| | *Hydrocotyle laxiflora* | 2 | 43% | 2 | 7% | positive |
| | *Pratia purpurascens* | 1 | 86% | 2 | 20% | uninformative |
| | *Viola hederacea* | 1 | 43% | 2 | 13% | uninformative |
| | *Brunoniella australis* | 2 | 29% | 2 | 7% | uninformative |
| | *Oxalis radicosa* | 2 | 29% | 1 | 1% | uninformative |
| | *Gonocarpus teucrioides* | 1 | 29% | 1 | 14% | uninformative |
| | *Dichondra repens* | 4 | 14% | 2 | 6% | uninformative |
| | *Amperea xiphoclada* | 1 | 14% | 1 | 4% | uninformative |
| | *Goodenia heterophylla* | 1 | 14% | 1 | 7% | uninformative |
| | *Hibbertia diffusa* | 1 | 14% | 2 | 4% | uninformative |
| | *Hydrocotyle geraniifolia* | 1 | 14% | 2 | 1% | uninformative |
| | *Hypoxis hygrometrica var hygrometrica* | 1 | 14% | 1 | 1% | uninformative |
| | *Opercularia hispida* | 1 | 14% | 1 | 4% | uninformative |
| | *Plectranthus parviflorus* | 1 | 14% | 1 | 5% | uninformative |
| | *Pomax umbellata* | 1 | 14% | 2 | 16% | uninformative |
| | *Wahlenbergia gracilis* | 1 | 14% | 1 | 2% | uninformative |
| Grass | *Oplismenus imbecillis* | 2 | 71% | 2 | 16% | positive |
| | *Imperata cylindrica var major* | 2 | 57% | 2 | 29% | positive |
| | *Entolasia stricta* | 2 | 57% | 2 | 53% | constant |
| | *Agrostis avenacea var avenacea* | 1 | 43% | 1 | 4% | uninformative |
| | *Themeda australis* | 3 | 29% | 2 | 24% | uninformative |
| | *Entolasia marginata* | 5 | 14% | 2 | 17% | uninformative |
| | *Eragrostis brownii* | 2 | 14% | 1 | 3% | uninformative |
| | *Cynodon dactylon* | 1 | 14% | 1 | 3% | uninformative |
| | *Echinopogon caespitosus var caespitosus* | 1 | 14% | 1 | 4% | uninformative |
| | *Echinopogon ovatus* | 1 | 14% | 2 | 5% | uninformative |
| | *Microlaena stipoides var stipoides* | 1 | 14% | 2 | 11% | uninformative |
| | *Panicum simile* | 1 | 14% | 1 | 5% | uninformative |
| Graminoid | *Dianella caerulea* | 1 | 100% | 1 | 50% | uninformative |
| | *Lomandra longifolia* | 2 | 57% | 2 | 44% | constant |
| Ground fern | *Adiantum aethiopicum* | 2 | 71% | 2 | 11% | positive |
| | *Blechnum cartilagineum* | 2 | 71% | 2 | 15% | positive |
| | *Calochlaena dubia* | 3 | 57% | 3 | 18% | positive |
| | *Doodia aspera* | 2 | 57% | 2 | 12% | positive |
| | *Pteridium esculentum* | 1 | 43% | 2 | 42% | negative |
| | *Polystichum australiense* | 2 | 14% | 2 | 2% | uninformative |
| | *Sticherus flabellatus var flabellatus* | 2 | 14% | 2 | 2% | uninformative |
| | *Cheilanthes sieberi subsp. sieberi* | 2 | 14% | 1 | 7% | uninformative |
| | *Adiantum hispidulum* | 1 | 14% | 2 | 7% | uninformative |
| | *Lindsaea microphylla* | 1 | 14% | 1 | 4% | uninformative |
| Epiphtyic fern | *Asplenium flabellifolium* | 2 | 14% | 1 | 3% | uninformative |
| Epiphytic orchid | *Cymbidium suave* | 1 | 14% | 1 | 5% | uninformative |
| Climber | *Cissus hypoglauca* | 2 | 86% | 1 | 17% | positive |

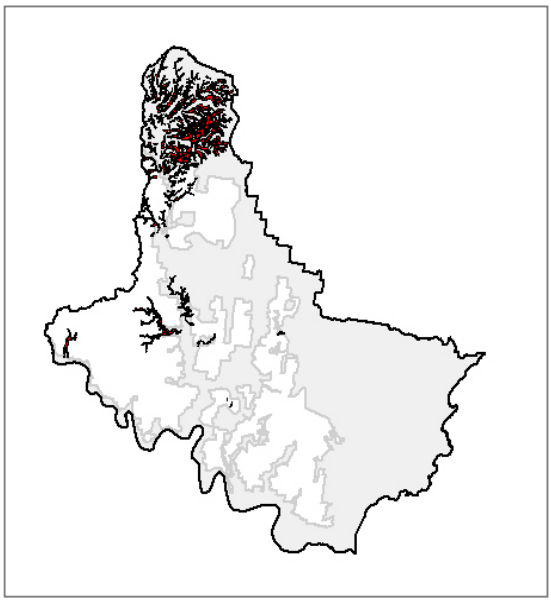
| | | | | | | |
|---|---|---|---|---|---|---|
| | *Smilax australis* | 2 | 86% | 1 | 21% | positive |
| | *Clematis aristata* | 2 | 71% | 1 | 9% | positive |
| | *Desmodium varians* | 2 | 71% | 2 | 10% | positive |
| | *Eustrephus latifolius* | 2 | 71% | 1 | 24% | positive |
| | *Glycine clandestina* | 2 | 71% | 2 | 22% | positive |
| | *Stephania japonica var discolor* | 1 | 100% | 1 | 16% | uninformative |
| | *Hibbertia scandens* | 1 | 71% | 1 | 13% | uninformative |
| | *Geitonoplesium cymosum* | 1 | 57% | 1 | 23% | uninformative |
| | *Pandorea pandorana subsp. pandorana* | 1 | 57% | 1 | 23% | uninformative |
| | *Sarcopetalum harveyanum* | 1 | 57% | 1 | 10% | uninformative |
| | *Tylophora barbata* | 1 | 57% | 1 | 4% | uninformative |
| | *Billardiera scandens* | 1 | 43% | 1 | 29% | uninformative |
| | *Kennedia rubicunda* | 1 | 43% | 1 | 11% | uninformative |
| | *Rubus parvifolius* | 1 | 43% | 1 | 6% | uninformative |
| | *Morinka jasminoides* | 3 | 29% | 1 | 15% | uninformative |
| | *Rubus moluccanus var trilobus* | 2 | 29% | 1 | 7% | uninformative |
| | *Smilax glyciphylla* | 2 | 29% | 1 | 19% | uninformative |
| | *Cayratia clematidea* | 1 | 29% | 1 | 6% | uninformative |
| | *Glycine microphylla* | 1 | 29% | 2 | 3% | uninformative |
| | *Cassytha pubescens* | 1 | 14% | 1 | 8% | uninformative |
| | *Cissus antarctica* | 1 | 14% | 1 | 10% | uninformative |
| | *Glycine tabacina* | 1 | 14% | 2 | 2% | uninformative |
| | *Hibbertia dentata* | 1 | 14% | 1 | 10% | uninformative |
| | *Parsonsia straminea* | 1 | 14% | 1 | 20% | uninformative |
| | *Passiflora herbertiana subsp. herbertiana* | 1 | 14% | 1 | 1% | uninformative |
| Sedge/ Rush | *Cyperus polystachyos* | 1 | 14% | 0 | 0% | unique |
| | *Lepidosperma laterale* | 1 | 43% | 2 | 27% | uninformative |
| | *Gymnostachys anceps* | 1 | 29% | 2 | 13% | uninformative |

# Sheltered Blue Gum Forest

## Sheltered Blue Gum Forest

# Unit E8

## REMS Unit 8



## General Description:

Sheltered Blue Gum Forest is a moist tall open forest occurring on sheltered slopes and gullies on the Narrabeen Sandstone series in the north-west of the LGA. It is very closely related to the Sheltered Rough-barked Apple Forest (Unit E7), both of which have been delineated by NPWS (2000) and share a range of common species. The current study could not sufficiently distinguish floristic differences between the two within the Gosford area, but further work would allow this to be resolved. Sheltered Blue Gum Forest is characterised by the dominance of *Eucalyptus deanei, Syncarpia glomulifera, Angophora floribunda,* and *Allocasuarina torulosa* in the canopy, over a moist understorey with some mesic elements (such as *Backhousia myrtifolia, Indigofera australis, Rapanea variabilis*, and a range of ground ferns and herbs). Climbing plants, such as *Smilax australis* and *Cissus hypoglauca*, are common.

## Known Floristic/ Structural Variations:

No variants have yet been identified for this community. Clarke & Benson (1987) and Bell (1998) describe an open forest on the Mt Olive diatreme in Popran NP, which could be described as a variant of Sheltered Blue Gum Forest. That community is dominated by *Allocasuarina torulosa, Angophora floribunda, Syncarpia glomulifera* and *Eucalyptus globoidea* (rather than blue gums), and supports a ground layer with greater herbs and grasses. Further sampling and analysis may clarify relationships here, although basalt diatremes (and hence potential sampling locations) are rare on the Central Coast.

## Distribution:

*Within Gosford LGA* – this community occurs mainly within the far north-western portion of the LGA, in the upper catchment of Mangrove Creek.

*Within LHCC Region* – NPWS (2000) have mapped 11713ha of their Sheltered Blue Gum Forest (Unit 8) as remaining in the region.

*Examples Within Gosford LGA*

- Upper Mangrove Creek and tributaries

## Extent:

*Extant* - 3336.07 ha

## Relationship to Other Communities:

Sheltered Blue Gum Forest is very similar to the Sheltered Rough-barked Apple Forest (Unit E7), and the Coastal Ranges Open Forest (Unit E9). All three of these communities have been delineated by NPWS (2000) as a series of moist sheltered forests found on Narrabeen soils. Floristically, the three share many common canopy and understorey species, and the current classification could not detect discernible differences within the Gosford LGA area. Unit E8 supports a greater proportion of blue gums than either of the other two, but all have *Angophora floribunda, Syncarpia glomulifera* and *Allocasuarina torulosa* as prominent canopy components. Understorey layers each share a range of mesic shrubs and small trees, ferns and herbs.

## Equivalent Vegetation Types:

- Benson 1981 (Mangrove Creek): *Eucalyptus deanei-Angophora floribunda* tall open forest
- Benson & Fallding 1981 (Brisbane Water) (?) Closed forest to Low closed forest (Unit 1) & Open-forest (Unit 2B)
- Benson 1986 (Gosf-Lake Mac): (?) Open-Forest (Unit 9h)
- Clarke & Benson 1986 (Dharug): Forest (Blue Gum Forest) (Unit B2)
- Strom 1986 (Bouddi Peninsula): n/a
- Clarke & Benson 1987 (Mt White/ Mt Olive): Blue Gum Forest (Unit B5)
- McRae 1990 (Bouddi Peninsula): n/a
- Binns 1996 (SF MFD): MORf Units 6 to 9
- Payne 1997 (Cockle Bay/ Bouddi): n/a
- Bell 1998 (Popran NP): Narrabeen Coastal Bluegum Forest (Unit F1)
- Bell 2002 (Wyong LGA): (?) Coastal Ranges Moist Layered Forest (Unit 35)

## Significant Species:

- Undescribed species – *none recorded*
- Threatened (TSC Act) – *none recorded*
- Rare (ROTAP) – *none recorded*

## Community Conservation Status:

*Reserve Representation* - within Gosford, this vegetation type is not represented in conservation reserve, although a few small polygons are shown for Brisbane Water, Dharug and Popran NP's. These are most likely in error.

*TSC Act (1995) Status* - not currently listed.

## Mapping Reliability & Included Units:

*High Resolution Area* – this vegetation type has not been mapped for the high resolution area.

*Low Resolution Area* – NPWS (2000) have modelled this vegetation type for most gullies and sheltered lower slopes in the upper Mangrove Creek catchment. Inclusion of either of the other moist forests on Narrabeen (Units E7 E9) may have occurred.

## Vegetation Structure:

| Stratum | Mean height (m) | Min height (m) | Max height (m) | Mean cover (%) | Sdev | n |
|---|---|---|---|---|---|---|
| Emergent | | | | | | |
| Tallest | 26.67 | 20.00 | 35.00 | 31 | 8.1 | 9 |
| Middle 1 | 9.78 | 2.00 | 15.00 | 25 | 20.3 | 9 |
| Middle 2 | 2.38 | 1.00 | 8.00 | 36 | 28.0 | 8 |
| Middle 3 | | | | | | |
| Lowest | 0.55 | 0.10 | 1.00 | 40 | 27.2 | 9 |

## Key Diagnostic Species [based on 20 plots]:

| Life Form | Species | Community | | All others | | Fidelity |
|---|---|---|---|---|---|---|
| | | c/a | Freq. | c/a | Freq. | |
| Tree | *Allocasuarina torulosa* | 3 | 90% | 2 | 24% | positive |
| | *Syncarpia glomulifera subsp. glomulifera* | 3 | 80% | 2 | 26% | positive |
| | *Angophora floribunda* | 2 | 75% | 2 | 16% | positive |
| | *Eucalyptus deanei* | 3 | 70% | 2 | 3% | positive |
| | *Eucalyptus amplifolia subsp. amplifolia* | 1 | 5% | 0 | 0% | unique |
| | *Eucalyptus saligna* | 3 | 30% | 3 | 6% | uninformative |
| | *Acmena smithii* | 1 | 30% | 2 | 13% | uninformative |
| | *Eucalyptus paniculata subsp. paniculata* | 3 | 20% | 3 | 8% | uninformative |
| | *Eucalyptus pilularis* | 3 | 20% | 3 | 14% | uninformative |
| | *Eucalyptus piperita* | 2 | 20% | 2 | 13% | uninformative |
| | *Eucalyptus agglomerata* | 3 | 15% | 2 | 1% | uninformative |
| | *Melicope micrococca* | 1 | 15% | 1 | 2% | uninformative |
| | *Ficus rubiginosa* | 4 | 10% | 1 | 2% | uninformative |
| | *Claoxylon australe* | 2 | 10% | 1 | 3% | uninformative |
| Palm | *Livistona australis* | 1 | 5% | 1 | 16% | uninformative |
| Small tree | *Acacia mearnsii* | 4 | 5% | 0 | 0% | unique |
| | *Planchonella australis* | 1 | 5% | 0 | 0% | unique |
| | *Trochocarpa laurina* | 1 | 40% | 1 | 8% | uninformative |
| | *Glochidion ferdinandii* | 1 | 35% | 2 | 28% | uninformative |
| | *Acacia prominens* | 3 | 30% | 2 | 5% | uninformative |
| | *Acacia elata* | 2 | 30% | 2 | 5% | uninformative |
| | *Backhousia myrtifolia* | 2 | 25% | 3 | 4% | uninformative |
| | *Synoum glandulosum subsp. glandulosum* | 1 | 25% | 1 | 12% | uninformative |
| | *Acacia parramattensis* | 2 | 20% | 1 | 3% | uninformative |
| | *Acacia parvipinnula* | 2 | 15% | 1 | 0% | uninformative |
| | *Acacia schinoides* | 2 | 15% | 1 | 3% | uninformative |
| | *Acacia maidenii* | 2 | 10% | 1 | 5% | uninformative |
| | *Alphitonia excelsa* | 2 | 10% | 1 | 9% | uninformative |
| | *Wilkiea huegeliana* | 2 | 10% | 1 | 5% | uninformative |
| Shrub | *Podolobium ilicifolium* | 2 | 40% | 2 | 10% | positive |
| | *Babingtonia pluriflora* | 4 | 5% | 0 | 0% | unique |
| | *Dodonaea viscosa* | 4 | 5% | 0 | 0% | unique |
| | *Seringia arborescens* | 1 | 10% | 0 | 0% | unique |
| | *Persoonia linearis* | 1 | 65% | 1 | 24% | uninformative |
| | *Breynia oblongifolia* | 1 | 60% | 1 | 31% | uninformative |
| | *Rapanea variabilis* | 1 | 50% | 1 | 14% | uninformative |
| | *Elaeocarpus reticulatus* | 1 | 40% | 1 | 8% | uninformative |
| | *Rhodamnia rubescens* | 3 | 30% | 1 | 7% | uninformative |
| | *Platysace lanceolata* | 1 | 30% | 2 | 15% | uninformative |
| | *Polyscias sambucifolia* | 1 | 30% | 1 | 17% | uninformative |
| | *Duboisia myoporoides* | 2 | 25% | 1 | 5% | uninformative |
| | *Astrotricha floccosa* | 1 | 25% | 1 | 4% | uninformative |
| | *Clerodendrum tomentosum* | 1 | 25% | 1 | 10% | uninformative |
| | *Dodonaea triquetra* | 1 | 25% | 1 | 16% | uninformative |
| | *Notelaea longifolia* | 1 | 25% | 1 | 15% | uninformative |
| | *Indigofera australis* | 2 | 20% | 1 | 4% | uninformative |
| | *Leucopogon lanceolatus var lanceolatus* | 2 | 20% | 1 | 4% | uninformative |
| | *Goodenia ovata* | 1 | 20% | 1 | 2% | uninformative |
| | *Maytenus silvestris* | 1 | 20% | 1 | 9% | uninformative |
| | *Ozothamnus diosmifolius* | 1 | 20% | 1 | 4% | uninformative |
| | *Pittosporum revolutum* | 1 | 20% | 1 | 12% | uninformative |
| | *Psychotria loniceroides* | 1 | 20% | 1 | 3% | uninformative |
| | *Asterolasia correifolia* | 2 | 15% | 1 | 1% | uninformative |
| | *Astrotricha latifolia* | 2 | 15% | 1 | 2% | uninformative |
| | *Doryanthes excelsa* | 1 | 15% | 2 | 12% | uninformative |
| | *Gompholobium latifolium* | 1 | 15% | 1 | 15% | uninformative |
| | *Acacia implexa* | 1 | 15% | 1 | 3% | uninformative |
| | *Jacksonia scoparia* | 1 | 15% | 2 | 3% | uninformative |
| | *Pittosporum undulatum* | 1 | 15% | 1 | 14% | uninformative |
| | *Pultenaea flexilis* | 1 | 15% | 1 | 11% | uninformative |

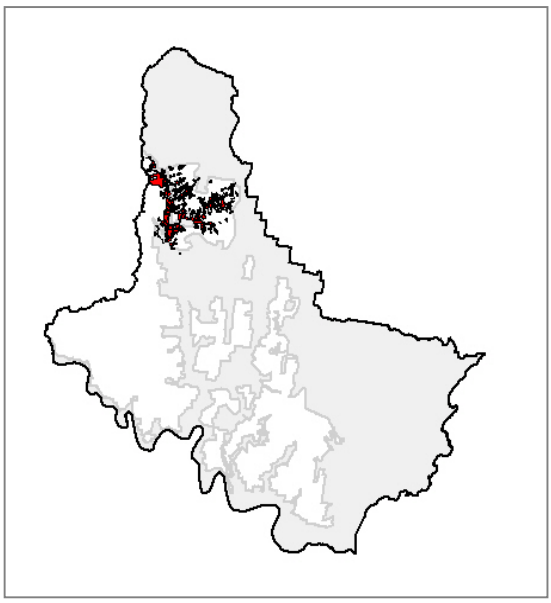
| | | | | | | |
|---|---|---|---|---|---|---|
| | *Trema tomentosa var viridis* | 1 | 15% | 1 | 2% | uninformative |
| | *Zieria smithii* | 1 | 15% | 2 | 3% | uninformative |
| | *Canthium coprosmoides* | 5 | 10% | 1 | 1% | uninformative |
| | *Lasiopetalum macrophyllum* | 4 | 10% | 1 | 0% | uninformative |
| | *Bursaria spinosa subsp. spinosa* | 2 | 10% | 2 | 3% | uninformative |
| | *Phyllanthus gunnii* | 2 | 10% | 1 | 1% | uninformative |
| | *Daviesia ulicifolia* | 1 | 10% | 1 | 1% | uninformative |
| | *Eupomatia laurina* | 1 | 10% | 1 | 7% | uninformative |
| | *Notelaea venosa* | 1 | 10% | 1 | 0% | uninformative |
| Sub-shrub | *Urtica incisa* | 1 | 5% | 0 | 0% | unique |
| | *Solanum prinophyllum* | 1 | 35% | 1 | 1% | uninformative |
| | *Zieria pilosa* | 4 | 10% | 1 | 1% | uninformative |
| | *Solanum campanulatum* | 2 | 10% | 1 | 0% | uninformative |
| Herb | *Pseuderanthemum variabile* | 2 | 75% | 2 | 14% | positive |
| | *Pratia purpurascens* | 2 | 50% | 2 | 19% | positive |
| | *Hydrocotyle laxiflora* | 2 | 45% | 2 | 6% | positive |
| | *Sigesbeckia orientalis subsp. orientalis* | 2 | 40% | 1 | 3% | positive |
| | *Libertia paniculata* | 2 | 15% | 0 | 0% | unique |
| | *Senecio quadridentatus* | 2 | 5% | 0 | 0% | unique |
| | *Stellaria flaccida* | 2 | 5% | 0 | 0% | unique |
| | *Geranium potentilloides* | 2 | 5% | 0 | 0% | unique |
| | *Hypericum japonicum* | 2 | 5% | 0 | 0% | unique |
| | *Oxalis exilis* | 2 | 5% | 0 | 0% | unique |
| | *Arthropodium species B* | 1 | 10% | 0 | 0% | unique |
| | *Convolvulus erubescens* | 1 | 5% | 0 | 0% | unique |
| | *Erodium crinitum* | 1 | 5% | 0 | 0% | unique |
| | *Galium ciliare* | 1 | 5% | 0 | 0% | unique |
| | *Oxalis chnoodes* | 1 | 5% | 0 | 0% | unique |
| | *Oxalis rubens* | 1 | 5% | 0 | 0% | unique |
| | *Plectranthus parviflorus* | 1 | 45% | 1 | 3% | uninformative |
| | *Viola hederacea* | 2 | 35% | 2 | 12% | uninformative |
| | *Galium binifolium* | 2 | 35% | 2 | 2% | uninformative |
| | *Geranium homeanum* | 1 | 35% | 2 | 2% | uninformative |
| | *Poranthera microphylla* | 1 | 35% | 2 | 4% | uninformative |
| | *Lagenifera stipitata* | 2 | 30% | 2 | 2% | uninformative |
| | *Schelhammera undulata* | 2 | 30% | 2 | 7% | uninformative |
| | *Pomax umbellata* | 1 | 25% | 2 | 16% | uninformative |
| | *Veronica plebeia* | 1 | 25% | 1 | 2% | uninformative |
| | *Senecio linearifolius* | 2 | 20% | 1 | 0% | uninformative |
| | *Hydrocotyle peduncularis* | 2 | 20% | 2 | 3% | uninformative |
| | *Opercularia aspera* | 1 | 20% | 1 | 4% | uninformative |
| | *Commelina cyanea* | 2 | 15% | 1 | 7% | uninformative |
| | *Dichondra repens* | 2 | 15% | 2 | 6% | uninformative |
| | *Arthropodium milleflorum* | 2 | 15% | 1 | 2% | uninformative |
| | *Brunoniella australis* | 1 | 15% | 2 | 6% | uninformative |
| | *Opercularia hispida* | 1 | 15% | 1 | 3% | uninformative |
| | *Galium propinquum* | 2 | 10% | 1 | 1% | uninformative |
| | *Goodenia heterophylla* | 2 | 10% | 1 | 6% | uninformative |
| | *Vernonia cinerea var cinerea* | 2 | 10% | 1 | 2% | uninformative |
| | *Crassula sieberiana* | 1 | 10% | 1 | 0% | uninformative |
| | *Gonocarpus tetragynus* | 1 | 10% | 2 | 5% | uninformative |
| | *Hypericum gramineum* | 1 | 10% | 1 | 2% | uninformative |
| | *Oxalis perennans* | 1 | 10% | 2 | 1% | uninformative |
| | *Phyllanthus hirtellus* | 1 | 10% | 2 | 19% | uninformative |
| | *Plantago debilis* | 1 | 10% | 1 | 0% | uninformative |
| | *Wahlenbergia gracilis* | 1 | 10% | 1 | 2% | uninformative |
| | *Wahlenbergia stricta subsp. stricta* | 1 | 10% | 1 | 0% | uninformative |
| Grass | *Imperata cylindrica var major* | 2 | 65% | 2 | 27% | positive |
| | *Microlaena stipoides var stipoides* | 2 | 60% | 2 | 8% | positive |
| | *Oplismenus imbecillis* | 2 | 55% | 2 | 15% | positive |
| | *Poa affinis* | 2 | 45% | 2 | 5% | positive |
| | *Entolasia marginata* | 2 | 40% | 2 | 15% | positive |
| | *Austrostipa scabra* | 2 | 5% | 0 | 0% | unique |

| | | | | | | |
|---|---|---|---|---|---|---|
| | *Austrodanthonia racemosa var racemosa* | 1 | 5% | 0 | 0% | unique |
| | *Dichelachne rara* | 1 | 5% | 0 | 0% | unique |
| | *Oplismenus aemulus* | 2 | 35% | 1 | 3% | uninformative |
| | *Echinopogon caespitosus var caespitosus* | 1 | 35% | 1 | 2% | uninformative |
| | *Themeda australis* | 1 | 35% | 2 | 24% | uninformative |
| | *Echinopogon ovatus* | 2 | 20% | 2 | 4% | uninformative |
| | *Digitaria parviflora* | 1 | 15% | 1 | 4% | uninformative |
| | *Digitaria ramularis* | 2 | 10% | 2 | 3% | uninformative |
| | *Entolasia stricta* | 2 | 20% | 2 | 55% | negative |
| Graminoid | *Dianella caerulea* | 1 | 85% | 1 | 49% | uninformative |
| | *Lomandra longifolia* | 1 | 85% | 2 | 43% | negative |
| Ground fern | *Calochlaena dubia* | 3 | 65% | 3 | 16% | positive |
| | *Adiantum aethiopicum* | 2 | 65% | 2 | 10% | positive |
| | *Doodia aspera* | 2 | 65% | 2 | 10% | positive |
| | *Blechnum cartilagineum* | 2 | 50% | 2 | 14% | positive |
| | *Pteridium esculentum* | 2 | 75% | 2 | 41% | constant |
| | *Adiantum hispidulum* | 1 | 35% | 2 | 5% | uninformative |
| | *Cheilanthes sieberi subsp. sieberi* | 1 | 25% | 2 | 6% | uninformative |
| | *Pellaea falcata* | 2 | 15% | 2 | 1% | uninformative |
| | *Lindsaea microphylla* | 1 | 15% | 1 | 3% | uninformative |
| | *Polystichum australiense* | 2 | 10% | 2 | 2% | uninformative |
| Epiphtyic fern | *Arthropteris tenella* | 1 | 5% | 0 | 0% | unique |
| | *Asplenium flabellifolium* | 1 | 25% | 2 | 2% | uninformative |
| | *Hymenophyllum cupressiforme* | 2 | 15% | 2 | 0% | uninformative |
| | *Platycerium bifurcatum* | 1 | 5% | 1 | 1% | uninformative |
| Ground orchid | *Corybas fimbriatus* | 2 | 10% | 0 | 0% | unique |
| | *Pterostylis curta* | 2 | 10% | 0 | 0% | unique |
| | *Pterostylis nutans* | 2 | 10% | 0 | 0% | unique |
| | *Acianthus spp.* | 3 | 5% | 0 | 0% | unique |
| | *Pterostylis grandiflora* | 1 | 5% | 0 | 0% | unique |
| Epiphytic orchid | *Cymbidium suave* | 1 | 20% | 1 | 4% | uninformative |
| | *Dendrobium speciosum* | 1 | 15% | 1 | 1% | uninformative |
| Climber | *Hibbertia scandens* | 2 | 80% | 1 | 11% | positive |
| | *Cissus hypoglauca* | 2 | 65% | 1 | 15% | positive |
| | *Desmodium varians* | 2 | 65% | 2 | 8% | positive |
| | *Glycine clandestina* | 2 | 60% | 2 | 21% | positive |
| | *Smilax australis* | 2 | 60% | 1 | 20% | positive |
| | *Clematis glycinoides var glycinoides* | 2 | 45% | 1 | 4% | positive |
| | *Pandorea pandorana subsp. pandorana* | 2 | 45% | 1 | 23% | positive |
| | *Rubus parvifolius* | 2 | 45% | 1 | 4% | positive |
| | *Hibbertia dentata* | 2 | 40% | 1 | 8% | positive |
| | *Comesperma volubile* | 1 | 5% | 0 | 0% | unique |
| | *Piper novae-hollandiae* | 1 | 5% | 0 | 0% | unique |
| | *Geitonoplesium cymosum* | 1 | 55% | 1 | 22% | uninformative |
| | *Eustrephus latifolius* | 1 | 50% | 1 | 23% | uninformative |
| | *Kennedia rubicunda* | 1 | 50% | 1 | 9% | uninformative |
| | *Sarcopetalum harveyanum* | 1 | 50% | 1 | 9% | uninformative |
| | *Billardiera scandens* | 1 | 45% | 1 | 28% | uninformative |
| | *Stephania japonica var discolor* | 2 | 35% | 1 | 16% | uninformative |
| | *Morinka jasminoides* | 1 | 35% | 1 | 14% | uninformative |
| | *Cayratia clematidea* | 2 | 30% | 1 | 5% | uninformative |
| | *Cissus antarctica* | 1 | 30% | 1 | 9% | uninformative |
| | *Desmodium rhytidophyllum* | 2 | 25% | 2 | 7% | uninformative |
| | *Glycine microphylla* | 2 | 25% | 1 | 2% | uninformative |
| | *Clematis aristata* | 1 | 25% | 1 | 9% | uninformative |
| | *Smilax glyciphylla* | 1 | 25% | 1 | 19% | uninformative |
| | *Hardenbergia violacea* | 1 | 20% | 1 | 10% | uninformative |
| | *Rubus moluccanus var trilobus* | 1 | 20% | 1 | 7% | uninformative |
| | *Rubus rosifolius* | 1 | 20% | 1 | 1% | uninformative |
| | *Passiflora herbertiana subsp. herbertiana* | 1 | 15% | 1 | 0% | uninformative |
| | *Tylophora paniculata* | 1 | 15% | 1 | 1% | uninformative |
| | *Parsonsia straminea* | 2 | 10% | 1 | 20% | uninformative |
| | *Tylophora barbata* | 1 | 10% | 1 | 4% | uninformative |

| | | | | | | |
|---|---|---|---|---|---|---|
| Sedge/ Rush | *Cyperus imbecillis* | 2 | 10% | 0 | 0% | unique |
| | *Luzula flaccida* | 1 | 5% | 0 | 0% | unique |
| | *Lepidosperma laterale* | 2 | 35% | 2 | 27% | uninformative |
| | *Gahnia melanocarpa* | 1 | 25% | 1 | 4% | uninformative |
| | *Gymnostachys anceps* | 1 | 25% | 2 | 12% | uninformative |

# Coastal Ranges Open Forest
## Coastal Ranges Open Forest

# Unit E9
## REMS Unit 9



## General Description:
Coastal Ranges Open Forest is a tall open forest occurring on sheltered slopes and gullies on the Narrabeen Sandstone series. It is very closely related to the Sheltered Rough-barked Apple Forest (Unit E7), and the Sheltered Blue Gum Forest (Unit E8), both of which have been delineated by NPWS (2000) and share a range of common species. The current study could not sufficiently distinguish floristic differences within the Gosford area, but as the main area of occurrence is within the low resolution area of the LGA, the NPWS (2000) classification has been adopted. Coastal Ranges Open Forest is characterised by the dominance of *Syncarpia glomulifera, Eucalyptus pilularis, Angophora floribunda, Eucalyptus deanei, Eucalyptus saligna,* and *Allocasuarina torulosa* in the canopy, over a dry moist understorey with some slight mesic elements (such as *Psychotria loniceroides, Maytenus silvestris*, and a range of ground ferns and herbs). Of the three (E7, E8 & E9), this community is perhaps the driest.

## Known Floristic/ Structural Variations:
No variants have yet been identified for this community.

## Distribution:
*Within Gosford LGA* – NPWS (2000) have modelled this community as occurring mainly within the Mangrove Dam portion of the LGA, in McPherson SF.

*Within LHCC Region* – NPWS (2000) have mapped 18528ha of their Coastal Ranges Open Forest (Unit 9) as remaining in the region.

*Examples Within Gosford LGA*
- Mangrove Creek

## Extent:
*Extant* - 1340.83 ha

## Relationship to Other Communities:
Coastal Ranges Open Forest is very similar to the Sheltered Rough-barked Apple Forest (Unit E7), and the Sheltered Blue Gum Forest (Unit E8). All three of these communities have been delineated by NPWS (2000) as a series of moist sheltered forests found on Narrabeen soils. Floristically, the three share many common canopy and understorey

species, and the current classification could not detect discernible differences within the Gosford LGA area. Unit E9 generally supports a greater component of dryer shrubs and grasses (eg: *Podolobium ilicifolium, Entolasia stricta*) than either of the other two, but all have *Angophora floribunda, Syncarpia glomulifera* and *Allocasuarina torulosa* as prominent canopy components. Understorey layers each share a range of mesic shrubs and small trees, ferns and herbs.

## Equivalent Vegetation Types:

- Benson 1981 (Mangrove Creek): (?) *Eucalyptus deanei-Angophora floribunda* tall open forest
- Benson & Fallding 1981 (Brisbane Water) n/a
- Benson 1986 (Gosf-Lake Mac): (?) Open-Forest (Unit 9h)
- Clarke & Benson 1986 (Dharug): n/a
- Strom 1986 (Bouddi Peninsula): n/a
- Clarke & Benson 1987 (Mt White/ Mt Olive): n/a
- McRae 1990 (Bouddi Peninsula): n/a
- Binns 1996 (SF MFD): MORf Units 6 to 9
- Payne 1997 (Cockle Bay/ Bouddi): n/a
- Bell 1998 (Popran NP): (?) Narrabeen Coastal Bluegum Forest (Unit F1)
- Bell 2002 (Wyong LGA): Coastal Ranges Moist Layered Forest (Unit 35)

## Significant Species:

- Undescribed species – *none recorded*
- Threatened (TSC Act) – *none recorded*
- Rare (ROTAP) – *none recorded*

## Community Conservation Status:

*Reserve Representation* - within Gosford, this vegetation type has not been modelled for any conservation reserve.

*TSC Act (1995) Status* - not currently listed.

## Mapping Reliability & Included Units:

*High Resolution Area* – this vegetation type has not been mapped for the high resolution area.

*Low Resolution Area* – NPWS (2000) have modelled this vegetation type for many gullies and sheltered lower slopes in the middle Mangrove Creek catchment. Inclusion of either of the other moist forests on Narrabeen (Units E7 E8) may have occurred.

## Vegetation Structure:

No structural data is yet available for this community, as clear distinctions between this and related communities could not be found.

## Key Diagnostic Species [no plots available]:

Diagnostic species have not been generated for this community due to a lack of suitable floristic data, and uncertainty between the composition of this and related communities. As a guide, the following species list has been extracted from the regional REMS profiles (NPWS 2000), but it has not been possible to rationalise this list with communities delineated during the present study.

| Life Form | Species | Community | | All others | | Fidelity |
|---|---|---|---|---|---|---|
| | | c/a | Freq. | c/a | Freq. | |
| Tree | *Syncarpia glomulifera* | - | - | - | - | - |
| | *Eucalyptus pilularis* | - | - | - | - | - |

| | | | | | | |
|---|---|---|---|---|---|---|
| | *Angophora floribunda* | - | - | - | - | - |
| | *Eucalyptus deanei* | - | - | - | - | - |
| | *Eucalyptus saligna* | - | - | - | - | - |
| | *Eucalyptus acmenioides* | - | - | - | - | - |
| | *Eucalyptus umbra* | - | - | - | - | - |
| | *Eucalyptus microcorys* | - | - | - | - | - |
| | *Eucalyptus paniculata subsp. paniculata* | - | - | - | - | - |
| | *Corymbia maculata* | - | - | - | - | - |
| | *Eucalyptus punctata* | - | - | - | - | - |
| | *Eucalyptus siderophloia* | - | - | - | - | - |
| Small tree | *Allocasuarina torulosa* | - | - | - | - | - |
| | *Acacia maidenii* | - | - | - | - | - |
| Shrub | *Persoonia linearis* | - | - | - | - | - |
| | *Podolobium ilicifolium* | - | - | - | - | - |
| | *Breynia oblongifolia* | - | - | - | - | - |
| | *Psychotria loniceroides* | - | - | - | - | - |
| | *Maytenus silvestris* | - | - | - | - | - |
| Herbs | *Pseuderanthemum variabile* | - | - | - | - | - |
| | *Pratia purpurascens* | - | - | - | - | - |
| | *Desmodium varians* | - | - | - | - | - |
| Grass | *Imperata cylindrica var. major* | - | - | - | - | - |
| | *Oplismenus imbecillis* | - | - | - | - | - |
| | *Microlaena stipoides var. stipoides* | - | - | - | - | - |
| | *Entolasia stricta* | - | - | - | - | - |
| | *Poa labillardieri* | - | - | - | - | - |
| Graminoid | *Dianella caerulea* | - | - | - | - | - |
| | *Lomandra longifolia* | - | - | - | - | - |
| Ground fern | *Pteridium esculentum* | - | - | - | - | - |
| | *Calochlaena dubia* | - | - | - | - | - |
| Climber | *Kennedia rubicunda* | - | - | - | - | - |
| | *Hibbertia scandens* | - | - | - | - | - |
| | *Hibbertia dentata* | - | - | - | - | - |

# Wollombi Redgum-River Oak Woodland Unit E14

## Wollombi Redgum-River Oak Woodland REMS Unit 14

## General Description:

Wollombi Redgum-River Oak Woodland is modelled and reported by NPWS (2000) as occurring within Dubbo Gully, south of Mangrove Creek, and also near Wisemans Ferry. The occurrence of this community in the modelled locations has not been confirmed by the current study, although vegetation in the Dubbo Gully location has been largely re-tagged to disturbed (Xr). NPWS (2000) state that this community is characterised by stands of River Oak (*Casuarina cunninghamiana* subsp*. cunninghamiana*) along high energy banks, but is otherwise dominated by *Angophora floribunda*, with *Eucalyptus tereticornis, Eucalyptus amplifolia* and *Eucalyptus eugenioides* also present. Closer to the Hawkesbury River, *Eucalyptus deanei* becomes more important. The dense ground layer is dominated by *Oplismenus aemulus, Microlaena stipoides var. stipoides, Entolasia marginata* and *Echinopogon ovatus*.

## Known Floristic/ Structural Variations:

No variants have yet been identified for this community.

## Distribution:

*Within Gosford LGA* – A few small polygons of this type remain within the low resolution mapping in Dharug NP, and require ground truthing.

*Within LHCC Region* – NPWS (2000) have mapped 622ha of their Wollombi Redgum-River Oak Woodland (Unit 14) as remaining in the region.

*Examples Within Gosford LGA*

- Dubbo Gully

## Extent:

*Extant* - 1.11 ha, based on NPWS (2000) modelling.

## Relationship to Other Communities:

Wollombi Redgum-River Oak Woodland, as described by NPWS (2000), appears to be a dryer variant of the other sheltered gully forests where *Angophora floribunda* is important. It is superficially similar to the Dharug Footslopes Apple-Redgum Forest (Unit E20), but that community is much drier, with species such as *Eucalyptus tereticornis* and *Eucalyptus paniculata* subsp*. paniculata* in the canopy, while *Casuarina cunninghamia* subsp. *cunninghamia* and

*Eucalyptus amplifolia* are absent. Further work is required to firstly confirm the occurrence of these communities in the LGA, and then to more clearly define their differences.

## Equivalent Vegetation Types:

- Benson 1981 (Mangrove Creek): n/a
- Benson & Fallding 1981 (Brisbane Water) n/a
- Benson 1986 (Gosf-Lake Mac): (?) Open-Forest (Unit 9h)
- Clarke & Benson 1986 (Dharug): n/a
- Strom 1986 (Bouddi Peninsula): n/a
- Clarke & Benson 1987 (Mt White/ Mt Olive): n/a
- McRae 1990 (Bouddi Peninsula): n/a
- Binns 1996 (SF MFD): n/a
- Payne 1997 (Cockle Bay/ Bouddi): n/a
- Bell 1998 (Popran NP): n/a
- Bell 2002 (Wyong LGA): n/a

## Significant Species:

- Undescribed species – *none recorded*
- Threatened (TSC Act) – *none recorded*
- Rare (ROTAP) – *none recorded*

## Community Conservation Status:

*Reserve Representation* - within Gosford, this vegetation type has not been modelled for any conservation reserve.

*TSC Act (1995) Status* - NPWS (2000) have suggested that this community aligns well with the *Sydney Coastal River-Flat Forest* EEC, which is gazetted as occurring in or near Dharug NP.

## Mapping Reliability & Included Units:

*High Resolution Area* – this vegetation type has not been mapped for the high resolution area.

*Low Resolution Area* – NPWS (2000) have modelled this vegetation type for gully flats in the Dubbo Gully area. Inclusion of either of the other footslope forests on Narrabeen (Units E7 E8 E20) may have occurred.

## Vegetation Structure:

No structural data is yet available for this community.

## Key Diagnostic Species [no plots available]:

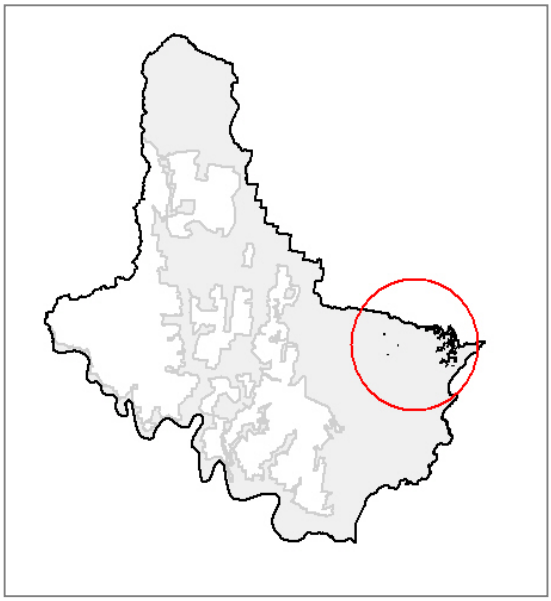
Diagnostic species have not been generated for this community due to a lack of suitable floristic data, and uncertainty between the composition of this and related communities. As a guide, the following species list has been extracted from the regional REMS profiles (NPWS 2000), but it has not been possible to rationalise this list with communities delineated during the present study.

| Life Form | Species | Community | | All others | | Fidelity |
|---|---|---|---|---|---|---|
| | | c/a | Freq. | c/a | Freq. | |
| Tree | *Casuarina cunninghamiana subsp. cunninghamiana* | - | - | - | - | - |
| | *Angophora floribunda* | - | - | - | - | - |
| | *Eucalyptus amplifolia subsp. amplifolia* | - | - | - | - | - |
| | *Eucalyptus eugenioides* | - | - | - | - | - |
| | *Eucalyptus tereticornis* | - | - | - | - | - |
| | *Alphitonia excelsa* | - | - | - | - | - |
| Small tree | *Melia azedarach* | - | - | - | - | - |

| | | | | | | |
|---|---|---|---|---|---|---|
| | *Backhousia myrtifolia* | - | - | - | - | - |
| | *Melaleuca linariifolia* | - | - | - | - | - |
| Shrub | *Phyllanthus gunnii* | - | - | - | - | - |
| | *Trema aspera* | - | - | - | - | - |
| | *Leptospermum polygalifolium* | - | - | - | - | - |
| Herb | *Sigesbeckia orientalis subsp. orientalis* | - | - | - | - | - |
| | *Dichondra repens* | - | - | - | - | - |
| | *Einadia trigonos* | - | - | - | - | - |
| | *Urtica incisa* | - | - | - | - | - |
| | *Oxalis chnoodes* | - | - | - | - | - |
| | *Pratia purpurascens* | - | - | - | - | - |
| Grass | *Oplismenus imbecillis* | - | - | - | - | - |
| | *Entolasia marginata* | - | - | - | - | - |
| | *Echinopogon ovatus* | - | - | - | - | - |
| | *Microlaena stipoides var stipoides* | - | - | - | - | - |
| Ground fern | *Pteridium esculentum* | - | - | - | - | - |
| Climber | *Stephania japonica var discolor* | - | - | - | - | - |
| | *Clematis glycinoides var glycinoides* | - | - | - | - | - |

# Tumbi Spotted Gum-Ironbark Forest — Unit E15a

## Coastal Foothills Spotted Gum – Ironbark Forest — REMS Unit 15



## General Description:

Tumbi Spotted Gum-Ironbark Forest occurs principally along The Ridgeway on the boundary of Gosford and Wyong local government areas. It is centred on the Tumbi trig station, and extends along this ridgeline south to Wamberal. Characteristically, Spotted Gum (Corymbia maculata) is a dominant component of this vegetation type, together with the ironbarks *Eucalyptus paniculata* subsp. *paniculata*, *Eucalyptus siderophloia* and *Eucalyptus fergusonii*, and *Eucalyptus acmenoides*. Understorey vegetation is often grassy in nature, including species such as *Entolasia stricta, Themeda australis, Imperata cylindrica* var. *major,* and *Microlaena stipoides* var. *stipoides*, with scattered shrubs of *Daviesia ulicifolia* and *Podolobium ilicifolium*. On more sheltered slopes, however, mesic species are evident, such as *Allocasuarina torulosa, Acacia schinoides, Synoum glandulosum, Asterolasia correifolia, Zieria smithii,* and *Pomaderris ferruginea*. In places close to the effects of salt-laden on-shore winds (such as around Wamberal), canopy trees become somewhat stunted and wind sheared. Further sampling is required within this community to better define the variations currently observed. Within Wyong Shire, this area was included as part of the Coastal Ranges Moist Layered Forest.

## Known Floristic/ Structural Variations:

(a) Ridgeline variant (mapped with variant (b) as E15ai) – along the more exposed ridgelines and exposed slopes, understorey vegetation is more open and grassy, although prolonged absence from fire will enable mesic species to encroach from nearby sheltered gullies.

(b) Sheltered slope variant (mapped with variant (a) as E15ai) – sheltered slopes support an overstorey of *Corymbia maculata* and ironbark species, with an understorey of mesic species such as *Synoum glandulosum, Asterolasia correifolia, Zieria smithii,* and *Pomaderris ferruginea*. A mid-canopy of *Acacia schinoides, Acacia prominens* and *Allocasuarina torulosa* is also evident in these situations.

(c) Past disturbance variant (mapped as E15aii) – in a number of locations on ridgetops running off The Ridgeway, partial clearing or fire disturbance decades previously has resulted in a modified forest type where a dense sub-canopy of wattle species (*Acacia schinoides, Acacia filicifolia, Acacia decurrens*) has developed, amongst a scattering of canopy trees. On aerial photographs, these areas have a fine textural appearance reminiscent of hanging swamps or wet heaths. These areas have been mapped within the equivalent disturbed variant of E6a.

## Distribution:

*Within Gosford LGA* – occurs along the boundary of Gosford and Wyong LGA's at The Ridgeway, and south to around Wamberal, on soils of the Narrabeen Sandstone series.

*Within LHCC Region* – NPWS (2000) have mapped 16939ha in their Coastal Foothills Spotted Gum-Ironbark Forest (Unit 15) as remaining in the region.

*Examples Within Gosford LGA*
- The Ridgeway, at Tumbi trig and towards Tumbi.
- Water reservoir above Aldinga Drive, Wamberal

## Extent:

*Extant* - 183.53 ha [includes 6.58 ha of *Acacia* regrowth – variant E15aii]

## Relationship to Other Communities:

Tumbi Spotted Gum-Ironbark Forest is most similar to the Wagstaff Spotted Gum Forest (Unit E15b), which occurs in near-coastal locations on the southern extent of the Bouddi Peninsula, and near Pearl Beach. However, Unit E15b is generally a much drier variant of Spotted Gum-Ironbark forest, lacking the mesic components such as *Synoum glandulosum* and *Zieria smithii*, and is not influenced by the well developed moist forests and rainforests that surround Unit E15a. The presence of *Angophora costata* and *Eucalyptus umbra* in parts of Unit E15b is also diagnostic. The Narrabeen Coastal Ironbark Forest (Unit E6b) may also be considered similar, however the lack of *Corymbia maculata* and the presence of *Eucalyptus punctata* and *Syncarpia glomulifera* sufficient distinguish the two.

## Equivalent Vegetation Types:

- Benson 1981 (Mangrove Creek): n/a
- Benson & Fallding 1981 (Brisbane Water) n/a
- Benson 1986 (Gosf-Lake Mac): (?) Open-Forest (Unit 9g)
- Clarke & Benson 1986 (Dharug): n/a
- Strom 1986 (Bouddi Peninsula): n/a
- Clarke & Benson 1987 (Mt White/ Mt Olive): n/a
- McRae 1990 (Bouddi Peninsula): n/a
- Binns 1996 (SF MFD): (?) MORf 4 *Eucalyptus fibrosa – Eucalyptus maculata*
- Payne 1997 (Cockle Bay/ Bouddi): n/a
- Bell 1998 (Popran NP): n/a
- Bell 2002 (Wyong LGA): *included in* Coastal Ranges Moist Layered Forest (Unit 35)

## Significant Species:

- Undescribed species – *none recorded*
- Threatened (TSC Act) – *Prostanthera askania*
- Rare (ROTAP) – *Callistemon shiressii, Eucalyptus fergusonii* subsp*. fergusonii*

## Community Conservation Status:

*Reserve Representation* - within Gosford, a small portion of this vegetation type is contained within Wambina NR.

*TSC Act (1995) Status* - not currently listed.

## Mapping Reliability & Included Units:

*High Resolution Area* – this vegetation type has been mapped from aerial photographic interpretation and ground truthing.

*Low Resolution Area* – occurrences of this community within the low resolution area are as modelled by NPWS (2000) and are considered incorrect.

## Vegetation Structure:

| Stratum | Mean height (m) | Min height (m) | Max height (m) | Mean cover (%) | Sdev | n |
|---|---|---|---|---|---|---|
| Emergent | | | | | | |
| Tallest | 22.50 | 18.00 | 35.00 | 45 | 7.1 | 6 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Middle 1 | 5.08 | 1.00 | 10.00 | 18 | 13.3 | 6 |
| Middle 2 | 2.38 | 1.00 | 6.00 | 9 | 5.1 | 4 |
| Middle 3 | | | | | | |
| Lowest | 0.69 | 0.10 | 2.50 | 37 | 26.3 | 7 |

## Key Diagnostic Species [based on 6 plots]:

| Life Form | Species | Community | | All others | | Fidelity |
|---|---|---|---|---|---|---|
| | | c/a | Freq. | c/a | Freq. | |
| Tree | *Corymbia maculata* | 3 | 100% | 2 | 1% | positive |
| | *Syncarpia glomulifera subsp. glomulifera* | 2 | 100% | 2 | 27% | positive |
| | ***Eucalyptus fergusonii subsp. fergusonii*** **[ROTAP]** | **3** | **17%** | **0** | **0%** | **unique** |
| | *Eucalyptus acmenoides* | 1 | 67% | 3 | 5% | uninformative |
| | *Allocasuarina torulosa* | 1 | 50% | 2 | 27% | uninformative |
| | *Eucalyptus siderophloia* | 1 | 50% | 3 | 1% | uninformative |
| | *Cryptocarya microneura* | 3 | 33% | 2 | 5% | uninformative |
| | *Eucalyptus paniculata subsp. paniculata* | 3 | 33% | 3 | 9% | uninformative |
| | *Melicope micrococca* | 2 | 33% | 1 | 2% | uninformative |
| | *Eucalyptus pilularis* | 3 | 17% | 3 | 14% | uninformative |
| | *Eucalyptus scias subsp. scias* | 2 | 17% | 2 | 1% | uninformative |
| | *Eucalyptus umbra* | 2 | 17% | 2 | 10% | uninformative |
| | *Angophora floribunda* | 1 | 17% | 2 | 19% | uninformative |
| | *Claoxylon australe* | 1 | 17% | 1 | 3% | uninformative |
| | *Cryptocarya glaucescens* | 1 | 17% | 2 | 3% | uninformative |
| | *Eucalyptus saligna* | 1 | 17% | 3 | 7% | uninformative |
| Palm | *Livistona australis* | 1 | 50% | 1 | 15% | uninformative |
| Small tree | *Acacia prominens* | 2 | 50% | 2 | 6% | positive |
| | *Acacia maidenii* | 1 | 67% | 1 | 4% | uninformative |
| | *Glochidion ferdinandii* | 2 | 33% | 2 | 28% | uninformative |
| | *Alphitonia excelsa* | 1 | 33% | 1 | 9% | uninformative |
| | *Guioa semiglauca* | 1 | 33% | 1 | 4% | uninformative |
| | *Synoum glandulosum subsp. glandulosum* | 1 | 33% | 1 | 12% | uninformative |
| | *Alectryon subcinereus* | 3 | 17% | 2 | 1% | uninformative |
| | *Acacia schinoides* | 2 | 17% | 1 | 3% | uninformative |
| | *Acacia irrorata subsp. irrorata* | 1 | 17% | 1 | 2% | uninformative |
| | *Backhousia myrtifolia* | 1 | 17% | 3 | 5% | uninformative |
| | ***Callistemon shiressii*** **[ROTAP]** | **1** | **17%** | **3** | **0%** | **uninformative** |
| | *Commersonia fraseri* | 1 | 17% | 2 | 0% | uninformative |
| | *Diospyros australis* | 1 | 17% | 1 | 2% | uninformative |
| | *Trochocarpa laurina* | 1 | 17% | 1 | 9% | uninformative |
| | *Wilkiea huegeliana* | 1 | 17% | 1 | 6% | uninformative |
| Shrub | *Rapanea variabilis* | 2 | 83% | 1 | 14% | positive |
| | *Maytenus silvestris* | 2 | 67% | 1 | 9% | positive |
| | *Pittosporum undulatum* | 2 | 50% | 1 | 13% | positive |
| | *Croton verreauxii* | 3 | 50% | 0 | 0% | unique |
| | *Coprosma quadrifida* | 1 | 33% | 0 | 0% | unique |
| | ***Prostanthera askania*** **[TSC Vulnerable]** | **1** | **17%** | **0** | **0%** | **unique** |
| | *Breynia oblongifolia* | 1 | 100% | 1 | 32% | uninformative |
| | *Notelaea longifolia* | 1 | 83% | 1 | 15% | uninformative |
| | *Pittosporum revolutum* | 1 | 83% | 1 | 11% | uninformative |
| | *Rhodamnia rubescens* | 1 | 83% | 2 | 7% | uninformative |
| | *Clerodendrum tomentosum* | 1 | 67% | 1 | 10% | uninformative |
| | *Astrotricha latifolia* | 1 | 50% | 2 | 2% | uninformative |
| | *Daviesia ulicifolia* | 1 | 50% | 1 | 1% | uninformative |
| | *Eupomatia laurina* | 1 | 50% | 1 | 7% | uninformative |
| | *Zieria smithii* | 4 | 33% | 1 | 3% | uninformative |
| | *Podolobium ilicifolium* | 3 | 33% | 2 | 12% | uninformative |
| | *Persoonia linearis* | 2 | 33% | 1 | 26% | uninformative |
| | *Pittosporum multiflorum* | 2 | 33% | 1 | 5% | uninformative |
| | *Podocarpus elatus* | 1 | 33% | 1 | 0% | uninformative |
| | *Asterolasia correifolia* | 3 | 17% | 1 | 2% | uninformative |

| | | | | | | |
|---|---|---|---|---|---|---|
| | *Macrozamia communis* | 3 | 17% | 2 | 11% | uninformative |
| | *Pomaderris ferruginea* | 3 | 17% | 1 | 3% | uninformative |
| | *Prostanthera incisa* | 2 | 17% | 1 | 0% | uninformative |
| | *Xanthorrhoea macronema* | 2 | 17% | 2 | 3% | uninformative |
| | *Acacia implexa* | 1 | 17% | 1 | 4% | uninformative |
| | *Acacia ulicifolia* | 1 | 17% | 1 | 24% | uninformative |
| | *Acrotriche divaricata* | 1 | 17% | 1 | 1% | uninformative |
| | *Hymenosporum flavum* | 1 | 17% | 1 | 1% | uninformative |
| | *Indigofera australis* | 1 | 17% | 1 | 4% | uninformative |
| | *Lasiopetalum ferrugineum* | 1 | 17% | 1 | 5% | uninformative |
| | *Leucopogon lanceolatus var lanceolatus* | 1 | 17% | 1 | 5% | uninformative |
| | *Platysace lanceolata* | 1 | 17% | 2 | 16% | uninformative |
| | *Polyscias sambucifolia* | 1 | 17% | 1 | 18% | uninformative |
| | *Psychotria loniceroides* | 1 | 17% | 1 | 3% | uninformative |
| | *Rapanea howittiana* | 1 | 17% | 1 | 1% | uninformative |
| Herb | *Pseuderanthemum variabile* | 2 | 83% | 2 | 16% | positive |
| | *Pratia purpurascens* | 2 | 50% | 2 | 20% | positive |
| | *Geranium homeanum* | 2 | 33% | 2 | 4% | uninformative |
| | *Hydrocotyle peduncularis* | 2 | 33% | 2 | 3% | uninformative |
| | *Schelhammera undulata* | 2 | 33% | 2 | 8% | uninformative |
| | *Viola hederacea* | 2 | 33% | 2 | 13% | uninformative |
| | *Brunoniella australis* | 2 | 17% | 2 | 7% | uninformative |
| | *Dichondra repens* | 2 | 17% | 2 | 6% | uninformative |
| | *Galium binifolium* | 1 | 17% | 2 | 3% | uninformative |
| | *Plectranthus parviflorus* | 1 | 17% | 1 | 5% | uninformative |
| | *Sigesbeckia orientalis subsp. orientalis* | 1 | 17% | 1 | 5% | uninformative |
| Grass | *Imperata cylindrica var major* | 2 | 67% | 2 | 29% | positive |
| | *Oplismenus imbecillis* | 2 | 67% | 2 | 16% | positive |
| | *Poa affinis* | 3 | 50% | 2 | 6% | positive |
| | *Entolasia stricta* | 2 | 83% | 2 | 53% | constant |
| | *Entolasia marginata* | 2 | 33% | 2 | 16% | uninformative |
| | *Digitaria parviflora* | 1 | 17% | 1 | 4% | uninformative |
| | *Oplismenus aemulus* | 1 | 17% | 2 | 5% | uninformative |
| Graminoid | *Dianella caerulea* | 2 | 83% | 1 | 50% | positive |
| | *Lomandra confertifolia* | 2 | 33% | 2 | 4% | uninformative |
| | *Lomandra multiflora subsp. multiflora* | 1 | 17% | 1 | 6% | uninformative |
| | *Lomandra longifolia* | 2 | 100% | 2 | 44% | constant |
| Ground fern | *Doodia aspera* | 2 | 50% | 2 | 13% | positive |
| | *Adiantum hispidulum* | 1 | 50% | 2 | 6% | uninformative |
| | *Pellaea paradoxa* | 3 | 17% | 1 | 1% | uninformative |
| | *Pteridium esculentum* | 2 | 17% | 2 | 43% | negative |
| | *Adiantum formosum* | 2 | 17% | 2 | 3% | uninformative |
| | *Calochlaena dubia* | 2 | 17% | 3 | 18% | uninformative |
| | *Blechnum cartilagineum* | 1 | 17% | 2 | 16% | uninformative |
| | *Nephrolepis cordifolia* | 1 | 17% | 1 | 0% | uninformative |
| | *Pellaea falcata* | 1 | 17% | 2 | 2% | uninformative |
| Epiphtyic fern | *Asplenium flabellifolium* | 1 | 17% | 2 | 3% | uninformative |
| | *Platycerium bifurcatum* | 1 | 17% | 1 | 1% | uninformative |
| Epiphytic orchid | *Cymbidium suave* | 1 | 17% | 1 | 5% | uninformative |
| Climber | *Dioscorea transversa* | 2 | 100% | 1 | 10% | positive |
| | *Eustrephus latifolius* | 2 | 100% | 1 | 24% | positive |
| | *Geitonoplesium cymosum* | 2 | 100% | 1 | 23% | positive |
| | *Smilax australis* | 2 | 100% | 1 | 21% | positive |
| | *Pandorea pandorana subsp. pandorana* | 2 | 83% | 1 | 23% | positive |
| | *Desmodium varians* | 2 | 50% | 2 | 10% | positive |
| | *Hibbertia dentata* | 2 | 50% | 1 | 9% | positive |
| | *Cissus hypoglauca* | 1 | 67% | 1 | 17% | uninformative |
| | *Billardiera scandens* | 1 | 50% | 1 | 29% | uninformative |
| | *Sarcopetalum harveyanum* | 1 | 50% | 1 | 11% | uninformative |
| | *Stephania japonica var discolor* | 1 | 50% | 1 | 17% | uninformative |
| | *Glycine tabacina* | 2 | 33% | 2 | 1% | uninformative |
| | *Kennedia rubicunda* | 2 | 33% | 1 | 11% | uninformative |
| | *Cassytha pubescens* | 1 | 33% | 1 | 8% | uninformative |

| | | | | | | |
|---|---|---|---|---|---|---|
| | *Cissus antarctica* | 1 | 33% | 1 | 10% | uninformative |
| | *Glycine clandestina* | 1 | 33% | 2 | 22% | uninformative |
| | *Morinka jasminoides* | 1 | 33% | 1 | 15% | uninformative |
| | *Tetrastigma nitens* | 1 | 33% | 1 | 0% | uninformative |
| | *Cassytha glabella forma glabella* | 2 | 17% | 1 | 14% | uninformative |
| | *Desmodium rhytidophyllum* | 2 | 17% | 2 | 7% | uninformative |
| | *Glycine microphylla* | 2 | 17% | 1 | 3% | uninformative |
| | *Cayratia clematidea* | 1 | 17% | 1 | 6% | uninformative |
| | *Clematis aristata* | 1 | 17% | 1 | 10% | uninformative |
| | *Clematis glycinoides var glycinoides* | 1 | 17% | 1 | 6% | uninformative |
| | *Maclura cochinchinensis* | 1 | 17% | 1 | 0% | uninformative |
| | *Parsonsia straminea* | 1 | 17% | 1 | 20% | uninformative |
| | *Ripogonum fawcettianum* | 1 | 17% | 1 | 6% | uninformative |
| | *Rubus moluccanus var trilobus* | 1 | 17% | 1 | 7% | uninformative |
| | *Trophis scandens subsp. scandens* | 1 | 17% | 1 | 2% | uninformative |
| | *Tylophora barbata* | 1 | 17% | 1 | 5% | uninformative |
| Sedge/ Rush | *Gymnostachys anceps* | 2 | 83% | 2 | 12% | positive |
| | *Lepidosperma laterale* | 2 | 67% | 2 | 26% | positive |
| | *Gahnia melanocarpa* | 1 | 67% | 1 | 4% | uninformative |
| | *Carex appressa* | 1 | 33% | 2 | 4% | uninformative |
| | *Lepidosperma elatius* | 2 | 17% | 1 | 2% | uninformative |
| | *Carex declinata* | 1 | 17% | 1 | 0% | uninformative |
| | *Cyperus laevis* | 1 | 17% | 1 | 3% | uninformative |

# Wagstaff Spotted Gum Forest — Unit E15b

## Coastal Foothills Spotted Gum – Ironbark Forest — REMS Unit 15

## General Description:

Wagstaff Spotted Gum - Ironbark Forest occurs only on the Narrabeen Sandstone ridgelines around Wagstaff and Pretty Beach, with disjunct locations across the entrance to Brisbane Water at Mount Ettalong, and within Brisbane Water at Mount Pleasant, Saratoga. This sub-community has strong similarities to the Pittwater Spotted Gum Forest currently listed as an EEC, which occurs approximately 5km to the south across Broken Bay in Pittwater LGA. Dominant species in the Wagstaff Spotted Gum – Ironbark Forest include *Corymbia maculata, Eucalyptus paniculata* subsp*. paniculata,* and *Corymbia gummifera* in the canopy, while the understorey is dominated by species such as *Pultenaea flexilis, Acacia ulicfiolia, Macrozamia communis, Pteridium esculentum, Themeda australis, Lomandra confertifolia* subsp*. pallida,* and *Entolasia stricta*. Higher rocky ridges receiving on-shore winds support *Angophora costata* and *Eucalyptus umbra* as the dominant components. In more sheltered locations, *Eucalyptus botryoides* and *Angophora floribunda* occur. Both of these latter variations appear to be included in the determination for the Pittwater Spotted Gum Forest EEC.

## Known Floristic/ Structural Variations:

(a) Type variant (mapped as E15bi) – tall forest dominated by *Corymbia maculata* and *Eucalyptus paniculata* subsp*. paniculata* occurs over a sparse to moderate understorey of shrubs and a well developed grass layer.

(b) Rocky ridgetop variant (mapped as E15bii) – on higher rocky ridges, *Corymbia maculata* and *Eucalyptus paniculata* subsp*. paniculata* are replaced by *Angophora costata* and *Eucalyptus umbra*, together with *Banksia integrifolia* and *Xanthorrhoea arborea* in the understorey.

(c) Bangalay-Apple variant (mapped as E15biii) – at Saratoga, sheltered areas occurring among rocky sandstone boulders support an open forest of *Eucalyptus botryoides* and *Angophora floribunda*. While potentially indicative of a distinct community, this area has been included as a variant of the Wagstaff Spotted Gum Forest.

(d) Footslopes variant (mapped as E15biv) – on exposed westerly footslopes adjacent to Broken Bay, in the Wagstaff to Lobster Beach area, *Eucalyptus umbra, Angophora costata, Eucalyptus botryoides* and *Allocasuarina torulosa* dominate (D.Kelly, pers. comm.). Further survey is required to ascertain the relationship of this variant with other documented variations.

## Distribution:

*Within Gosford LGA* – restricted to the ridgelines and slopes around Wagstaff and Pretty Beach, and also at Mount Ettalong and Mount Pleasant.

*Within LHCC Region* – NPWS (2000) have mapped 16939ha in their Coastal Foothills Spotted Gum-Ironbark Forest (Unit 15) as remaining in the region.

*Examples Within Gosford LGA*
- Foot track to Half Tide Rocks, Wagstaff (variants a & b)
- Mt Ettalong lookout, Pearl Beach (variant a)
- Mt Pleasant, Saratoga (variants a & c)

## Extent:

*Extant* - 116.99 ha

## Relationship to Other Communities:

Wagstaff Spotted Gum - Ironbark Forest is the only vegetation type supporting *Corymbia maculata* and *Eucalyptus paniculata* occurring on coastal headlands at the entrance of Brisbane Water/ Broken Bay. Other communities dominated by Spotted Gum and Ironbark species tend to support more mesic species in their understorey's, as they are located inland from on-shore winds.

## Equivalent Vegetation Types:

- Benson 1981 (Mangrove Creek): n/a
- Benson & Fallding 1981 (Brisbane Water) (?) Low open-forest (Unit 5)
- Benson 1986 (Gosf-Lake Mac): (?) Open-Forest (Unit 9g)
- Clarke & Benson 1986 (Dharug): n/a
- Strom 1986 (Bouddi Peninsula): Open forest (Unit 4.3.2) & Woodland (Unit 4.5)
- Clarke & Benson 1987 (Mt White/ Mt Olive): n/a
- McRae 1990 (Bouddi Peninsula): *included in* Woodland/ low woodland on ridges, slopes & gullies (Unit 1.5)
- Binns 1996 (SF MFD): n/a
- Payne 1997 (Cockle Bay/ Bouddi): Woodland/ low woodland on ridges, slopes & gullies (Unit 1.5)
- Bell 1998 (Popran NP): n/a
- Bell 2002 (Wyong LGA): n/a

## Significant Species:

- Undescribed species – *none recorded*
- Threatened (TSC Act) – *none recorded*
- Rare (ROTAP) – *none recorded*

## Community Conservation Status:

*Reserve Representation* - part of this vegetation type is conserved within Bouddi and Brisbane Water NPs.

*TSC Act (1995) Status* - forms part of the *Pittwater Spotted Gum Forest* EEC.

## Mapping Reliability & Included Units:

*High Resolution Area* – this vegetation type has been mapped from aerial photographic interpretation and ground truthing.

*Low Resolution Area* – may be expected within the low resolution area on coastal headlands at the head of the Hawkesbury River.

## Vegetation Structure:

| Stratum | Mean height (m) | Min height (m) | Max height (m) | Mean cover (%) | Sdev | n |
|---|---|---|---|---|---|---|
| Emergent | | | | | | |
| Tallest | 16.50 | 4.00 | 25.00 | 32 | 5.8 | 3 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Middle 1 | 7.00 | 1.00 | 12.00 | 14 | 9.8 | 3 |
| Middle 2 | 1.75 | 1.00 | 2.50 | 65 | | 1 |
| Middle 3 | | | | | | |
| Lowest | 0.40 | 0.10 | 1.00 | 32 | 29.7 | 3 |

## Key Diagnostic Species [based on 3 plots]:

| Life Form | Species | Community | | All others | | Fidelity |
|---|---|---|---|---|---|---|
| | | c/a | Freq. | c/a | Freq. | |
| Tree | *Corymbia maculata* | 4 | 67% | 2 | 2% | positive |
| | *Eucalyptus paniculata subsp. paniculata* | 3 | 67% | 3 | 9% | positive |
| | *Angophora costata* | 4 | 33% | 2 | 31% | uninformative |
| | *Allocasuarina torulosa* | 2 | 33% | 2 | 27% | uninformative |
| | *Corymbia gummifera* | 2 | 33% | 2 | 30% | uninformative |
| | *Eucalyptus umbra* | 1 | 33% | 2 | 10% | uninformative |
| | *Ficus rubiginosa* | 1 | 33% | 1 | 3% | uninformative |
| Small tree | *Allocasuarina littoralis* | 3 | 67% | 1 | 14% | positive |
| Shrub | *Macrozamia communis* | 3 | 100% | 2 | 11% | positive |
| | *Acacia ulicifolia* | 2 | 100% | 1 | 23% | positive |
| | *Pultenaea flexilis* | 4 | 67% | 1 | 11% | positive |
| | *Banksia integrifolia subsp. integrifolia* | 2 | 67% | 1 | 7% | positive |
| | *Rapanea variabilis* | 2 | 67% | 1 | 15% | positive |
| | *Xanthorrhoea arborea* | 2 | 67% | 2 | 7% | positive |
| | *Persoonia linearis* | 1 | 67% | 1 | 26% | uninformative |
| | *Platysace lanceolata* | 3 | 33% | 1 | 16% | uninformative |
| | *Persoonia levis* | 2 | 33% | 1 | 34% | uninformative |
| | *Acacia implexa* | 2 | 33% | 1 | 4% | uninformative |
| | *Acacia longifolia* | 1 | 33% | 2 | 11% | uninformative |
| | *Astrotricha floccosa* | 1 | 33% | 1 | 5% | uninformative |
| | *Breynia oblongifolia* | 1 | 33% | 1 | 33% | uninformative |
| | *Hakea salicifolia* | 1 | 33% | 1 | 1% | uninformative |
| | *Notelaea longifolia* | 1 | 33% | 1 | 16% | uninformative |
| | *Platysace linearifolia* | 1 | 33% | 2 | 32% | uninformative |
| | *Pultenaea elliptica* | 1 | 33% | 2 | 10% | uninformative |
| Herb | *Wikstroemia indica* | 1 | 33% | 0 | 0% | unique |
| | *Actinotus helianthi* | 2 | 33% | 1 | 7% | uninformative |
| | *Phyllanthus hirtellus* | 2 | 33% | 1 | 18% | uninformative |
| | *Hibbertia diffusa* | 1 | 33% | 2 | 4% | uninformative |
| | *Pratia purpurascens* | 1 | 33% | 2 | 21% | uninformative |
| | *Pseuderanthemum variabile* | 1 | 33% | 2 | 16% | uninformative |
| Grass | *Themeda australis* | 3 | 67% | 2 | 24% | positive |
| | *Entolasia stricta* | 2 | 100% | 2 | 53% | constant |
| | *Aristida vagans* | 2 | 33% | 1 | 5% | uninformative |
| | *Austrodanthonia tenuior* | 1 | 33% | 2 | 0% | uninformative |
| | *Digitaria ramularis* | 1 | 33% | 2 | 3% | uninformative |
| | *Eragrostis brownii* | 1 | 33% | 1 | 3% | uninformative |
| | *Panicum simile* | 1 | 33% | 1 | 5% | uninformative |
| Graminoid | *Lomandra confertifolia* | 2 | 100% | 2 | 3% | positive |
| | *Lomandra glauca* | 2 | 67% | 2 | 18% | positive |
| | *Lomandra longifolia* | 1 | 100% | 2 | 44% | negative |
| | *Dianella caerulea* | 1 | 100% | 1 | 50% | uninformative |
| | *Dianella revoluta var revoluta* | 1 | 100% | 1 | 5% | uninformative |
| | *Lomandra filiformis* | 1 | 33% | 1 | 9% | uninformative |
| Ground fern | *Pteridium esculentum* | 2 | 100% | 2 | 42% | constant |
| Climber | *Billardiera scandens* | 2 | 67% | 1 | 29% | positive |
| | *Eustrephus latifolius* | 1 | 67% | 1 | 24% | uninformative |
| | *Hardenbergia violacea* | 1 | 67% | 1 | 10% | uninformative |
| | *Cassytha glabella forma glabella* | 2 | 33% | 1 | 14% | uninformative |
| | *Pandorea pandorana subsp. pandorana* | 2 | 33% | 1 | 24% | uninformative |
| | *Cassytha pubescens* | 1 | 33% | 1 | 8% | uninformative |
| | *Cayratia clematidea* | 1 | 33% | 1 | 6% | uninformative |

# Dharug Footslopes Apple-Redgum Forest Unit E20

## Dharug Rough-barked Apple Forest REMS Unit 20

## General Description:

Dharug Rough-barked Apple Forest is a dry open forest occurring on the Narrabeen footslopes in and around the Dharug-Mangrove Creek area. It is characterised by the presence of *Angophora floribunda, Eucalyptus tereticornis, Eucalyptus punctata* and *Eucalyptus paniculata* subsp*. paniculata* in the canopy, although local variations can be dominated by any of these species. Other species such as *Eucalyptus eugenioides* and *Eucalyptus siderophloia* may also be present. *Allocasuarina torulosa* is generally a consistent component in the mid-storey. Understorey vegetation is generally sparse, with a few shrubs such as *Breynia oblongifolia* and *Persoonia linearis,* and grasses and herbs such as *Themeda australis, Entolasia stricta* and *Pratia purpurascens*.

## Known Floristic/ Structural Variations:

(a) Type variant (mapped as E20) – an open forest dominated by *Angophora floribunda, Eucalyptus tereticornis, Eucalyptus punctata* and *Eucalyptus paniculata* subsp*. paniculata*, over a sparse to moderate understorey of shrubs and a well developed grass layer.

(b) Riverine variant (included in E20) – previous work in the Popran NP area has delineated a riverine form of this community, principally along the Hawkesbury River on steep terraces, where *Angophora floribunda* occurs with some *Angophora costata* and *Eucalyptus punctata*. This form has been mapped by Bell (1998) for the Popran NP area, but has not yet been included on the current map.

(c) Ironbark variant (included in E20) – previous work in the Popran NP area has delineated an ironbark-dominated form of this community, where *Eucalyptus paniculata* subsp*. paniculata* and *Eucalyptus siderophloia* occur with some *Eucalyptus tereticornis* and *Eucalyptus punctata*. This form has been mapped by Bell (1998) for the Popran NP area, but has not yet been included on the current map.

## Distribution:

*Within Gosford LGA* – This community occurs on the dry Narrabeen slopes in the Dharug NP and lower Mangrove Creek areas.

*Within LHCC Region* – NPWS (2000) have mapped 4007ha of their Dharug Rough-barked Apple Forest (Unit 20) as remaining in the region.

*Examples Within Gosford LGA*

- Most exposed slopes in the Dharug area
- Lower slopes around lower Mangrove Creek (variant b)
- Lower slopes of Popran and Ironbark Creek, where they enter Mangrove Creek

## Extent:

*Extant* - 5266.36 ha

## Relationship to Other Communities:

Dharug Rough-barked Apple Forest is superficially similar to the Sheltered Rough-barked Apple Forest (Unit E7), but that community occurs in better-protected environments on Narrabeen Sandstone slopes and gullies, and comprises a range of more mesic understorey species. The presence of *Syncarpia glomulifera* subsp. *glomulifera* and *Eucalyptus deanei* as important components of the canopy is also diagnostic. Other communities comprising ironbark species (such as the Wagstaff Spotted Gum Forest – Unit E15b, and Tumbi Spotted Gum-Ironbark Forest – Unit 15a) do not support *Angophora floribunda* as important canopy components, but instead have *Corymbia maculata* as obvious constituents. The Narrabeen Coastal Ironbark Forest (Unit E6b) supports a well developed and mesic understorey layer, in addition to other canopy species such as *Eucalyptus acmenioides* and *Syncarpia glomulifera* subsp. *glomulifera*.

## Equivalent Vegetation Types:

- Benson 1981 (Mangrove Creek): *Eucalyptus tereticornis-Eucalyptus eugenioides* open forest
- Benson & Fallding 1981 (Brisbane Water): (?) Open-forest (Unit 2A)
- Benson 1986 (Gosf-Lake Mac): (?) Open-Forest (Unit 9h)
- Clarke & Benson 1986 (Dharug): Open forest/ woodland – Ironbark forest (Unit B6)
- Strom 1986 (Bouddi Peninsula): n/a
- Clarke & Benson 1987 (Mt White/ Mt Olive): Ironbark/ Redgum Forest (Unit B7) & Rough-barked Apple Forest (Unit B6)
- McRae 1990 (Bouddi Peninsula): n/a
- Binns 1996 (SF MFD): n/a
- Payne 1997 (Cockle Bay/ Bouddi): n/a
- Bell 1998 (Popran NP): Narrabeen Riverine Apple Forest (Unit F5) & Narrabeen Coastal Ironbark Forest (Unit F4)
- Bell 2002 (Wyong LGA): n/a

## Significant Species:

- Undescribed species – *none recorded*
- Threatened (TSC Act) – *none recorded*
- Rare (ROTAP) – *none recorded*

## Community Conservation Status:

*Reserve Representation* - within Gosford, this vegetation type is mapped for Dharug and Popran NP's.

*TSC Act (1995) Status* - not currently listed.

## Mapping Reliability & Included Units:

*High Resolution Area* – this vegetation type has been mapped from aerial photographic interpretation and ground truthing for a small area around Mangrove Creek.

*Low Resolution Area* – NPWS (2000) have modelled this vegetation type for many gullies and exposed lower slopes in the Dharug NP and lower Mangrove Creek area.

## Vegetation Structure:

| Stratum | Mean height (m) | Min height (m) | Max height (m) | Mean cover (%) | Sdev | n |
|---|---|---|---|---|---|---|
| Emergent | | | | | | |
| Tallest | 21.25 | 15.00 | 25.00 | 35 | 21.2 | 2 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Middle 1 | 9.00 | 3.00 | 15.00 | 35 | 7.1 | 2 |
| Middle 2 | 1.75 | 1.00 | 3.00 | 18 | 3.5 | 2 |
| Middle 3 | | | | | | |
| Lowest | 0.55 | 0.10 | 1.00 | 8 | 3.5 | 2 |

## Key Diagnostic Species [based on 21 plots]:

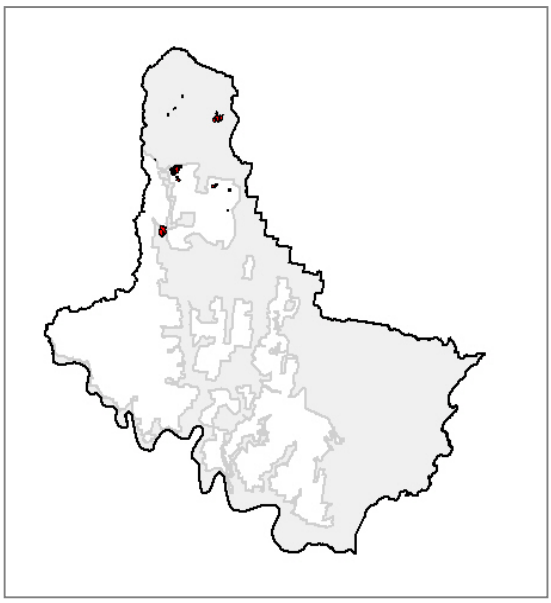
| Life Form | Species | Community | | All others | | Fidelity |
|---|---|---|---|---|---|---|
| | | c/a | Freq. | c/a | Freq. | |
| Tree | *Angophora floribunda* | 3 | 95% | 2 | 15% | positive |
| | *Allocasuarina torulosa* | 3 | 95% | 2 | 23% | positive |
| | *Eucalyptus punctata* | 2 | 67% | 2 | 11% | positive |
| | *Eucalyptus eugenioides* | 2 | 33% | 0 | 0% | unique |
| | *Eucalyptus tereticornis* | 3 | 38% | 3 | 1% | uninformative |
| | *Eucalyptus paniculata subsp. paniculata* | 3 | 33% | 2 | 8% | uninformative |
| | *Corymbia eximia* | 1 | 19% | 2 | 7% | uninformative |
| | *Eucalyptus siderophloia* | 3 | 14% | 1 | 1% | uninformative |
| | *Syncarpia glomulifera subsp. glomulifera* | 2 | 14% | 2 | 29% | uninformative |
| | *Angophora bakeri* | 1 | 14% | 3 | 4% | uninformative |
| | *Ficus rubiginosa* | 1 | 14% | 1 | 2% | uninformative |
| | *Corymbia gummifera* | 1 | 14% | 2 | 31% | uninformative |
| | *Acmena smithii* | 1 | 10% | 2 | 14% | uninformative |
| | *Eucalyptus crebra* | 3 | 10% | 1 | 0% | uninformative |
| | *Eucalyptus deanei* | 2 | 10% | 3 | 6% | uninformative |
| Palm | *Livistona australis* | 2 | 5% | 1 | 16% | uninformative |
| Small tree | *Glochidion ferdinandii* | 2 | 62% | 2 | 27% | positive |
| | *Acacia parramattensis* | 1 | 48% | 1 | 2% | uninformative |
| | *Alphitonia excelsa* | 1 | 43% | 1 | 7% | uninformative |
| | *Backhousia myrtifolia* | 5 | 10% | 3 | 5% | uninformative |
| | *Acacia prominens* | 3 | 10% | 2 | 6% | uninformative |
| | *Acacia elata* | 2 | 10% | 2 | 6% | uninformative |
| | *Allocasuarina littoralis* | 2 | 10% | 1 | 15% | uninformative |
| | *Trochocarpa laurina* | 2 | 10% | 1 | 9% | uninformative |
| Shrub | *Jacksonia scoparia* | 2 | 48% | 1 | 1% | positive |
| | *Cassinia aculeata* | 1 | 5% | 0 | 0% | unique |
| | *Persoonia linearis* | 1 | 86% | 1 | 23% | uninformative |
| | *Breynia oblongifolia* | 1 | 76% | 1 | 30% | uninformative |
| | *Rapanea variabilis* | 1 | 71% | 1 | 12% | uninformative |
| | *Clerodendrum tomentosum* | 1 | 62% | 1 | 8% | uninformative |
| | *Bursaria spinosa subsp. spinosa* | 2 | 38% | 1 | 1% | uninformative |
| | *Polyscias sambucifolia* | 1 | 38% | 1 | 16% | uninformative |
| | *Exocarpos cupressiformis* | 1 | 33% | 1 | 4% | uninformative |
| | *Dodonaea triquetra* | 2 | 29% | 1 | 16% | uninformative |
| | *Indigofera australis* | 1 | 29% | 1 | 3% | uninformative |
| | *Acacia implexa* | 1 | 24% | 1 | 3% | uninformative |
| | *Acacia ulicifolia* | 1 | 24% | 1 | 24% | uninformative |
| | *Gompholobium latifolium* | 2 | 19% | 1 | 15% | uninformative |
| | *Podolobium ilicifolium* | 2 | 19% | 2 | 11% | uninformative |
| | *Acacia filicifolia* | 2 | 14% | 1 | 1% | uninformative |
| | *Exocarpos strictus* | 2 | 14% | 1 | 0% | uninformative |
| | *Ozothamnus diosmifolius* | 1 | 14% | 1 | 4% | uninformative |
| | *Persoonia levis* | 1 | 14% | 1 | 35% | uninformative |
| | *Platysace lanceolata* | 1 | 14% | 2 | 16% | uninformative |
| | *Platysace linearifolia* | 1 | 14% | 2 | 33% | uninformative |
| | *Trema tomentosa var viridis* | 1 | 14% | 1 | 2% | uninformative |
| | *Acacia falcata* | 2 | 10% | 1 | 1% | uninformative |
| | *Acacia longifolia* | 1 | 10% | 2 | 12% | uninformative |

| | | | | | | |
|---|---|---|---|---|---|---|
| | *Duboisia myoporoides* | 1 | 10% | 1 | 5% | uninformative |
| | *Elaeocarpus reticulatus* | 1 | 10% | 1 | 10% | uninformative |
| | *Hibbertia empetrifolia subsp. empetrifolia* | 1 | 10% | 1 | 11% | uninformative |
| | *Leptospermum polygalifolium* | 1 | 10% | 2 | 25% | uninformative |
| | *Pomaderris ferruginea* | 1 | 10% | 2 | 2% | uninformative |
| Sub-shrub | *Zornia dyctiocarpa var dyctiocarpa* | 1 | 5% | 0 | 0% | unique |
| | *Solanum prinophyllum* | 2 | 10% | 1 | 2% | uninformative |
| | *Scaevola ramosissima* | 1 | 10% | 1 | 8% | uninformative |
| Herb | *Pratia purpurascens* | 2 | 100% | 2 | 17% | positive |
| | *Brunoniella australis* | 2 | 62% | 2 | 4% | positive |
| | *Dichondra repens* | 2 | 62% | 2 | 3% | positive |
| | *Hibbertia diffusa* | 2 | 57% | 1 | 2% | positive |
| | *Poranthera microphylla* | 2 | 57% | 1 | 3% | positive |
| | *Hydrocotyle laxiflora* | 2 | 43% | 2 | 6% | positive |
| | *Aneilema biflorum* | 2 | 5% | 0 | 0% | unique |
| | *Brachyscome multifida var multifida* | 1 | 5% | 0 | 0% | unique |
| | *Dichopogon fimbriatus* | 1 | 5% | 0 | 0% | unique |
| | *Galium liratum* | 1 | 5% | 0 | 0% | unique |
| | *Mentha satureioides* | 2 | 5% | 0 | 0% | unique |
| | *Tricoryne simplex* | 1 | 5% | 0 | 0% | unique |
| | *Wahlenbergia communis* | 1 | 5% | 0 | 0% | unique |
| | *Geranium solanderi var solanderi* | 2 | 10% | 0 | 0% | unique |
| | *Pomax umbellata* | 1 | 48% | 2 | 14% | uninformative |
| | *Goodenia hederacea subsp. hederacea* | 2 | 38% | 1 | 3% | uninformative |
| | *Arthropodium milleflorum* | 1 | 38% | 2 | 1% | uninformative |
| | *Sigesbeckia orientalis subsp. orientalis* | 1 | 38% | 1 | 3% | uninformative |
| | *Lagenifera stipitata* | 2 | 33% | 2 | 2% | uninformative |
| | *Wahlenbergia gracilis* | 1 | 33% | 1 | 1% | uninformative |
| | *Phyllanthus hirtellus* | 2 | 29% | 1 | 18% | uninformative |
| | *Commelina cyanea* | 1 | 29% | 1 | 6% | uninformative |
| | *Hypericum gramineum* | 1 | 29% | 1 | 1% | uninformative |
| | *Veronica plebeia* | 1 | 29% | 1 | 2% | uninformative |
| | *Galium binifolium* | 2 | 24% | 2 | 2% | uninformative |
| | *Pseuderanthemum variabile* | 2 | 24% | 2 | 16% | uninformative |
| | *Opercularia hispida* | 2 | 24% | 1 | 3% | uninformative |
| | *Oxalis radicosa* | 1 | 24% | 1 | 1% | uninformative |
| | *Plectranthus parviflorus* | 1 | 24% | 1 | 4% | uninformative |
| | *Hybanthus monopetalus* | 1 | 14% | 1 | 5% | uninformative |
| | *Hypoxis hygrometrica var hygrometrica* | 1 | 14% | 1 | 0% | uninformative |
| | *Xanthosia pilosa* | 1 | 14% | 1 | 13% | uninformative |
| | *Galium propinquum* | 2 | 10% | 1 | 1% | uninformative |
| | *Gonocarpus tetragynus* | 2 | 10% | 2 | 5% | uninformative |
| | *Gonocarpus teucrioides* | 2 | 10% | 1 | 15% | uninformative |
| | *Hydrocotyle geraniifolia* | 2 | 10% | 1 | 1% | uninformative |
| | *Opercularia aspera* | 1 | 10% | 1 | 5% | uninformative |
| | *Tricoryne elatior* | 1 | 10% | 2 | 0% | uninformative |
| | *Vernonia cinerea var cinerea* | 1 | 10% | 1 | 2% | uninformative |
| | *Wahlenbergia stricta subsp. stricta* | 1 | 10% | 1 | 0% | uninformative |
| Grass | *Themeda australis* | 2 | 81% | 2 | 21% | positive |
| | *Imperata cylindrica var major* | 2 | 67% | 2 | 27% | positive |
| | *Oplismenus imbecillis* | 2 | 67% | 2 | 14% | positive |
| | *Cymbopogon refractus* | 2 | 57% | 1 | 0% | positive |
| | *Microlaena stipoides var stipoides* | 2 | 57% | 2 | 8% | positive |
| | *Digitaria parviflora* | 2 | 48% | 1 | 2% | positive |
| | *Aristida vagans* | 2 | 43% | 1 | 3% | positive |
| | *Entolasia stricta* | 2 | 81% | 2 | 52% | constant |
| | *Echinopogon ovatus* | 1 | 52% | 2 | 2% | uninformative |
| | *Agrostis avenacea var avenacea* | 1 | 48% | 1 | 2% | uninformative |

| | | | | | | |
|---|---|---|---|---|---|---|
| | *Paspalidium distans* | 1 | 38% | 1 | 2% | uninformative |
| | *Digitaria ramularis* | 2 | 33% | 2 | 2% | uninformative |
| | *Cynodon dactylon* | 1 | 29% | 1 | 2% | uninformative |
| | *Dichelachne micrantha* | 2 | 24% | 1 | 1% | uninformative |
| | *Panicum simile* | 2 | 24% | 1 | 4% | uninformative |
| | *Echinopogon caespitosus var caespitosus* | 1 | 19% | 1 | 3% | uninformative |
| | *Anisopogon avenaceus* | 2 | 10% | 2 | 16% | uninformative |
| | *Aristida ramosa var ramosa* | 2 | 10% | 2 | 0% | uninformative |
| | *Entolasia marginata* | 2 | 10% | 2 | 17% | uninformative |
| | *Oplismenus aemulus* | 2 | 10% | 1 | 5% | uninformative |
| Graminoid | *Dianella caerulea* | 1 | 81% | 1 | 49% | uninformative |
| | *Lomandra longifolia* | 2 | 67% | 2 | 43% | constant |
| | *Lomandra gracilis* | 1 | 33% | 1 | 5% | uninformative |
| | *Lomandra multiflora subsp. multiflora* | 2 | 19% | 1 | 6% | uninformative |
| | *Dianella revoluta var revoluta* | 1 | 19% | 1 | 4% | uninformative |
| | *Lomandra glauca* | 1 | 19% | 2 | 18% | uninformative |
| | *Lomandra filiformis* | 1 | 14% | 1 | 8% | uninformative |
| Ground fern | *Cheilanthes sieberi subsp. sieberi* | 2 | 62% | 1 | 4% | positive |
| | *Pteridium esculentum* | 2 | 76% | 2 | 41% | constant |
| | *Adiantum aethiopicum* | 2 | 29% | 2 | 11% | uninformative |
| | *Blechnum cartilagineum* | 2 | 19% | 2 | 16% | uninformative |
| | *Doodia aspera* | 3 | 10% | 2 | 13% | uninformative |
| Ground orchid | *Acianthus fornicatus* | 2 | 5% | 1 | 0% | uninformative |
| Epiphytic orchid | *Cymbidium suave* | 1 | 5% | 1 | 5% | uninformative |
| Climber | *Glycine clandestina* | 2 | 95% | 1 | 19% | positive |
| | *Billardiera scandens* | 2 | 76% | 1 | 27% | positive |
| | *Desmodium rhytidophyllum* | 2 | 76% | 2 | 4% | positive |
| | *Clematis aristata* | 2 | 67% | 1 | 7% | positive |
| | *Desmodium varians* | 2 | 57% | 2 | 8% | positive |
| | *Eustrephus latifolius* | 1 | 67% | 1 | 22% | uninformative |
| | *Rubus parvifolius* | 1 | 67% | 1 | 3% | uninformative |
| | *Hibbertia scandens* | 1 | 43% | 1 | 13% | uninformative |
| | *Geitonoplesium cymosum* | 1 | 38% | 1 | 23% | uninformative |
| | *Stephania japonica var discolor* | 1 | 38% | 1 | 16% | uninformative |
| | *Hardenbergia violacea* | 1 | 29% | 1 | 9% | uninformative |
| | *Smilax australis* | 1 | 24% | 2 | 22% | uninformative |
| | *Glycine tabacina* | 2 | 14% | 1 | 1% | uninformative |
| | *Cissus hypoglauca* | 1 | 14% | 1 | 18% | uninformative |
| | *Kennedia rubicunda* | 1 | 14% | 1 | 11% | uninformative |
| | *Pandorea pandorana subsp. pandorana* | 1 | 14% | 1 | 24% | uninformative |
| | *Tylophora barbata* | 1 | 14% | 1 | 4% | uninformative |
| | *Hibbertia dentata* | 3 | 10% | 1 | 10% | uninformative |
| | *Cayratia clematidea* | 1 | 10% | 1 | 6% | uninformative |
| | *Sarcopetalum harveyanum* | 1 | 10% | 1 | 11% | uninformative |
| | *Smilax glyciphylla* | 1 | 10% | 1 | 20% | uninformative |
| Sedge/ Rush | *Lepidosperma laterale* | 2 | 57% | 2 | 25% | positive |
| | *Cyperus laevis* | 1 | 57% | 1 | 0% | uninformative |
| | *Gahnia aspera* | 1 | 33% | 2 | 0% | uninformative |

# Hunter Range Grey Gum Forest Unit E21

## Hunter Range Grey Gum Forest REMS Unit 21



## General Description:

NPWS (2000) extensively modelled the distribution of Hunter Range Grey Gum Forest within the northern portion of Gosford LGA, on Narrabeen Sandstone slopes in the upper Mangrove Creek catchment. It has not been possible to confirm all of the modelling of this vegetation type, but it would appear unlikely to be widespread, as the core distribution reportedly occurs well to the north in the Pokolbin/ Corrabare/ Heaton SF area. Small occurrences of vegetation most similar to the Hunter Range Grey Gum Forest occur on some of the higher ridges within the Mangrove Dam catchment area, but no plot data is available for comparisons to be made. NPWS (2000) report that this community supports *Eucalyptus punctata* as a canopy dominant, but also regularly occurs with *Angophora costata*, *Syncarpia glomulifera*, *Eucalyptus sparsifolia* and *Eucalyptus crebra*. A sparse upper mid-storey of *Allocasuarina torulosa* frequently occurs with a shrubby lower mid-storey of *Persoonia linearis*, *Podolobium ilicifolium, Rapanea variabilis*, *Exocarpus strictus* and various other shrubs. The ground layer is open and consists of herbs and grasses such as *Entolasia stricta*, *Goodenia heterophylla,* and *Themeda australis*. Further survey work is required to confirm the identity and extent of this community within Gosford LGA.

## Known Floristic/ Structural Variations:

No variations have been recognised.

## Distribution:

*Within Gosford LGA* – small occurrences of this vegetation type occur on some ridges in the Mangrove Dam catchment area, and NPWS (2000) have modelled other areas in the vicinity.

*Within LHCC Region* – NPWS (2000) have mapped 38950ha of their Hunter Range Grey Gum Forest (Unit 21) as remaining in the region.

*Examples Within Gosford LGA*

- Some sections of The Rugby Track, Mangrove Dam catchment

## Extent:

*Extant* - 184.05 ha mapped, but possibly more in remote areas.

## Relationship to Other Communities:

Hunter Range Grey Gum Forest is perhaps most similar to the Narrabeen Coastal Shrub Forest complex (Unit E22), but appears to differ in the dominance of *Eucalyptus punctata*, *Angophora costata*, *Syncarpia glomulifera*, *Eucalyptus sparsifolia* and *Eucalyptus crebra*. Understorey species are similar in both communities, however additional floristic survey is required for confirmation.

## Equivalent Vegetation Types:

- Benson 1981 (Mangrove Creek): n/a
- Benson & Fallding 1981 (Brisbane Water) n/a
- Benson 1986 (Gosf-Lake Mac): n/a
- Clarke & Benson 1986 (Dharug): n/a
- Strom 1986 (Bouddi Peninsula): n/a
- Clarke & Benson 1987 (Mt White/ Mt Olive): n/a
- McRae 1990 (Bouddi Peninsula): n/a
- Binns 1996 (SF MFD): ? MORf Units 6 to 9
- Payne 1997 (Cockle Bay/ Bouddi): n/a
- Bell 1998 (Popran NP): n/a
- Bell 2002 (Wyong LGA): n/a

## Significant Species:

- Undescribed species – *none recorded*
- Threatened (TSC Act) – *Cynanchum elegans* (NPWS 2000)
- Rare (ROTAP) – *Eucalyptus prominula, Eucalyptus hypostomatica* (NPWS 2000)

## Community Conservation Status:

*Reserve Representation* - within Gosford, this vegetation type is not known in reserve, but occurs within the Mangrove Dam catchment (McPherson SF).

*TSC Act (1995) Status* - not currently listed.

## Mapping Reliability & Included Units:

*High Resolution Area* – a form of this vegetation type is present within the Mangrove Dam catchment area, although no plot data or analysis has yet been undertaken.

*Low Resolution Area* – NPWS (2000) have modelled this vegetation type on Narrabeen slopes in the McPherson SF area.

## Vegetation Structure:

No structural data is yet available for this community.

## Key Diagnostic Species [no plots available]:

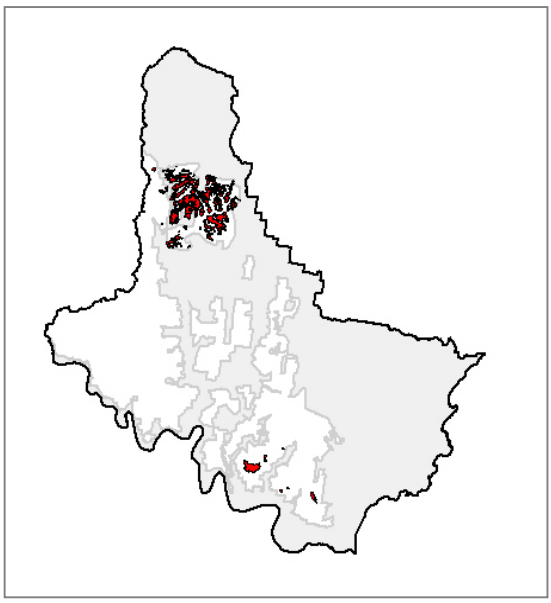
Diagnostic species have not been generated for this community due to a lack of suitable floristic data, and uncertainty between the composition of this and related communities. As a guide, the following species list has been extracted from the regional REMS profiles (NPWS 2000), but it has not been possible to rationalise this list with communities delineated during the present study.

| Life Form | Species | Community | | All others | | Fidelity |
|---|---|---|---|---|---|---|
| | | c/a | Freq. | c/a | Freq. | |
| Tree | *Eucalyptus punctata* | - | - | - | - | - |
| | *Angophora costata* | - | - | - | - | - |
| | *Eucalyptus sparsifolia* | - | - | - | - | - |
| | *Syncarpia glomulifera subsp. glomulifera* | - | - | - | - | - |

| | | | | | | |
|---|---|---|---|---|---|---|
| | *Eucalyptus crebra* | - | - | - | - | - |
| | *Eucalyptus agglomerata* | - | - | - | - | - |
| | *Angophora floribunda* | - | - | - | - | - |
| | ***Eucalyptus prominula* [ROTAP]** | **-** | **-** | **-** | **-** | **-** |
| | *Corymbia eximia* | - | - | - | - | - |
| | *Corymbia maculata* | - | - | - | - | - |
| | *Eucalyptus piperita* | - | - | - | - | - |
| | *Eucalyptus acmenioides* | - | - | - | - | - |
| | *Allocasuarina torulosa* | - | - | - | - | - |
| Shrub | *Persoonia linearis* | - | - | - | - | - |
| | *Podolobium ilicifolium* | - | - | - | - | - |
| | *Persoonia levis* | - | - | - | - | - |
| | *Rapanea variabilis* | - | - | - | - | - |
| | *Exocarpus strictus* | - | - | - | - | - |
| | *Platysace lanceolata* | | | | | |
| | *Jacksonia scoparia* | - | - | - | - | - |
| Herb | *Pomax umbellata* | - | - | - | - | - |
| | *Goodenia heterophylla* | - | - | - | - | - |
| | *Hibbertia obtusifolia* | - | - | - | - | - |
| | *Vittadinia dissecta var dissecta* | - | - | - | - | - |
| Grass | *Entolasia stricta* | - | - | - | - | - |
| | *Themeda australis* | - | - | - | - | - |
| | *Microlaena stipoides var stipoides* | - | - | - | - | - |
| | *Poa affinis* | - | - | - | - | - |
| Ground orchid | *Pterostylis revoluta* | - | - | - | - | - |
| Climber | *Hardenbergia violacea* | - | - | - | - | - |
| | *Kennedia rubicunda* | - | - | - | - | - |

# Coastal Narrabeen Shrub Forest Unit E22

## Coastal Narrabeen Shrub Forest REMS Unit 22



## General Description:

Coastal Narrabeen Shrub Forest is a community originally delineated by NPWS (2000), but which has been further divided during the present study into sub-units E22a, E22b and E22c (see following profiles). Residual areas of Unit 22 remain in the low resolution area of Gosford LGA, however it is likely that further ground truthing in these areas will enable re-assignment into one or more of the identified sub-units. NPWS (2000) describe Coastal Narrabeen Shrub Forest as a shrubby dry open forest attaining a height of 25m, and with a variable canopy supporting species such as *Angophora costata*, *Syncarpia glomulifera*, *Corymbia gummifera* and *Eucalyptus pilularis*. A sparse upper mid strata of *Allocasuarina torulosa* is also present, over a shrub layer of *Persoonia linearis, Podolobium ilicifolium, Leptospermum polygalifolium, Polyscias sambucifolia, Entolasia stricta, Pteridium esculentum*, and *Dianella caerulea* (NPWS 2000).

## Known Floristic/ Structural Variations:

No variations have been recognised, as it is likely that areas mapped as E22 will be re-assigned to one or more of E22a-c.

## Distribution:

*Within Gosford LGA* – occurs predominantly in McPherson SF, although this distribution is based on the modelling of NPWS (2000), and requires confirmation.

*Within LHCC Region* – NPWS (2000) have mapped 7461ha of their Coastal Narrabeen Shrub Forest (Unit 22) as remaining in the region, although this also includes a variant in the Watagan Mountains in Lake Macquarie LGA.

*Examples Within Gosford LGA*

- McPherson SF

## Extent:

*Extant* - 1720.33 ha

## Relationship to Other Communities:

This community can be generally identified by the dominance of one or more of *Eucalyptus pilularis, Angophora costata, Corymbia gummifera* or *Syncarpia glomulifera* in the canopy, together with a sparse to moderate understorey of shrubs

and grasses. It is difficult to state with certainty how this community relates to other units described here, as re-assignment into the various sub-units is likely with further work in the low resolution areas.

## Equivalent Vegetation Types:

- Benson 1981 (Mangrove Creek): n/a
- Benson & Fallding 1981 (Brisbane Water) n/a
- Benson 1986 (Gosf-Lake Mac): (?) Open-Forest (Unit 9g)
- Clarke & Benson 1986 (Dharug): n/a
- Strom 1986 (Bouddi Peninsula): (?) Open forest (Unit 4.3.1) & Low open forest (Unit 4.4.1)
- Clarke & Benson 1987 (Mt White/ Mt Olive): n/a
- McRae 1990 (Bouddi Peninsula): (?) Woodland (Unit 2.4)
- Binns 1996 (SF MFD): n/a
- Payne 1997 (Cockle Bay/ Bouddi): (?) Open forest on ridges, slopes & gullies (Unit 1.7)
- Bell 1998 (Popran NP): n/a
- Bell 2002 (Wyong LGA): Narrabeen Coastal Blackbutt Shrubby Forest (Unit 27)

## Significant Species:

- Undescribed species – *none recorded*
- Threatened (TSC Act) – *none recorded*
- Rare (ROTAP) – *Callistemon shiressii*

## Community Conservation Status:

*Reserve Representation* - within Gosford, this vegetation type has been modelled for parts of McPherson SF and Brisbane Water NP, although confirmation and re-assignment is required.

*TSC Act (1995) Status* - not currently listed.

## Mapping Reliability & Included Units:

*High Resolution Area* – this vegetation type has not been mapped in the high resolution area, although the various sub-units (E22a-c) have.

*Low Resolution Area* – NPWS (2000) modelling of this community has been adopted in the low resolution area, but requires ground truthing.

## Vegetation Structure:

No structural data is yet available for this community, but it can be expected to be very similar to that described for Unit E22a.

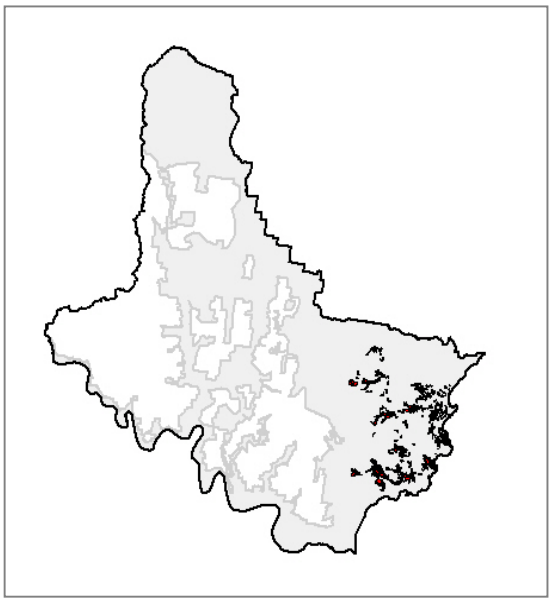
## Key Diagnostic Species [no plots available]:

| Life Form | Species | Community | | All others | | Fidelity |
|---|---|---|---|---|---|---|
| | | c/a | Freq. | c/a | Freq. | |
| Tree | *Angophora costata* | - | - | - | - | - |
| | *Syncarpia glomulifera subsp. glomulifera* | - | - | - | - | - |
| | *Corymbia gummifera* | - | - | - | - | - |
| | *Eucalyptus pilularis* | - | - | - | - | - |
| | *Eucalyptus piperita* | - | - | - | - | - |
| | *Eucalyptus umbra* | - | - | - | - | - |
| | *Angophora floribunda* | - | - | - | - | - |
| | *Eucalyptus agglomerata* | - | - | - | - | - |
| | *Eucalyptus acmenoides* | - | - | - | - | - |
| | *Eucalyptus punctata* | - | - | - | - | - |

| | | | | | | |
|---|---|---|---|---|---|---|
| | *Eucalyptus resinifera subsp. resinifera* | - | - | - | - | - |
| | *Allocasuarina torulosa* | - | - | - | - | - |
| Small tree | *Glochidion ferdinandii* | - | - | - | - | - |
| Shrub | *Persoonia linearis* | - | - | - | - | - |
| | *Podolobium ilicifolium* | - | - | - | - | - |
| | *Polyscias sambucifolia* | - | - | - | - | - |
| | *Leptospermum polygalifolium* | - | - | - | - | - |
| | *Platysace linearifolia* | | | | | |
| | *Platysace lanceolata* | - | - | - | - | - |
| | ***Callistemon shiressii* [ROTAP]** | - | - | - | - | - |
| | *Pultenaea blakelyi* | - | - | - | - | - |
| Herb | *Pomax umbellata* | - | - | - | - | - |
| | *Pratia purpurascens* | - | - | - | - | - |
| | *Pseuderanthemum variabile* | - | - | - | - | - |
| Grass | *Entolasia stricta* | - | - | - | - | - |
| | *Imperata cylindrica var major* | - | - | - | - | - |
| | *Themeda australis* | - | - | - | - | - |
| Graminoid | *Dianella caerulea* | - | - | - | - | - |
| | *Lomandra longifolia* | - | - | - | - | - |
| Ground fern | *Pteridium esculentum* | - | - | - | - | - |
| | *Calochlaena dubia* | - | - | - | - | - |
| Climber | *Glycine clandestina* | - | - | - | - | - |
| | *Eustrephus latifolius* | - | - | - | - | - |
| Sedge/ Rush | *Lepidosperma laterale* | - | - | - | - | - |

# Narrabeen Coastal Blackbutt Forest — Unit E22a

## Coastal Narrabeen Shrub Forest — REMS Unit 22



## General Description:

Narrabeen Coastal Blackbutt Forest occurs on the Erina soil landscape on the hills and slopes around Gosford City and east, and down the Bouddi Peninsula. Vegetation here is clearly dominated by Blackbutt (*Eucalyptus pilularis*), *Syncarpia glomulifera* subsp. *glomulifera,* and *Allocasuarina torulosa* in the canopy, over a shrubby understorey of *Acacia longifolia, Duboisia myoporoides, Leucopogon margarodes, Gompholobium latifolium, Bossiaea obcordata, Hibbertia aspera, Lomandra obliqua, Xanthorrhoea macronema*, and *Pteridium esculentum*. McRae (1990) describes a similar community for parts of the Bouddi Peninsula near Gosford.

## Known Floristic/ Structural Variations:

(a) Type variant (mapped as E22ai) – tall forest dominated by *Eucalyptus pilularis* occurs over a sparse to moderate understorey of shrubs and a well developed grass layer.

(b) *Angophora costata* variant (mapped as E22aii) – an ecotonal community occurs in places such as the northern slopes of Kincumber Mountain, where *Angophora costata* becomes more common in the canopy, and an increase in the diversity of shrub species.

**(c)** Sheltered variant (mapped as E22aiii) – in sheltered locations, an understorey of more mesic shrub species occurs under the dominant *Eucalyptus pilularis*.

## Distribution:

*Within Gosford LGA* – occurs over the Erina Hills landscape on Narrabeen Sandstones, generally east of West Gosford and down the Bouddi Peninsula.

*Within LHCC Region* – NPWS (2000) have mapped 7461ha of their Coastal Narrabeen Shrub Forest (Unit 22) as remaining in the region, although this also includes a variant in the Watagan Mountains in Lake Macquarie LGA.

*Examples Within Gosford LGA*

- Presidents Hill, Gosford (variant a)
- Bouddi Hill Road, McMasters Beach (variant a)
- Blackwall Mount, Ettalong (variant c)

## Extent:

*Extant* - 1010.23 ha

## Relationship to Other Communities:

This community can be easily identified by the dominance of *Eucalyptus pilularis* in the canopy, together with a sparse to moderate understorey of shrubs and grasses. *Eucalyptus pilularis* is also present within the Coastal Sand Apple Blackbutt Forest (Unit E33a), but understorey species typical of coastal sands such as *Banksia serrata, Banksia aemula, Monotoca elliptica*, *Monotoca scoparia, Eriostemon australasius,* and *Amperea xiphoclada* var. *xiphoclada* are generally absent or poorly represented.

## Equivalent Vegetation Types:

- Benson 1981 (Mangrove Creek): n/a
- Benson & Fallding 1981 (Brisbane Water) n/a
- Benson 1986 (Gosf-Lake Mac): (?) Open-Forest (Unit 9g)
- Clarke & Benson 1986 (Dharug): n/a
- Strom 1986 (Bouddi Peninsula): (?) Open forest (Unit 4.3.1) & Low open forest (Unit 4.4.1)
- Clarke & Benson 1987 (Mt White/ Mt Olive): n/a
- McRae 1990 (Bouddi Peninsula): (?) Woodland (Unit 2.4)
- Binns 1996 (SF MFD): n/a
- Payne 1997 (Cockle Bay/ Bouddi): (?) Open forest on ridges, slopes & gullies (Unit 1.7)
- Bell 1998 (Popran NP): n/a
- Bell 2002 (Wyong LGA): Narrabeen Coastal Blackbutt Shrubby Forest (Unit 27)

## Significant Species:

- Undescribed species – *none recorded*
- Threatened (TSC Act) – *none recorded*
- Rare (ROTAP) – *none recorded*

## Community Conservation Status:

*Reserve Representation* - within Gosford, this vegetation type is known from Kincumber Mountain and Katandra Reserve, as well as parts of Bouddi NP.

*TSC Act (1995) Status* - not currently listed.

## Mapping Reliability & Included Units:

*High Resolution Area* – this vegetation type has been mapped from aerial photographic interpretation and ground truthing.

*Low Resolution Area* – NPWS (2000) modelling of this community in areas such as Mangrove Creek dam requires validation, as it is not expected to occur in the low resolution area.

## Vegetation Structure:

| Stratum | Mean height (m) | Min height (m) | Max height (m) | Mean cover (%) | Sdev | n |
|---|---|---|---|---|---|---|
| Emergent | | | | | | |
| Tallest | 20.42 | 8.00 | 35.00 | 43 | 12.2 | 24 |
| Middle 1 | 5.65 | 1.00 | 25.00 | 25 | 22.1 | 22 |
| Middle 2 | 2.44 | 1.00 | 5.00 | 33 | 38.3 | 5 |
| Middle 3 | 0.83 | 0.01 | 4.50 | 64 | 32.7 | 23 |
| Lowest | 0.48 | 0.10 | 0.80 | 36 | 43.1 | 4 |

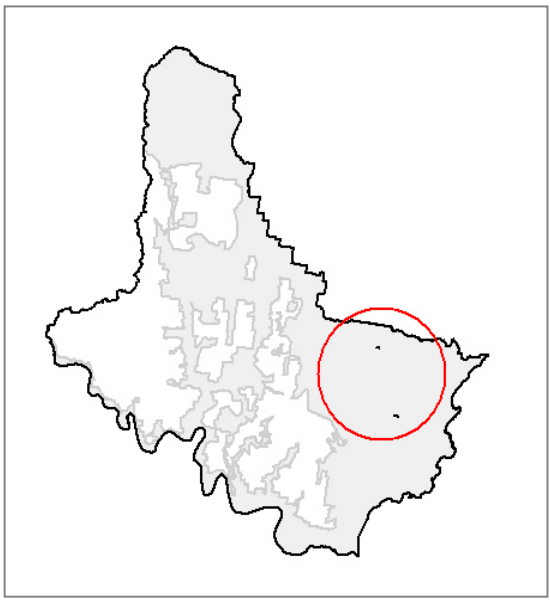
## Key Diagnostic Species [based on 24 plots]:

| Life Form | Species | Community | | All others | | Fidelity |
|---|---|---|---|---|---|---|
| | | c/a | Freq. | c/a | Freq. | |
| Tree | *Eucalyptus pilularis* | 3 | 67% | 3 | 11% | positive |
| | *Allocasuarina torulosa* | 3 | 58% | 2 | 25% | positive |
| | *Eucalyptus scias* | 2 | 8% | 0 | 0% | unique |
| | *Angophora costata* | 1 | 100% | 3 | 27% | uninformative |
| | *Corymbia gummifera* | 1 | 46% | 2 | 29% | uninformative |
| | *Syncarpia glomulifera subsp. glomulifera* | 1 | 21% | 2 | 29% | uninformative |
| | *Eucalyptus acmenoides* | 3 | 17% | 2 | 5% | uninformative |
| Palm | *Livistona australis* | 1 | 13% | 1 | 16% | uninformative |
| Small tree | *Glochidion ferdinandii* | 2 | 42% | 2 | 28% | positive |
| | *Banksia serrata* | 2 | 29% | 2 | 25% | uninformative |
| | *Allocasuarina littoralis* | 2 | 25% | 1 | 14% | uninformative |
| Shrub | *Xanthorrhoea minor subsp. minor* | 1 | 4% | 0 | 0% | unique |
| | *Persoonia levis* | 1 | 71% | 1 | 32% | uninformative |
| | *Platylobium formosum* | 1 | 71% | 2 | 6% | uninformative |
| | *Platysace lanceolata* | 1 | 58% | 2 | 13% | uninformative |
| | *Polyscias sambucifolia* | 1 | 58% | 1 | 15% | uninformative |
| | *Breynia oblongifolia* | 1 | 46% | 1 | 32% | uninformative |
| | *Persoonia linearis* | 1 | 46% | 1 | 25% | uninformative |
| | *Acacia ulicifolia* | 2 | 38% | 1 | 23% | uninformative |
| | *Macrozamia communis* | 2 | 38% | 2 | 10% | uninformative |
| | *Dodonaea triquetra* | 1 | 38% | 1 | 16% | uninformative |
| | *Dillwynia retorta* | 3 | 33% | 2 | 4% | uninformative |
| | *Podolobium ilicifolium* | 2 | 29% | 2 | 11% | uninformative |
| | *Leptospermum polygalifolium* | 2 | 25% | 2 | 24% | uninformative |
| | *Pimelea linifolia* | 2 | 25% | 1 | 20% | uninformative |
| | *Banksia spinulosa* | 1 | 25% | 2 | 16% | uninformative |
| | *Xanthorrhoea media* | 1 | 25% | 2 | 14% | uninformative |
| | *Acacia suaveolens* | 1 | 21% | 1 | 28% | uninformative |
| | *Duboisia myoporoides* | 1 | 21% | 1 | 5% | uninformative |
| | *Pittosporum undulatum* | 1 | 21% | 1 | 14% | uninformative |
| | *Platysace linearifolia* | 1 | 21% | 2 | 33% | uninformative |
| | *Pultenaea flexilis* | 1 | 21% | 1 | 11% | uninformative |
| | *Woollsia pungens* | 2 | 17% | 1 | 9% | uninformative |
| | *Xanthorrhoea macronema* | 2 | 17% | 2 | 2% | uninformative |
| | *Banksia integrifolia subsp. integrifolia* | 1 | 17% | 1 | 7% | uninformative |
| | *Leucopogon lanceolatus var lanceolatus* | 1 | 17% | 1 | 4% | uninformative |
| | *Pultenaea daphnoides* | 1 | 17% | 1 | 7% | uninformative |
| | *Xanthorrhoea arborea* | 3 | 13% | 1 | 7% | uninformative |
| | *Acacia floribunda* | 1 | 13% | 1 | 5% | uninformative |
| | *Gompholobium latifolium* | 1 | 13% | 1 | 15% | uninformative |
| | *Hibbertia empetrifolia subsp. empetrifolia* | 1 | 13% | 1 | 11% | uninformative |
| | *Leptomeria acida* | 1 | 13% | 1 | 3% | uninformative |
| | *Maytenus silvestris* | 1 | 13% | 1 | 9% | uninformative |
| | *Notelaea longifolia* | 1 | 13% | 1 | 16% | uninformative |
| | *Pittosporum revolutum* | 1 | 13% | 1 | 12% | uninformative |
| Herb | *Pratia purpurascens* | 2 | 42% | 2 | 20% | positive |
| | *Isotoma fluviatilis* | 1 | 4% | 0 | 0% | unique |
| | *Gonocarpus teucrioides* | 1 | 33% | 1 | 14% | uninformative |
| | *Pseuderanthemum variabile* | 2 | 25% | 2 | 16% | uninformative |
| | *Opercularia aspera* | 1 | 25% | 1 | 4% | uninformative |
| | *Pomax umbellata* | 1 | 25% | 2 | 16% | uninformative |
| | *Actinotus helianthi* | 2 | 21% | 1 | 6% | uninformative |
| | *Xanthosia pilosa* | 1 | 21% | 1 | 13% | uninformative |
| | *Gonocarpus tetragynus* | 2 | 13% | 2 | 5% | uninformative |
| | *Schelhammera undulata* | 2 | 13% | 2 | 8% | uninformative |
| | *Goodenia heterophylla* | 2 | 13% | 1 | 6% | uninformative |
| | *Plectranthus graveolens* | 1 | 13% | 2 | 1% | uninformative |
| Grass | *Themeda australis* | 2 | 71% | 2 | 21% | positive |
| | *Entolasia stricta* | 2 | 83% | 2 | 52% | constant |
| | *Imperata cylindrica var major* | 1 | 58% | 2 | 27% | uninformative |

| | | | | | | |
|---|---|---|---|---|---|---|
| | *Anisopogon avenaceus* | 1 | 13% | 2 | 16% | uninformative |
| Graminoid | *Dianella caerulea* | 1 | 83% | 1 | 49% | uninformative |
| | *Lomandra longifolia* | 1 | 67% | 2 | 43% | negative |
| | *Lomandra obliqua* | 2 | 17% | 2 | 20% | uninformative |
| Ground fern | *Schizaea fistulosa* | 1 | 4% | 0 | 0% | unique |
| | *Pteridium esculentum* | 3 | 79% | 2 | 40% | constant |
| | *Calochlaena dubia* | 3 | 33% | 3 | 17% | uninformative |
| | *Cheilanthes sieberi subsp. sieberi* | 1 | 21% | 2 | 6% | uninformative |
| | *Blechnum cartilagineum* | 2 | 17% | 2 | 16% | uninformative |
| | *Adiantum aethiopicum* | 2 | 13% | 2 | 12% | uninformative |
| Climber | *Billardiera scandens* | 1 | 63% | 1 | 27% | uninformative |
| | *Eustrephus latifolius* | 1 | 33% | 1 | 24% | uninformative |
| | *Geitonoplesium cymosum* | 1 | 33% | 1 | 23% | uninformative |
| | *Glycine clandestina* | 1 | 29% | 2 | 22% | uninformative |
| | *Hibbertia scandens* | 1 | 29% | 1 | 14% | uninformative |
| | *Parsonsia straminea* | 1 | 29% | 1 | 19% | uninformative |
| | *Pandorea pandorana subsp. pandorana* | 2 | 25% | 1 | 24% | uninformative |
| | *Cissus hypoglauca* | 1 | 21% | 1 | 18% | uninformative |
| | *Smilax glyciphylla* | 1 | 17% | 1 | 20% | uninformative |
| | *Stephania japonica var discolor* | 1 | 17% | 1 | 17% | uninformative |
| | *Cassytha glabella forma glabella* | 1 | 13% | 2 | 15% | uninformative |
| Sedge/ Rush | *Lepidosperma laterale* | 1 | 38% | 2 | 26% | uninformative |
| | *Gahnia clarkei* | 2 | 13% | 2 | 11% | uninformative |

# Narrabeen Coastal Apple Forest
## Coastal Narrabeen Shrub Forest

# Unit E22b
## REMS Unit 22



## General Description:
Narrabeen Coastal Apple Forest occurs on exposed slopes of the Erina soil landscape, within the wider landscape of Narrabeen Coastal Blackbutt Forest (Unit E22a). This sub-community is dominated by *Angophora floribunda, Eucalyptus siderophloia* and *Allocasuarina torulosa* in the canopy, which replaces *Eucalyptus pilularis* in exposed situations. Understorey vegetation is not dissimilar to that present within Unit E22a, but shrubs are less common and grasses and herbs more diverse. Additional survey work is required to more clearly define this sub-community. Only those stands encountered in the field have been mapped.

## Known Floristic/ Structural Variations:
No variations have been recognised.

## Distribution:
*Within Gosford LGA* – currently known only from a few small patches on the northern lower slopes of Kincumber Mountain, and at Narrara.

*Within LHCC Region* – NPWS (2000) have mapped 7461ha of their Coastal Narrabeen Shrub Forest (Unit 22) as remaining in the region, although this also includes a variant in the Watagan Mountains in Lake Macquarie LGA.

*Examples Within Gosford LGA*
- Off Koolang Road, Erina

## Extent:
*Extant* - 7.18 ha

## Relationship to Other Communities:
The presence of *Angophora floribunda* as a prominent component of the canopy distinguishes this type from other communities on the Erina Hills. Dharug Footslopes Apple-Redgum Forest (Unit 20) occupies a similar environment, but encompasses a different suite of understorey species, and comprises *Eucalyptus tereticornis* in the canopy.

## Equivalent Vegetation Types:

- Benson 1981 (Mangrove Creek): n/a
- Benson & Fallding 1981 (Brisbane Water) n/a
- Benson 1986 (Gosf-Lake Mac): (?) Open-Forest (Unit 9g)
- Clarke & Benson 1986 (Dharug): n/a
- Strom 1986 (Bouddi Peninsula): n/a
- Clarke & Benson 1987 (Mt White/ Mt Olive): n/a
- McRae 1990 (Bouddi Peninsula): n/a
- Binns 1996 (SF MFD): n/a
- Payne 1997 (Cockle Bay/ Bouddi): n/a
- Bell 1998 (Popran NP): n/a
- Bell 2002 (Wyong LGA): n/a

## Significant Species:

- Undescribed species – *none recorded*
- Threatened (TSC Act) – *none recorded*
- Rare (ROTAP) – *none recorded*

## Community Conservation Status:

*Reserve Representation* - within Gosford, this vegetation type is known from the lower slopes of Kincumber Mountain Reserve, but is otherwise not formally reserved.

*TSC Act (1995) Status* - not currently listed.

## Mapping Reliability & Included Units:

*High Resolution Area* – this vegetation type has been mapped from aerial photographic interpretation and ground truthing.

*Low Resolution Area* – not expected to occur in the low resolution area.

## Vegetation Structure:

| Stratum | Mean height (m) | Min height (m) | Max height (m) | Mean cover (%) | Sdev | n |
|---|---|---|---|---|---|---|
| Emergent | | | | | | |
| Tallest | 21.50 | 18.00 | 25.00 | 10 | | 1 |
| Middle 1 | 12.50 | 10.00 | 15.00 | 45 | | 1 |
| Middle 2 | 4.00 | 2.00 | 6.00 | 35 | | 1 |
| Middle 3 | | | | | | |
| Lowest | 0.55 | 0.10 | 1.00 | 45 | | 1 |

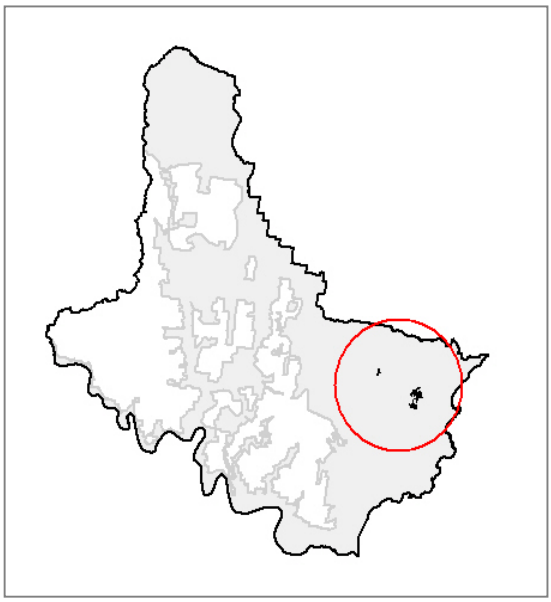
## Key Diagnostic Species [based on 1 plot]:

| Life Form | Species | Community | | All others | | Fidelity |
|---|---|---|---|---|---|---|
| | | c/a | Freq. | c/a | Freq. | |
| Tree | *Angophora floribunda* | 4 | 100% | 2 | 19% | positive |
| | *Eucalyptus siderophloia* | 3 | 100% | 2 | 1% | positive |
| | *Corymbia gummifera* | 1 | 100% | 2 | 30% | uninformative |
| | *Cryptocarya microneura* | 1 | 100% | 2 | 5% | uninformative |
| Palm | *Livistona australis* | 1 | 100% | 1 | 15% | uninformative |
| Small tree | *Allocasuarina littoralis* | 3 | 100% | 1 | 14% | positive |
| | *Glochidion ferdinandii* | 2 | 100% | 2 | 28% | positive |

| | | | | | | |
|---|---|---|---|---|---|---|
| | *Acacia schinoides* | 1 | 100% | 2 | 3% | uninformative |
| | *Alphitonia excelsa* | 1 | 100% | 1 | 9% | uninformative |
| Shrub | *Platylobium formosum* | 3 | 100% | 2 | 10% | positive |
| | *Acacia longifolia* | 2 | 100% | 1 | 11% | positive |
| | *Persoonia linearis* | 2 | 100% | 1 | 26% | positive |
| | *Podolobium ilicifolium* | 2 | 100% | 2 | 12% | positive |
| | *Breynia oblongifolia* | 1 | 100% | 1 | 33% | uninformative |
| | *Cassinia uncata* | 1 | 100% | 1 | 0% | uninformative |
| | *Clerodendrum tomentosum* | 1 | 100% | 1 | 11% | uninformative |
| | *Leucopogon lanceolatus var lanceolatus* | 1 | 100% | 1 | 5% | uninformative |
| | *Maytenus silvestris* | 1 | 100% | 1 | 9% | uninformative |
| | *Persoonia levis* | 1 | 100% | 1 | 34% | uninformative |
| | *Polyscias sambucifolia* | 1 | 100% | 1 | 17% | uninformative |
| Herb | *Brunoniella australis* | 2 | 100% | 2 | 7% | positive |
| | *Pratia purpurascens* | 1 | 100% | 2 | 21% | uninformative |
| | *Vernonia cinerea var cinerea* | 1 | 100% | 1 | 2% | uninformative |
| | *Veronica plebeia* | 1 | 100% | 1 | 3% | uninformative |
| Grass | *Themeda australis* | 4 | 100% | 2 | 24% | positive |
| | *Imperata cylindrica var major* | 3 | 100% | 2 | 29% | positive |
| | *Oplismenus imbecillis* | 2 | 100% | 2 | 17% | positive |
| | *Panicum simile* | 2 | 100% | 1 | 5% | positive |
| | *Entolasia marginata* | 1 | 100% | 2 | 16% | uninformative |
| | *Poa affinis* | 1 | 100% | 2 | 6% | uninformative |
| | *Entolasia stricta* | 2 | 100% | 2 | 53% | constant |
| Graminoid | *Dianella caerulea* | 2 | 100% | 1 | 51% | positive |
| | *Lomandra longifolia* | 1 | 100% | 2 | 44% | negative |
| Ground fern | *Pteridium esculentum* | 3 | 100% | 2 | 42% | constant |
| Climber | *Billardiera scandens* | 2 | 100% | 1 | 29% | positive |
| | *Clematis glycinoides var glycinoides* | 2 | 100% | 1 | 6% | positive |
| | *Desmodium rhytidophyllum* | 2 | 100% | 2 | 7% | positive |
| | *Dioscorea transversa* | 2 | 100% | 1 | 11% | positive |
| | *Eustrephus latifolius* | 2 | 100% | 1 | 24% | positive |
| | *Geitonoplesium cymosum* | 2 | 100% | 1 | 24% | positive |
| | *Glycine clandestina* | 2 | 100% | 2 | 22% | positive |
| | *Glycine microphylla* | 2 | 100% | 1 | 3% | positive |
| | *Hibbertia scandens* | 2 | 100% | 1 | 14% | positive |
| | *Pandorea pandorana subsp. pandorana* | 2 | 100% | 1 | 24% | positive |
| | *Cayratia clematidea* | 1 | 100% | 1 | 6% | uninformative |
| | *Hardenbergia violacea* | 1 | 100% | 1 | 10% | uninformative |
| | *Parsonsia straminea* | 1 | 100% | 1 | 19% | uninformative |
| | *Rubus moluccanus var trilobus* | 1 | 100% | 1 | 7% | uninformative |
| | *Stephania japonica var discolor* | 1 | 100% | 1 | 17% | uninformative |
| Sedge/ Rush | *Lepidosperma laterale* | 2 | 100% | 2 | 27% | positive |

# Narrabeen Coastal Peppermint Forest Unit E22c

## Coastal Narrabeen Shrub Forest REMS Unit 22



## General Description:

Narrabeen Coastal Peppermint Forest occurs principally in the Erina area on the lower relief Narrabeen Sandstone footslopes, with a small outlier at Wyoming. The vegetation here is dominated by *Eucalyptus piperita, Corymbia gummifera*, and *Angophora costata*, and supports a well-developed shrub understorey of species such as *Banksia spinulosa, Lomatia silaifolia*, and various wattles (*Acacia*) and peas. This vegetation is distinct from the upslope areas of Narrabeen Coastal Blackbutt Forest (Unit E22a), although in parts a broad ecotone exists (described in Unit E22d). It is likely that much of the current urban area around the North Gosford-Erina area once supported this vegetation type.

## Known Floristic/ Structural Variations:

No variants have been recognised, although localised dominance by any of the major canopy species may occur, and fire history will determine the relative proportion of pea species in the understorey.

## Distribution:

*Within Gosford LGA* – occupies a small portion of the footslopes of Katandra Mountain at Wyoming, but the main area of occurrence is between The Entrance Road and Karalta Road at Erina.

*Within LHCC Region* – NPWS (2000) have mapped 7461ha of their Coastal Narrabeen Shrub Forest (Unit 22) as remaining in the region, although this also includes a variant in the Watagan Mountains in Lake Macquarie LGA.

*Examples Within Gosford LGA*

- Japonica Drive, Wyoming
- Karalta Road, Erina
- Portsmouth Road, Erina

## Extent:

*Extant* - 45.90 ha

## Relationship to Other Communities:

This community is most similar to the Kincumber Scribbly Gum Forest (Unit E102), although the dominance of *Eucalyptus racemosa* in the canopy of that community easily distinguishes the two. It is also similar to the Hawkesbury Peppermint-Apple Forest (Unit E25), but that type occurs on steeper sheltered slopes of Hawkesbury Sandstone material, and includes a range of understorey species rare or absent from Unit E22c.

## Equivalent Vegetation Types:

- Benson 1981 (Mangrove Creek): n/a
- Benson & Fallding 1981 (Brisbane Water) n/a
- Benson 1986 (Gosf-Lake Mac): (?) Open-Forest (Unit 9g)
- Clarke & Benson 1986 (Dharug): n/a
- Strom 1986 (Bouddi Peninsula): n/a
- Clarke & Benson 1987 (Mt White/ Mt Olive): n/a
- McRae 1990 (Bouddi Peninsula): n/a
- Binns 1996 (SF MFD): n/a
- Payne 1997 (Cockle Bay/ Bouddi): n/a
- Bell 1998 (Popran NP): n/a
- Bell 2002 (Wyong LGA): n/a

## Significant Species:

- Undescribed species – *none recorded*
- Threatened (TSC Act) – *none recorded*
- Rare (ROTAP) – *none recorded*

## Community Conservation Status:

*Reserve Representation* - within Gosford, this vegetation type is not known in reservation.

*TSC Act (1995) Status* - not currently listed.

## Mapping Reliability & Included Units:

*High Resolution Area* – this vegetation type has been mapped from aerial photographic interpretation and ground truthing.

*Low Resolution Area* – not expected to occur in the low resolution area.

## Vegetation Structure:

| Stratum | Mean height (m) | Min height (m) | Max height (m) | Mean cover (%) | Sdev | n |
|---|---|---|---|---|---|---|
| Emergent | | | | | | |
| Tallest | 18.00 | 16.00 | 20.00 | 35 | | 1 |
| Middle 1 | 3.50 | 2.00 | 5.00 | 5 | | 1 |
| Middle 2 | 0.95 | 0.30 | 1.60 | 45 | | 1 |
| Middle 3 | | | | | | |
| Lowest | 0.15 | 0.01 | 0.30 | 65 | | 1 |

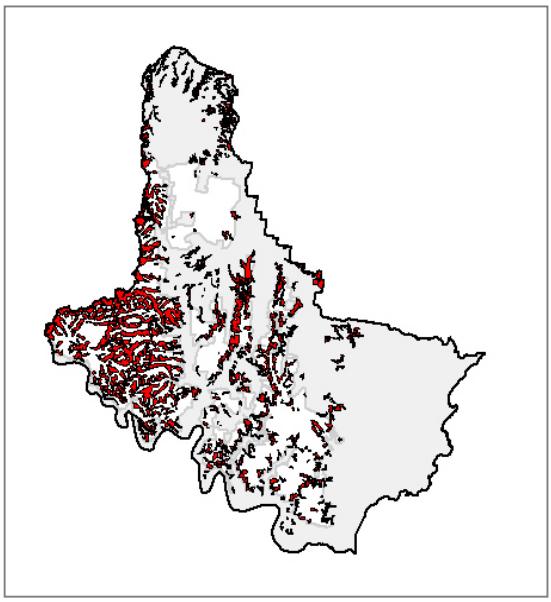
## Key Diagnostic Species [based on 1 plot]:

| Life Form | Species | Community | | All others | | Fidelity |
|---|---|---|---|---|---|---|
| | | c/a | Freq. | c/a | Freq. | |
| Tree | *Angophora costata* | 3 | 100% | 2 | 31% | positive |
| | *Corymbia gummifera* | 3 | 100% | 2 | 30% | positive |
| | *Eucalyptus piperita* | 3 | 100% | 2 | 13% | positive |

| | | | | | | |
|---|---|---|---|---|---|---|
| | *Allocasuarina torulosa* | 2 | 100% | 2 | 27% | positive |
| Small tree | *Glochidion ferdinandii* | 2 | 100% | 2 | 28% | positive |
| Shrub | *Gompholobium latifolium* | 4 | 100% | 1 | 15% | positive |
| | *Acacia ulicifolia* | 3 | 100% | 1 | 24% | positive |
| | *Bossiaea obcordata* | 3 | 100% | 2 | 10% | positive |
| | *Grevillea linearifolia* | 2 | 100% | 2 | 3% | positive |
| | *Hibbertia aspera* | 2 | 100% | 1 | 4% | positive |
| | *Persoonia levis* | 2 | 100% | 1 | 34% | positive |
| | *Pimelea linifolia* | 2 | 100% | 1 | 20% | positive |
| | *Xanthorrhoea macronema* | 2 | 100% | 2 | 3% | positive |
| | *Breynia oblongifolia* | 1 | 100% | 1 | 33% | uninformative |
| | *Epacris pulchella* | 1 | 100% | 2 | 14% | uninformative |
| | *Leptospermum polygalifolium* | 1 | 100% | 2 | 24% | uninformative |
| | *Monotoca scoparia* | 1 | 100% | 1 | 10% | uninformative |
| | *Platysace lanceolata* | 1 | 100% | 2 | 16% | uninformative |
| | *Podolobium ilicifolium* | 1 | 100% | 2 | 12% | uninformative |
| | *Xanthorrhoea arborea* | 1 | 100% | 2 | 7% | uninformative |
| Sub-shrub | *Tetratheca thymifolia* | 2 | 100% | 1 | 4% | positive |
| Herb | *Goodenia heterophylla* | 2 | 100% | 1 | 6% | positive |
| | *Pomax umbellata* | 2 | 100% | 2 | 16% | positive |
| | *Pratia purpurascens* | 2 | 100% | 2 | 21% | positive |
| | *Drosera auriculata* | 1 | 100% | 2 | 3% | uninformative |
| Grass | *Themeda australis* | 4 | 100% | 2 | 24% | positive |
| | *Imperata cylindrica var major* | 2 | 100% | 2 | 29% | positive |
| | *Microlaena stipoides var stipoides* | 2 | 100% | 2 | 10% | positive |
| | *Panicum simile* | 2 | 100% | 1 | 5% | positive |
| | *Entolasia stricta* | 3 | 100% | 2 | 53% | constant |
| | *Aristida vagans* | 1 | 100% | 1 | 5% | uninformative |
| | *Eragrostis brownii* | 1 | 100% | 1 | 3% | uninformative |
| Graminoid | *Lomandra obliqua* | 2 | 100% | 2 | 19% | positive |
| | *Dianella caerulea* | 1 | 100% | 1 | 51% | uninformative |
| | *Lomandra filiformis* | 1 | 100% | 1 | 9% | uninformative |
| | *Lomandra longifolia* | 1 | 100% | 2 | 44% | negative |
| Ground fern | *Pteridium esculentum* | 2 | 100% | 2 | 42% | constant |
| Ground orchid | *Cryptostylis subulata* | 2 | 100% | 1 | 2% | positive |
| Climber | *Glycine clandestina* | 2 | 100% | 2 | 22% | positive |
| | *Billardiera scandens* | 1 | 100% | 1 | 29% | uninformative |
| | *Cassytha glabella forma glabella* | 1 | 100% | 2 | 14% | uninformative |
| | *Eustrephus latifolius* | 1 | 100% | 1 | 24% | uninformative |
| Sedge/ Rush | *Lepidosperma laterale* | 2 | 100% | 2 | 27% | positive |

# Hawkesbury Peppermint-Apple Forest — Unit E25

## Sheltered Dry Hawkesbury Woodland — REMS Unit 25



## General Description:

Occurring on sheltered slopes of both the upper Narrabeen and Hawkesbury Sandstone formations, Hawkesbury Peppermint-Apple Forest represents a widespread vegetation type occurring between the exposed forests and woodlands of the sandstone plateaus and the moister sheltered slopes forest at lower elevations. It is characterised by a canopy of species such as *Eucalyptus piperita, Angophora costata, Allocasuarina torulosa, Syncarpia glomulifera* subsp. *glomulifera, Corymbia gummifera, Eucalyptus scias* subsp. *scias,* and *Eucalyptus umbra*. Other eucalypts from adjoining communities are also regularly present, but always in low numbers. Understorey composition is generally dry with few herbs, and includes shrubs such as *Persoonia linearis, Acacia ulicifolia, Podolobium ilicifolium, Leptospermum polygalifolium,* and *Lomatia silaifolia*.

## Known Floristic/ Structural Variations:

No variants have been identified for this community. *Eucalyptus scias* subsp. *scias* may be locally common, but does not appear to be consistently tied to any environmental feature.

## Distribution:

*Within Gosford LGA* – occurs on sheltered higher slopes of the Hawkesbury Sandstones and upper Narrabeen Sandstones, west of Brisbane Water.

*Within LHCC Region* – NPWS (2000) have mapped 18639ha in their Sheltered Dry Hawkesbury Woodland (Unit 25) as remaining in the region.

*Examples Within Gosford LGA*

- Mangrove Road, Niagara Park
- Reservoir Road, Somersby

## Extent:

*Extant* - 13061.21 ha

## Relationship to Other Communities:

Hawkesbury Peppermint-Apple Forest can be differentiated from the adjoining Exposed Hawkesbury Woodland (Unit E26), which also supports *Eucalyptus piperita, Corymbia gummifera, Eucalyptus umbra,* and *Syncarpia glomulifera*

subsp. *glomulifera*, by the understorey. The composition in Unit E26 is considerably different, with many more "typical" Hawkesbury Sandstone species present (eg: *Boronia pinnata, Grevillea buxifolia, Acacia linifolia, Actinotus minor*). Other communities where *Eucalyptus piperita* is prominent include the Narrabeen Coastal Peppermint Forest (Unit E22c), which is restricted to the Erina area on flat to undulating Narrabeen Sandstone footslopes, and the Kincumber Scribbly Gum Forest (Unit E102) which supports *Eucalyptus racemosa* as a dominant canopy species.

## Equivalent Vegetation Types:

- Benson 1981 (Mangrove Creek): *Angophora costata-Eucalyptus pipertia* open forest
- Benson & Fallding 1981 (Brisbane Water) Open-forest to low open-forest (Unit 4)
- Benson 1986 (Gosf-Lake Mac): Open-Forest/ Woodland (Unit 10a)
- Clarke & Benson 1986 (Dharug): Open forest (Unit C1)
- Strom 1986 (Bouddi Peninsula): n/a
- Clarke & Benson 1987 (Mt White/ Mt Olive): Smooth-barked Apple Forest (Unit C1)
- McRae 1990 (Bouddi Peninsula): n/a
- Binns 1996 (SF MFD): (?) MORF 19 *Angophora costata – Eucalyptus gummifera – Eucalyptus piperita*
- Payne 1997 (Cockle Bay/ Bouddi): n/a
- Bell 1998 (Popran NP): Hawkesbury Coastal Sheltered Dry Forest (Unit F3)
- Bell 2002 (Wyong LGA): Hunter Ranges Sheltered Dry Peppermint Forest (Unit 34)

## Significant Species:

- Undescribed species – *none recorded*
- Threatened (TSC Act) – *none recorded*
- Rare (ROTAP) – *Lomandra brevis*

## Community Conservation Status:

*Reserve Representation* - within Gosford, this vegetation type is known from Popran, Brisbane Water and Dharug NP's.

*TSC Act (1995) Status* - not currently listed.

## Mapping Reliability & Included Units:

*High Resolution Area* – this vegetation type has been mapped from aerial photographic interpretation and ground truthing. Sub-communities of the Exposed Hawkesbury Forests (Unit E26) may be included in some parts.

*Low Resolution Area* – this community is included within the modelling of Sheltered Dry Hawkesbury Woodland (Unit 25) of REMS.

## Vegetation Structure:

| Stratum | Mean height (m) | Min height (m) | Max height (m) | Mean cover (%) | Sdev | n |
|---|---|---|---|---|---|---|
| Emergent | | | | | | |
| Tallest | 17.58 | 4.00 | 35.00 | 38 | 17.6 | 30 |
| Middle 1 | 4.92 | 0.50 | 15.00 | 43 | 30.4 | 30 |
| Middle 2 | 2.60 | 1.00 | 6.00 | 41 | 16.0 | 5 |
| Middle 3 | | | | | | |
| Lowest | 1.09 | 0.01 | 6.00 | 49 | 27.9 | 30 |

## Key Diagnostic Species [based on 39 plots]:

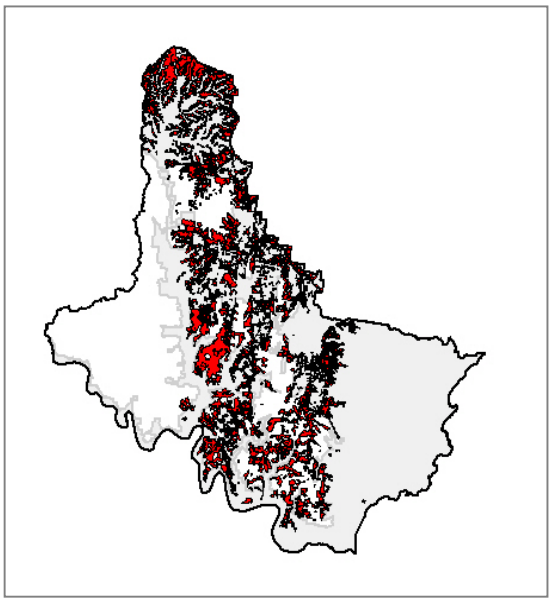
| Life Form | Species | Community | | All others | | Fidelity |
|---|---|---|---|---|---|---|
| | | c/a | Freq. | c/a | Freq. | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Tree | *Angophora costata* | 3 | 97% | 2 | 24% | positive |
| | *Syncarpia glomulifera subsp. glomulifera* | 2 | 56% | 2 | 26% | positive |
| | *Eucalyptus piperita* | 3 | 54% | 2 | 9% | positive |
| | *Corymbia gummifera* | 2 | 51% | 2 | 28% | positive |
| | *Allocasuarina torulosa* | 2 | 33% | 2 | 26% | uninformative |
| | *Eucalyptus umbra* | 2 | 26% | 2 | 9% | uninformative |
| | *Eucalyptus punctata* | 2 | 23% | 2 | 13% | uninformative |
| | *Angophora floribunda* | 1 | 13% | 2 | 19% | uninformative |
| | *Eucalyptus globoidea* | 2 | 8% | 1 | 2% | uninformative |
| | *Eucalyptus pilularis* | 2 | 8% | 3 | 15% | uninformative |
| | *Eucalyptus acmenoides* | 3 | 5% | 2 | 6% | uninformative |
| | *Eucalyptus agglomerata* | 3 | 5% | 3 | 1% | uninformative |
| | *Corymbia maculata* | 1 | 5% | 3 | 2% | uninformative |
| Palm | *Livistona australis* | 1 | 21% | 1 | 15% | uninformative |
| Small tree | *Banksia serrata* | 2 | 31% | 2 | 24% | uninformative |
| | *Ceratopetalum gummiferum* | 2 | 31% | 1 | 3% | uninformative |
| | *Allocasuarina littoralis* | 1 | 21% | 2 | 14% | uninformative |
| | *Acacia elata* | 2 | 13% | 2 | 6% | uninformative |
| | *Acacia schinoides* | 3 | 10% | 1 | 3% | uninformative |
| | *Callicoma serratifolia* | 2 | 10% | 2 | 3% | uninformative |
| | *Trochocarpa laurina* | 1 | 10% | 1 | 9% | uninformative |
| Shrub | *Leptospermum polygalifolium* | 3 | 62% | 2 | 20% | positive |
| | *Acacia ulicifolia* | 2 | 62% | 1 | 20% | positive |
| | *Tristania neriifolia* | 3 | 3% | 0 | 0% | unique |
| | *Boronia rubiginosa* | 2 | 3% | 0 | 0% | unique |
| | *Melichrus urceolatus* | 2 | 3% | 0 | 0% | unique |
| | *Prostanthera linearis* | 2 | 3% | 0 | 0% | unique |
| | *Choretrum species A* | 1 | 3% | 0 | 0% | unique |
| | *Phebalium obcordatum* | 1 | 3% | 0 | 0% | unique |
| | *Persoonia levis* | 1 | 59% | 1 | 31% | uninformative |
| | *Acacia linifolia* | 1 | 54% | 1 | 10% | uninformative |
| | *Platysace linearifolia* | 1 | 54% | 2 | 30% | uninformative |
| | *Gompholobium latifolium* | 1 | 41% | 1 | 12% | uninformative |
| | *Persoonia linearis* | 1 | 41% | 1 | 24% | uninformative |
| | *Doryanthes excelsa* | 2 | 38% | 1 | 10% | uninformative |
| | *Pimelea linifolia* | 1 | 38% | 1 | 19% | uninformative |
| | *Banksia spinulosa* | 2 | 33% | 2 | 15% | uninformative |
| | *Dodonaea triquetra* | 2 | 33% | 1 | 15% | uninformative |
| | *Lomatia silaifolia* | 1 | 33% | 1 | 10% | uninformative |
| | *Acacia terminalis* | 1 | 33% | 1 | 7% | uninformative |
| | *Grevillea buxifolia* | 1 | 31% | 2 | 18% | uninformative |
| | *Pultenaea daphnoides* | 1 | 31% | 1 | 5% | uninformative |
| | *Acacia suaveolens* | 1 | 28% | 1 | 28% | uninformative |
| | *Pultenaea flexilis* | 2 | 28% | 1 | 10% | uninformative |
| | *Boronia ledifolia* | 2 | 28% | 1 | 10% | uninformative |
| | *Dillwynia floribunda* | 1 | 28% | 2 | 10% | uninformative |
| | *Lasiopetalum ferrugineum* | 1 | 28% | 1 | 3% | uninformative |
| | *Grevillea sericea* | 2 | 26% | 2 | 7% | uninformative |
| | *Leptospermum trinervium* | 2 | 26% | 2 | 28% | uninformative |
| | *Xanthorrhoea arborea* | 3 | 26% | 1 | 5% | uninformative |
| Sub-shrub | *Astroloma humifusum* | 1 | 3% | 0 | 0% | unique |
| | *Pultenaea rosmarinifolia* | 1 | 23% | 2 | 14% | uninformative |
| | *Hibbertia monogyna* | 1 | 18% | 1 | 4% | uninformative |
| | *Scaevola ramosissima* | 1 | 15% | 1 | 7% | uninformative |
| Herb | *Opercularia diphylla* | 1 | 3% | 0 | 0% | unique |
| | *Xanthosia pilosa* | 1 | 54% | 1 | 9% | uninformative |
| | *Phyllanthus hirtellus* | 1 | 38% | 2 | 16% | uninformative |
| | *Pomax umbellata* | 2 | 36% | 2 | 14% | uninformative |

| | | | | | | |
|---|---|---|---|---|---|---|
| | *Gonocarpus teucrioides* | 1 | 33% | 1 | 13% | uninformative |
| | *Xanthosia tridentata* | 2 | 23% | 1 | 9% | uninformative |
| | *Amperea xiphoclada* | 2 | 15% | 1 | 3% | uninformative |
| | *Gonocarpus tetragynus* | 2 | 15% | 2 | 4% | uninformative |
| | *Correa reflexa* | 1 | 15% | 1 | 4% | uninformative |
| | *Goodenia heterophylla* | 2 | 13% | 1 | 6% | uninformative |
| | *Hybanthus monopetalus* | 1 | 13% | 1 | 4% | uninformative |
| | *Micrantheum ericoides* | 1 | 13% | 1 | 4% | uninformative |
| Grass | *Entolasia stricta* | 2 | 72% | 2 | 51% | constant |
| | *Themeda australis* | 2 | 26% | 2 | 24% | uninformative |
| | *Imperata cylindrica var major* | 2 | 26% | 2 | 30% | uninformative |
| | *Entolasia marginata* | 2 | 18% | 2 | 16% | uninformative |
| | *Anisopogon avenaceus* | 1 | 18% | 2 | 16% | uninformative |
| | *Microlaena stipoides var stipoides* | 1 | 13% | 2 | 10% | uninformative |
| Graminoid | *Dianella caerulea* | 2 | 69% | 1 | 49% | positive |
| | *Lomandra longifolia* | 1 | 74% | 2 | 42% | negative |
| | *Lomandra obliqua* | 1 | 28% | 2 | 19% | uninformative |
| | *Lomandra gracilis* | 1 | 23% | 1 | 5% | uninformative |
| | *Lomandra multiflora subsp. multiflora* | 1 | 21% | 1 | 5% | uninformative |
| | *Lomandra filiformis* | 1 | 18% | 1 | 8% | uninformative |
| | *Patersonia sericea* | 1 | 15% | 2 | 18% | uninformative |
| | *Lomandra glauca* | 1 | 13% | 2 | 19% | uninformative |
| Ground fern | *Pteridium esculentum* | 2 | 85% | 2 | 38% | positive |
| | *Gleichenia rupestris* | 5 | 3% | 0 | 0% | unique |
| | *Calochlaena dubia* | 1 | 26% | 3 | 17% | uninformative |
| | *Lindsaea linearis* | 2 | 18% | 2 | 15% | uninformative |
| | *Schizaea bifida* | 1 | 15% | 1 | 3% | uninformative |
| | *Gleichenia dicarpa* | 4 | 10% | 2 | 7% | uninformative |
| | *Blechnum cartilagineum* | 1 | 10% | 2 | 17% | uninformative |
| | *Lindsaea microphylla* | 1 | 10% | 1 | 3% | uninformative |
| Epiphtyic fern | *Grammitis billardierei* | 2 | 3% | 0 | 0% | unique |
| Ground orchid | *Lyperanthus suaveolens* | 2 | 3% | 0 | 0% | unique |
| | *Cryptostylis subulata* | 1 | 10% | 1 | 1% | uninformative |
| Epiphytic orchid | *Cymbidium suave* | 1 | 13% | 1 | 4% | uninformative |
| Climber | *Smilax glyciphylla* | 1 | 44% | 1 | 17% | uninformative |
| | *Billardiera scandens* | 1 | 31% | 1 | 29% | uninformative |
| | *Hardenbergia violacea* | 1 | 21% | 1 | 9% | uninformative |
| | *Cassytha pubescens* | 1 | 21% | 1 | 7% | uninformative |
| | *Parsonsia straminea* | 1 | 18% | 1 | 20% | uninformative |
| | *Kennedia rubicunda* | 1 | 15% | 1 | 11% | uninformative |
| | *Hibbertia scandens* | 1 | 10% | 1 | 15% | uninformative |
| | *Marsdenia suaveolens* | 1 | 10% | 1 | 1% | uninformative |
| | *Pandorea pandorana subsp. pandorana* | 1 | 10% | 1 | 25% | uninformative |
| Mistletoe | *Amyema congener subsp. congener* | 1 | 3% | 1 | 0% | uninformative |
| Sedge/ Rush | *Lepidosperma laterale* | 2 | 46% | 2 | 25% | positive |
| | *Gahnia sieberiana* | 1 | 23% | 1 | 5% | uninformative |
| | *Schoenus melanostachys* | 2 | 18% | 1 | 2% | uninformative |
| | *Cyathochaeta diandra* | 2 | 13% | 2 | 21% | uninformative |
| | *Lepyrodia scariosa* | 3 | 10% | 2 | 20% | uninformative |

# Exposed Hawkesbury Woodland Unit E26

## Exposed Hawkesbury Woodland REMS Unit 26



## General Description:

Exposed Hawkesbury Woodland is widely distributed across the major Hawkesbury Sandstone plateaus, from Mangrove to the Hawkesbury River, and east into Brisbane Water National Park. There is considerable variation in both floristics and structure, generally relating to local fire history and soil drainage conditions. Characteristically, the presence of *Eucalyptus haemastoma, Corymbia gummifera*, and *Angophora costata* occur as widely spaced trees in the canopy, over a diverse heathy understorey containing many species from the Fabaceae, Mimosoidaceae, Myrtaceae, Proteaceae and Rutaceae families. Fire history and soil drainage are important determiners of local floristic and structural variation.

## Known Floristic/ Structural Variations:

(a) Type variant (mapped as E26) – in the typical variant, the canopy comprises varying combinations of *Eucalyptus haemastoma, Corymbia gummifera* and *Angophora costata* over a range of sclerophyllous understorey species such as *Banksia spinulosa, Lomatia silaifolia, Acacia* spp*., Banksia serrata, Dillwynia* spp*., Boronia ledifolia*, etc. In moister locations, sedges such as *Lepyrodia scariosa* can become prominent.

(b) *Banksia* scrub-woodland variant (included in E26) - in some locations, dense understorey stands of *Banksia ericifolia* subsp*. ericifolia* occur, forming a scrub-woodland. Such areas are dynamic, and depend heavily on prevailing fire history. These areas appear to differ from similar vegetation described as Unit E28 through the absence of *Angophora hispida*, although additional survey and analysis in this widespread unit is required.

(c) Bloodwood-Snappy Gum variant (included in E26) – at the top end of the Mangrove Creek catchment in the northern part of the LGA, open forests and woodlands occur where bloodwoods (*Corymbia gummifera* and *Corymbia eximia*) and Snappy Gum (*Eucalyptus racemosa*) become prominent, over a heathy understorey. Very few sample sites have been completed in this location, hence sufficient information on floristic composition is not yet available. This area has been modelled by NPWS (2000) as supporting Hunter Range Grey Gum Forest (REMS Unit 21), but limited ground truthing during the current project, together with the work of Benson (1981) in that area, suggest that this community does not occur there.

## Distribution:

*Within Gosford LGA* – widespread on Hawkesbury Sandstone ridgetops and exposed slopes, from Mangrove to the Hawkesbury River, east to Brisbane Water NP, and west to the Mangrove Creek area.

*Within LHCC Region* – NPWS (2000) have modelled 16504ha of their Exposed Hawkesbury Woodland (Unit 26) as remaining in the region.

*Examples Within Gosford LGA*
- Piles Creek picnic area, Brisbane Water NP (variant a)
- George Downes Drive, Kulnura (variants a, b & c)

## Extent:

*Extant* - 17195.23ha

## Relationship to Other Communities:

The dominance of *Eucalyptus haemastoma* with *Corymbia gummifera* and *Angophora costata* in a woodland structure, together with a diverse heathy understorey distinguish this community from other similar types on Hawkesbury Sandstone. In the Somersby Plateau Forest (Unit E26d), *Eucalyptus haemastoma* is replaced with *Eucalyptus sieberi* in the canopy, and *Doryanthes sieberi* becomes more prevalent in the understorey. *Eucalyptus capitellata, Eucalyptus piperita, Syncarpia glomulifera* subsp*. glomulifera* and *Eucalyptus umbra* also tend to become more common in that type. Further west, the Dharug Arid Exposed Woodland (Unit E27) is characterised by *Corymbia eximia* and *Angophora bakeri* in the canopy, but with some overlap in understorey species.

## Equivalent Vegetation Types:

- Benson 1981 (Mangrove Creek): (?) *Eucalyptus eximia-Eucalyptus gummifera-Eucalyptus punctata* Woodland
- Benson & Fallding 1981 (Brisbane Water) Open-forest (Unit 4S) & Low woodland to low open woodland (Unit 6)
- Benson 1986 (Gosf-Lake Mac): (?) Low Woodland (Unit 10a)
- Clarke & Benson 1986 (Dharug): (?) Woodland (Unit C2)
- Strom 1986 (Bouddi Peninsula): (?) Low woodland (Unit 5.2.1, 5.2.2 & 5.2.3) & Low open woodland (Units 6.1.1 & 6.1.2)
- Clarke & Benson 1987 (Mt White/ Mt Olive): Bloodwood/ Scribbly Gum Woodland (Unit C2)
- McRae 1990 (Bouddi Peninsula): Woodland/ open-heath (Unit 2.3)
- Binns 1996 (SF MFD): MORf 20 *Banksia serrata – Eucalyptus gummifera – Eucalyptus haemastoma*
- Payne 1997 (Cockle Bay/ Bouddi): n/a
- Bell 1998 (Popran NP): Hawkesbury Hornsby Plateau Exposed woodland (Unit W2)
- Bell 2002 (Wyong LGA): (?) Hawkesbury Exposed Kulnura Plateau Forest (Unit 38)

## Significant Species:

- Undescribed species – *none recorded*
- Threatened (TSC Act) – *Prostanthera junonis, Acacia bynoeana, Eucalyptus camfieldii, Melaleuca groveana, Tetratheca glandulosa*
- Rare (ROTAP) – *Grevillea oldei, "Acacia kulnurensis", Lomandra brevis*

## Community Conservation Status:

*Reserve Representation* - within Gosford, extensive areas of this vegetation type are contained within Brisbane Water and Popran NP's.

*TSC Act (1995) Status* - not currently listed.

## Mapping Reliability & Included Units:

*High Resolution Area* – this vegetation type has been mapped from aerial photographic interpretation and ground truthing. Other sub-communities of the Exposed Hawkesbury Forests (Unit E26) and the Somersby Plateau Forest (Unit E26d) may be included in some parts.

*Low Resolution Area* – this community is included within the modelling of Exposed Hawkesbury Woodland (Unit 26) of REMS.

## Vegetation Structure:

| Stratum | Mean height (m) | Min height (m) | Max height (m) | Mean cover (%) | Sdev | n |
|---|---|---|---|---|---|---|
| Emergent | | | | | | |
| Tallest | 12.41 | 3.00 | 25.00 | 21 | 13.7 | 29 |
| Middle 1 | 4.24 | 0.50 | 10.00 | 44 | 30.5 | 21 |
| Middle 2 | 1.78 | 0.60 | 3.00 | 43 | 17.7 | 2 |
| Middle 3 | 1.75 | 0.01 | 4.00 | 58 | 46.0 | 2 |
| Lowest | 1.49 | 0.01 | 5.00 | 70 | 26.5 | 28 |

## Key Diagnostic Species [based on 51 plots]:

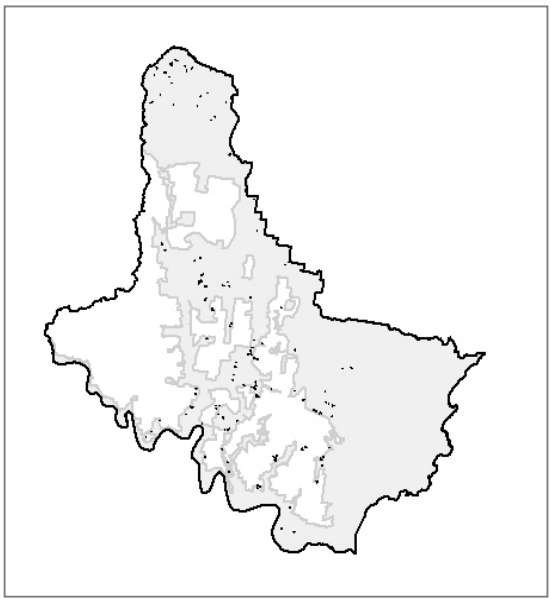
| Life Form | Species | Community | | All others | | Fidelity |
|---|---|---|---|---|---|---|
| | | c/a | Freq. | c/a | Freq. | |
| Tree | *Corymbia gummifera* | 3 | 76% | 2 | 24% | positive |
| | *Eucalyptus haemastoma* | 3 | 59% | 2 | 11% | positive |
| | *Angophora costata* | 3 | 49% | 2 | 28% | positive |
| | *Eucalyptus oblonga* | 3 | 20% | 2 | 3% | uninformative |
| | *Eucalyptus umbra* | 2 | 20% | 2 | 9% | uninformative |
| | *Eucalyptus punctata* | 3 | 18% | 2 | 14% | uninformative |
| | *Eucalyptus piperita* | 2 | 12% | 2 | 13% | uninformative |
| | *Syncarpia glomulifera subsp. glomulifera* | 1 | 12% | 2 | 31% | uninformative |
| | *Eucalyptus capitellata* | 3 | 10% | 3 | 1% | uninformative |
| | *Corymbia eximia* | 2 | 10% | 2 | 7% | uninformative |
| | *Eucalyptus racemosa* | 2 | 6% | 3 | 2% | uninformative |
| | *Eucalyptus sieberi* | 2 | 6% | 3 | 6% | uninformative |
| | *Allocasuarina torulosa* | 1 | 6% | 2 | 30% | uninformative |
| | *Eucalyptus agglomerata* | 1 | 4% | 3 | 1% | uninformative |
| | *Eucalyptus globoidea* | 1 | 4% | 2 | 2% | uninformative |
| | *Ceratopetalum apetalum* | 2 | 2% | 3 | 6% | uninformative |
| | *Angophora bakeri* | 1 | 2% | 3 | 5% | uninformative |
| | *Angophora floribunda* | 1 | 2% | 2 | 21% | uninformative |
| | *Eucalyptus pilularis* | 3 | 2% | 3 | 16% | uninformative |
| Small tree | *Banksia serrata* | 2 | 69% | 2 | 19% | positive |
| | *Ceratopetalum gummiferum* | 2 | 12% | 2 | 5% | uninformative |
| | *Allocasuarina littoralis* | 1 | 12% | 2 | 15% | uninformative |
| | *Xylomelum pyriforme* | 1 | 10% | 1 | 2% | uninformative |
| Shrub | *Platysace linearifolia* | 2 | 88% | 2 | 25% | positive |
| | *Leptospermum trinervium* | 3 | 82% | 2 | 20% | positive |
| | *Grevillea buxifolia* | 2 | 67% | 2 | 12% | positive |
| | *Lambertia formosa* | 2 | 63% | 2 | 12% | positive |
| | *Phyllota phylicoides* | 2 | 61% | 2 | 12% | positive |
| | *Petrophile pulchella* | 2 | 57% | 2 | 13% | positive |
| | *Grevillea diffusa subsp. filipendula* | 2 | 53% | 2 | 6% | positive |
| | *Banksia ericifolia subsp. ericifolia* | 3 | 49% | 3 | 12% | positive |
| | *Banksia spinulosa* | 2 | 47% | 2 | 12% | positive |
| | *Boronia ledifolia* | 2 | 43% | 1 | 7% | positive |
| | *Epacris pulchella* | 2 | 41% | 2 | 10% | positive |
| | *Acacia echinula* | 1 | 4% | 0 | 0% | unique |
| | *Astrotricha obovata* | 1 | 2% | 0 | 0% | unique |
| | *Banksia marginata* | 1 | 2% | 0 | 0% | unique |
| | *Leucopogon setiger* | 1 | 2% | 0 | 0% | unique |
| | ***Melaleuca groveana* [TSC Vulnerable]** | **1** | **2%** | **0** | **0%** | **unique** |
| | *Persoonia laurina subsp. laurina* | 1 | 2% | 0 | 0% | unique |
| | *Styphelia tubiflora* | 1 | 4% | 0 | 0% | unique |
| | *Persoonia levis* | 1 | 67% | 1 | 29% | uninformative |
| | *Acacia suaveolens* | 1 | 63% | 1 | 23% | uninformative |

| | | | | | | |
|---|---|---|---|---|---|---|
| | *Hakea dactyloides* | 1 | 57% | 1 | 15% | uninformative |
| | *Banksia oblongifolia* | 1 | 55% | 2 | 13% | uninformative |
| | *Hakea teretifolia* | 1 | 53% | 1 | 12% | uninformative |
| | *Isopogon anemonifolius* | 1 | 53% | 1 | 13% | uninformative |
| | *Persoonia isophylla* | 1 | 47% | 1 | 9% | uninformative |
| | *Conospermum longifolium* | 1 | 45% | 1 | 7% | uninformative |
| | *Pimelea linifolia* | 1 | 43% | 1 | 17% | uninformative |
| | *Gompholobium grandiflorum* | 1 | 41% | 1 | 6% | uninformative |
| | *Acacia linifolia* | 1 | 39% | 1 | 11% | uninformative |
| | *Dillwynia floribunda* | 2 | 37% | 1 | 8% | uninformative |
| | *Xanthorrhoea resinifera* | 1 | 37% | 2 | 5% | uninformative |
| | *Acacia ulicifolia* | 1 | 35% | 1 | 22% | uninformative |
| | *Acacia oxycedrus* | 2 | 33% | 1 | 8% | uninformative |
| | *Pultenaea elliptica* | 2 | 33% | 2 | 7% | uninformative |
| | *Doryanthes excelsa* | 1 | 33% | 2 | 9% | uninformative |
| | *Leucopogon microphyllus* | 2 | 31% | 2 | 5% | uninformative |
| | *Xanthorrhoea media* | 2 | 31% | 2 | 12% | uninformative |
| | *Lomatia silaifolia* | 1 | 31% | 1 | 10% | uninformative |
| | *Monotoca scoparia* | 1 | 29% | 1 | 7% | uninformative |
| | *Woollsia pungens* | 1 | 29% | 1 | 7% | uninformative |
| | *Bossiaea scolopendria* | 1 | 29% | 1 | 8% | uninformative |
| | *Bossiaea heterophylla* | 2 | 27% | 2 | 8% | uninformative |
| | *Leptospermum polygalifolium* | 2 | 27% | 2 | 24% | uninformative |
| | *Acacia myrtifolia* | 1 | 27% | 1 | 9% | uninformative |
| | *Acacia terminalis* | 1 | 25% | 1 | 7% | uninformative |
| | *Hakea sericea* | 1 | 25% | 1 | 9% | uninformative |
| | *Boronia pinnata* | 2 | 24% | 1 | 2% | uninformative |
| | *Bossiaea obcordata* | 2 | 22% | 2 | 8% | uninformative |
| | *Kunzea capitata* | 2 | 22% | 2 | 2% | uninformative |
| | *Hibbertia acicularis* | 1 | 22% | 1 | 2% | uninformative |
| | *Hibbertia bracteata* | 1 | 22% | 1 | 3% | uninformative |
| | *Grevillea sericea* | 2 | 18% | 2 | 8% | uninformative |
| | *Brachyloma daphnoides subsp. daphnoides* | 1 | 18% | 1 | 1% | uninformative |
| | *Baeckea diosmifolia* | 1 | 18% | 2 | 5% | uninformative |
| | *Angophora hispida* | 2 | 16% | 2 | 7% | uninformative |
| | *Eriostemon australasius* | 2 | 16% | 2 | 5% | uninformative |
| | *Hibbertia empetrifolia subsp. empetrifolia* | 2 | 16% | 1 | 10% | uninformative |
| | *Pultenaea ferruginea* | 2 | 16% | 2 | 5% | uninformative |
| | *Gompholobium latifolium* | 1 | 16% | 1 | 15% | uninformative |
| | *Bossiaea stephensonii* | 3 | 14% | 2 | 4% | uninformative |
| | *Bauera rubioides* | 1 | 14% | 2 | 3% | uninformative |
| | *Persoonia lanceolata* | 1 | 14% | 1 | 6% | uninformative |
| | *Ricinocarpos pinifolius* | 2 | 12% | 1 | 5% | uninformative |
| | *Dillwynia sericea* | 2 | 12% | 2 | 3% | uninformative |
| | *Hibbertia aspera* | 1 | 12% | 1 | 3% | uninformative |
| | *Pultenaea flexilis* | 1 | 12% | 2 | 11% | uninformative |
| | *Telopea speciosissima* | 1 | 10% | 1 | 2% | uninformative |
| | *Xanthorrhoea fulva* | 1 | 10% | 1 | 0% | uninformative |
| | ***Grevillea oldei* [ROTAP]** | **2** | **6%** | **2** | **1%** | **uninformative** |
| Sub-shrub | *Pultenaea rosmarinifolia* | 2 | 55% | 1 | 9% | positive |
| | *Leucopogon appressus* | 1 | 4% | 0 | 0% | unique |
| | *Euryomyrtus ramosissima subsp. ramosissima* | 1 | 2% | 0 | 0% | unique |
| | *Hovea linearis* | 1 | 25% | 1 | 7% | uninformative |
| | *Scaevola ramosissima* | 1 | 22% | 1 | 6% | uninformative |
| | *Tetratheca thymifolia* | 1 | 20% | 1 | 2% | uninformative |
| | *Hibbertia monogyna* | 2 | 18% | 1 | 4% | uninformative |
| | *Hibbertia linearis* | 1 | 18% | 1 | 3% | uninformative |

| | | | | | | |
|---|---|---|---|---|---|---|
| | *Tetratheca shiressii* | 1 | 16% | 2 | 1% | uninformative |
| | ***Tetratheca glandulosa* [TSC Vulnerable]** | **1** | **14%** | **2** | **1%** | **uninformative** |
| | ***Darwinia glaucophylla* [TSC Vulnerable]** | **4** | **4%** | **5** | **0%** | **uninformative** |
| | *Acacia bynoeana* | 1 | 2% | 1 | 0% | uninformative |
| Herb | *Actinotus minor* | 2 | 63% | 2 | 13% | positive |
| | *Hybanthus vernonii* | 1 | 2% | 0 | 0% | unique |
| | *Phyllanthus hirtellus* | 1 | 37% | 2 | 16% | uninformative |
| | *Dampiera stricta* | 1 | 31% | 1 | 10% | uninformative |
| | *Xanthosia pilosa* | 1 | 29% | 1 | 11% | uninformative |
| | *Xanthosia tridentata* | 1 | 29% | 1 | 8% | uninformative |
| | *Gonocarpus teucrioides* | 2 | 24% | 1 | 13% | uninformative |
| | *Micrantheum ericoides* | 2 | 12% | 1 | 4% | uninformative |
| | *Mitrasacme polymorpha* | 1 | 12% | 1 | 4% | uninformative |
| | *Goodenia heterophylla* | 1 | 12% | 2 | 6% | uninformative |
| | *Pomax umbellata* | 1 | 10% | 2 | 17% | uninformative |
| | *Actinotus helianthi* | 1 | 10% | 1 | 6% | uninformative |
| Grass | *Anisopogon avenaceus* | 2 | 45% | 2 | 12% | positive |
| | *Poa labillardierei var labillardierei* | 2 | 2% | 0 | 0% | unique |
| | *Entolasia stricta* | 2 | 71% | 2 | 51% | constant |
| | *Joycea pallida* | 2 | 12% | 3 | 1% | uninformative |
| | *Tetrarrhena juncea* | 2 | 10% | 2 | 3% | uninformative |
| Graminoid | *Lomandra obliqua* | 2 | 47% | 2 | 16% | positive |
| | *Patersonia sericea* | 2 | 47% | 1 | 14% | positive |
| | *Lomandra glauca* | 2 | 43% | 2 | 15% | positive |
| | *Lomandra micrantha subsp. tuberculata* | 1 | 2% | 0 | 0% | unique |
| | *Patersonia glabrata* | 1 | 25% | 2 | 4% | uninformative |
| | *Dianella caerulea* | 1 | 22% | 1 | 55% | uninformative |
| | *Lomandra filiformis* | 1 | 18% | 1 | 8% | uninformative |
| | *Lomandra cylindrica* | 1 | 14% | 2 | 4% | uninformative |
| | *Lomandra gracilis* | 2 | 12% | 1 | 6% | uninformative |
| | ***Lomandra brevis* [ROTAP]** | **1** | **10%** | **2** | **1%** | **uninformative** |
| | *Lomandra confertifolia* | 1 | 10% | 2 | 3% | uninformative |
| | *Lomandra longifolia* | 1 | 10% | 2 | 49% | negative |
| Ground fern | *Lindsaea linearis* | 1 | 43% | 2 | 11% | uninformative |
| | *Pteridium esculentum* | 1 | 27% | 2 | 44% | negative |
| | *Schizaea bifida* | 1 | 12% | 1 | 4% | uninformative |
| | *Gleichenia dicarpa* | 2 | 10% | 4 | 6% | uninformative |
| Ground orchid | *Pterostylis parviflora* | 1 | 4% | 0 | 0% | unique |
| | *Caladenia catenata* | 2 | 2% | 0 | 0% | unique |
| | *Caladenia carnea* | 1 | 2% | 0 | 0% | unique |
| | *Eriochilus cucullatus* | 1 | 2% | 0 | 0% | unique |
| | *Genoplesium rufum* | 1 | 2% | 0 | 0% | unique |
| | *Orthoceras strictum* | 1 | 2% | 0 | 0% | unique |
| Clubmoss | *Selaginella uliginosa* | 2 | 10% | 1 | 5% | uninformative |
| Climber | *Cassytha glabella forma glabella* | 1 | 22% | 2 | 13% | uninformative |
| | *Billardiera scandens* | 1 | 16% | 1 | 31% | uninformative |
| | *Cassytha pubescens* | 1 | 14% | 1 | 8% | uninformative |
| | *Smilax glyciphylla* | 1 | 10% | 1 | 21% | uninformative |
| Mistletoe | *Muellerina celastroides* | 1 | 2% | 0 | 0% | unique |
| Sedge/ Rush | *Cyathochaeta diandra* | 2 | 59% | 2 | 15% | positive |
| | *Lepyrodia scariosa* | 2 | 57% | 3 | 14% | positive |
| | *Lepidosperma laterale* | 2 | 41% | 2 | 25% | positive |
| | *Schoenus nitens* | 1 | 2% | 0 | 0% | unique |
| | *Schoenus ericetorum* | 1 | 24% | 1 | 1% | uninformative |
| | *Ptilothrix deusta* | 2 | 22% | 3 | 7% | uninformative |
| | *Caustis flexuosa* | 1 | 22% | 1 | 6% | uninformative |
| | *Schoenus imberbis* | 2 | 18% | 2 | 4% | uninformative |
| | *Schoenus brevifolius* | 1 | 10% | 2 | 4% | uninformative |

# Hawkesbury Rock Pavement Heath Unit E26a

## Exposed Hawkesbury Woodland (Heath) REMS Unit 26a



## General Description:

Within the larger expanses of Exposed Hawkesbury Woodland (Unit E26), small pockets of Hawkesbury Rock Pavement Heath occur where sandstone outcrops resist the actions of erosion and weathering. These heaths are internally floristically simple, but are diverse across the region. Further survey and analysis is required to better understand relationships within them. Typically, these heaths support species such as *Leptospermum parvifolium, Baeckea brevifolia, Darwinia fascicularis, Kunzea ambigua, Leucopogon microphyllus* var. *microphyllous,* and *Schoenus imberbis*. In moister sites with deeper soils, *Acacia oxycedrus, Leptospermum trinervium* and *Banksia ericifolia* may become more prominent. Occasional stunted emergents of *Eucalyptus haemastoma* or *Angophora hispida* may also occur. This sub-community does not include the Hawkesbury Sandstone heaths occurring on the Bouddi Peninsula (see Unit E26e).

## Known Floristic/ Structural Variations:

No variants in this community have been clearly identified, although these do exist. Factors such as soil depth and drainage appear to determine floristic composition.

## Distribution:

*Within Gosford LGA* – widespread but scattered on Hawkesbury Sandstone ridgetops and exposed slopes, from Mangrove to the Hawkesbury River, east to Brisbane Water NP, and west to Dharug NP.

*Within LHCC Region* – NPWS (2000) have modelled 2052ha of their Exposed Hawkesbury Woodland (Heath) (Unit 26a) as remaining in the region.

*Examples Within Gosford LGA*

- Brisbane Water NP
- Popran NP

## Extent:

*Extant* - 89.46ha

## Relationship to Other Communities:

Hawkesbury Rock Pavement Heath is characterised by open expanses of rock pavement with scattered occurrences of sclerophyllous shrub species such as *Baeckea brevifolia* and *Leptospermum parvifolium*. Other heaths on Hawkesbury

Sandstone develop into a scrub vegetation with thickets of *Banksia ericifolia* subsp. *ericifolia* and *Angophora hispida* (the Hawkesbury Coastal *Banksia* Scrub-Woodland Unit E29a), or comprise thickets of *Allocasuarina distyla*, occur on the coast and are subject to on-shore winds (the Bouddi Sandstone Coastal Heath Unit E26e).

## Equivalent Vegetation Types:

- Benson 1981 (Mangrove Creek): n/a
- Benson & Fallding 1981 (Brisbane Water) Rocky outcrops with pockets of heath (Unit 9)
- Benson 1986 (Gosf-Lake Mac): n/a
- Clarke & Benson 1986 (Dharug): Heathland (Unit C5)
- Strom 1986 (Bouddi Peninsula): n/a
- Clarke & Benson 1987 (Mt White/ Mt Olive): Rocky Outcrop Heath (Unit C4)
- McRae 1990 (Bouddi Peninsula): n/a
- Binns 1996 (SF MFD): n/a
- Payne 1997 (Cockle Bay/ Bouddi): n/a
- Bell 1998 (Popran NP): Hawkesbury Coastal Rocky Heath (Unit H1)
- Bell 2002 (Wyong LGA): n/a

## Significant Species:

- Undescribed species – *none recorded*
- Threatened (TSC Act) – *Darwinia glaucophylla, (?) Micromyrtus blakelyi*
- Rare (ROTAP) – *Darwinia procera*

## Community Conservation Status:

*Reserve Representation* - within Gosford, areas of this vegetation type are contained within Brisbane Water, Dharug, and Popran NP's.

*TSC Act (1995) Status* - not currently listed.

## Mapping Reliability & Included Units:

*High Resolution Area* – this vegetation type has been mapped from aerial photographic interpretation and ground truthing. Unmapped portions may have been included in the Exposed Hawkesbury Woodland (Unit E26) and the Somersby Plateau Forest (Unit E26d) in some parts.

*Low Resolution Area* – this community is included within the modelling of Exposed Hawkesbury Woodland (Heath) (Unit 26a) of REMS. Some areas may also be included in the E55 (Heath) community, but this needs clarification.

## Vegetation Structure:

No structural data is yet available for this community, however it is typically comprised of a shrub layer 0.5-2.0m high with widely spaced canopy species at low density, interspersed with bare rocky pavements.

## Key Diagnostic Species [based on 5 plots]:

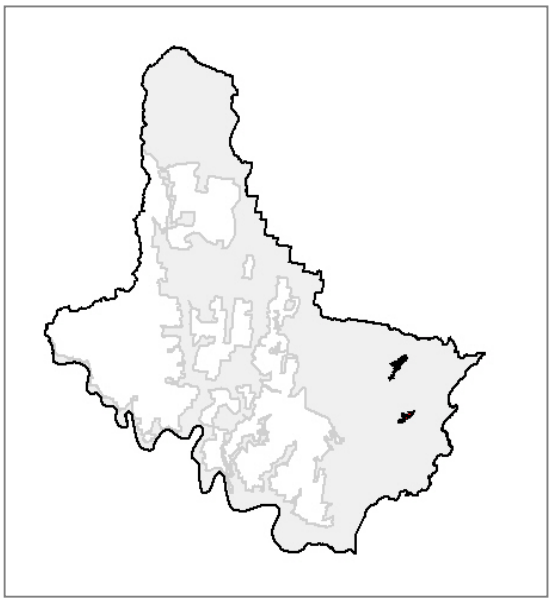
| Life Form | Species | Community | | All others | | Fidelity |
|---|---|---|---|---|---|---|
| | | c/a | Freq. | c/a | Freq. | |
| Tree | *Eucalyptus haemastoma* | 2 | 40% | 2 | 17% | positive |
| | *Corymbia eximia* | 1 | 60% | 2 | 7% | uninformative |
| | *Angophora bakeri* | 1 | 20% | 3 | 4% | uninformative |
| | *Corymbia gummifera* | 1 | 20% | 2 | 30% | uninformative |
| | *Eucalyptus oblonga* | 1 | 20% | 2 | 5% | uninformative |
| Small tree | *Allocasuarina littoralis* | 1 | 20% | 2 | 14% | uninformative |
| | *Banksia serrata* | 1 | 20% | 2 | 25% | uninformative |

| | | | | | | |
|---|---|---|---|---|---|---|
| Shrub | *Baeckea brevifolia* | 4 | 60% | 1 | 1% | positive |
| | *Banksia oblongifolia* | 4 | 40% | 2 | 18% | positive |
| | *Petrophile pulchella* | 2 | 80% | 2 | 17% | positive |
| | *Baeckea diosmifolia* | 2 | 60% | 2 | 6% | positive |
| | *Angophora hispida* | 2 | 60% | 2 | 7% | positive |
| | *Epacris pulchella* | 2 | 40% | 2 | 14% | positive |
| | *Grevillea sericea* | 2 | 40% | 2 | 8% | positive |
| | *Cryptandra propinqua* | 1 | 20% | 0 | 0% | unique |
| | *Dillwynia acicularis* | 1 | 20% | 0 | 0% | unique |
| | *Hakea bakeriana* | 1 | 20% | 0 | 0% | unique |
| | *Isopogon anemonifolius* | 1 | 100% | 1 | 17% | uninformative |
| | *Leptospermum trinervium* | 1 | 80% | 2 | 27% | uninformative |
| | *Acacia suaveolens* | 1 | 80% | 1 | 27% | uninformative |
| | *Platysace linearifolia* | 1 | 60% | 2 | 32% | uninformative |
| | *Zieria laevigata* | 1 | 60% | 1 | 1% | uninformative |
| | *Dillwynia floribunda* | 1 | 40% | 2 | 12% | uninformative |
| | *Hakea dactyloides* | 1 | 40% | 1 | 20% | uninformative |
| | *Bossiaea scolopendria* | 1 | 40% | 1 | 10% | uninformative |
| | *Persoonia levis* | 1 | 40% | 1 | 34% | uninformative |
| | *Xanthorrhoea media* | 1 | 40% | 2 | 14% | uninformative |
| | *Phyllota phylicoides* | 3 | 20% | 2 | 18% | uninformative |
| | *Hibbertia empetrifolia subsp. empetrifolia* | 2 | 20% | 1 | 11% | uninformative |
| | *Leucopogon microphyllus* | 2 | 20% | 2 | 8% | uninformative |
| | *Leucopogon muticus* | 2 | 20% | 1 | 2% | uninformative |
| | *Comesperma ericinum* | 2 | 20% | 1 | 3% | uninformative |
| | *Bauera rubioides* | 2 | 20% | 1 | 4% | uninformative |
| | *Acacia myrtifolia* | 1 | 20% | 1 | 11% | uninformative |
| | *Acacia oxycedrus* | 1 | 20% | 2 | 11% | uninformative |
| | *Bossiaea stephensonii* | 1 | 20% | 3 | 5% | uninformative |
| | ***Darwinia procera* [ROTAP]** | **1** | **20%** | **1** | **0%** | **uninformative** |
| | *Dillwynia sericea* | 1 | 20% | 2 | 4% | uninformative |
| | *Gompholobium glabratum* | 1 | 20% | 2 | 2% | uninformative |
| | *Hakea sericea* | 1 | 20% | 1 | 11% | uninformative |
| | *Hakea teretifolia* | 1 | 20% | 1 | 17% | uninformative |
| | *Hibbertia bracteata* | 1 | 20% | 1 | 5% | uninformative |
| | *Persoonia isophylla* | 1 | 20% | 1 | 14% | uninformative |
| | *Philotheca salsolifolia* | 1 | 20% | 2 | 0% | uninformative |
| | *Pimelea linifolia* | 1 | 20% | 1 | 20% | uninformative |
| | *Pultenaea elliptica* | 1 | 20% | 2 | 10% | uninformative |
| | *Styphelia laeta subsp. latifolia* | 1 | 20% | 1 | 4% | uninformative |
| Sub-shrub | *Hibbertia linearis* | 1 | 40% | 1 | 4% | uninformative |
| | *Hemigenia purpurea* | 3 | 20% | 2 | 4% | uninformative |
| | *Leucopogon esquamatus* | 1 | 20% | 1 | 1% | uninformative |
| Herb | *Actinotus minor* | 2 | 40% | 2 | 19% | positive |
| | *Dampiera stricta* | 2 | 40% | 1 | 12% | positive |
| | *Drosera auriculata* | 2 | 40% | 2 | 3% | positive |
| | *Actinotus helianthi* | 1 | 20% | 1 | 7% | uninformative |
| Grass | *Paspalidium distans* | 2 | 40% | 1 | 4% | positive |
| | *Entolasia stricta* | 1 | 80% | 2 | 53% | negative |
| | *Aristida warburgii* | 2 | 20% | 2 | 2% | uninformative |
| | *Entolasia marginata* | 1 | 20% | 2 | 17% | uninformative |
| | *Eragrostis brownii* | 1 | 20% | 1 | 3% | uninformative |
| Graminoid | *Patersonia sericea* | 2 | 40% | 2 | 18% | positive |
| | *Lomandra glauca* | 1 | 40% | 2 | 18% | uninformative |
| | *Dianella prunina* | 1 | 20% | 1 | 4% | uninformative |
| | *Haemodorum corymbosum* | 1 | 20% | 1 | 0% | uninformative |
| | *Lomandra cylindrica* | 2 | 20% | 1 | 5% | uninformative |
| | *Lomandra longifolia* | 0 | 0% | 2 | 45% | negative |

| | | | | | | |
|---|---|---|---|---|---|---|
| Ground fern | *Gleichenia dicarpa* | 1 | 20% | 3 | 7% | uninformative |
| Ground fern | *Pteridium esculentum* | 0 | 0% | 2 | 43% | negative |
| Climber | *Cassytha glabella forma glabella* | 2 | 40% | 1 | 14% | positive |
| | *Mirbelia rubiifolia* | 2 | 40% | 1 | 6% | positive |
| Sedge/ Rush | *Lepyrodia scariosa* | 3 | 60% | 2 | 19% | positive |
| | *Schoenus imberbis* | 2 | 60% | 2 | 5% | positive |
| | *Cyathochaeta diandra* | 2 | 60% | 2 | 20% | positive |
| | *Ptilothrix deusta* | 3 | 40% | 2 | 8% | positive |
| | *Lepidosperma laterale* | 2 | 40% | 2 | 27% | positive |
| | *Lepidosperma gunnii* | 2 | 20% | 2 | 0% | uninformative |
| | *Lepyrodia muelleri* | 2 | 20% | 2 | 2% | uninformative |
| | *Gahnia erythrocarpa* | 1 | 20% | 3 | 0% | uninformative |
| | *Hypolaena fastigiata* | 1 | 20% | 2 | 2% | uninformative |

# Katandra Hawkesbury Woodland — Unit E26b

## Exposed Hawkesbury Woodland — REMS Unit 26



## General Description:

On the upper ridges of Katandra Mountain and Kincumber Mountain, residual areas of Hawkesbury Sandstone occur over the underlying Narrabeen Sandstones. These remnants support the Katandra Hawkesbury Woodland, which is recognised as a variant of the more widespread Exposed Hawkesbury Woodland (Unit E26) due to higher rainfall and the presence of *Eucalyptus pilularis*. Soils here have weathered *in situ* on the flat plateau tops to develop a deep sandy soil. Vegetation present includes a canopy of *Corymbia gummifera, Eucalyptus pilularis, Angophora costata*, *Eucalyptus piperita*, and *Allocasuarina torulosa*, with a tall shrub layer supporting *Banksia serrata* and *Leptospermum trinervium*. On Kincumber Mountain, *Eucalyptus haemastoma* is also present and is locally common. Understorey species present include *Banksia spinulosa, Lomatia silaifolia, Trachymene incisa* subsp*. incisa, Leptospermum polygalifolium, Grevillea linearifolia, Bossiaea obcordata, Hakea sericea, Gompholobium latifolium*, and *Correa reflexa* var. *reflexa*.

## Known Floristic/ Structural Variations:

No variants have been recognised within this sub-community, although it is to be expected that aspect and fire history will impact on species composition.

## Distribution:

*Within Gosford LGA* – restricted to the upper ridgetops of Katandra and Kincumber Mountains.

*Within LHCC Region* – NPWS (2000) have modelled 16504ha of their Exposed Hawkesbury Woodland (Unit 26) as remaining in the region, which would include this sub-community.

*Examples Within Gosford LGA*

- Katandra Mountain picnic area, Mount Elliot
- Island View Drive, Kincumber Mountain Reserve

## Extent:

*Extant* - 159.96ha

## Relationship to Other Communities:

Katandra Hawkesbury Woodland is superficially similar to other sub-communities in the Exposed Hawkesbury Woodland complex (Unit E26). However, the higher rainfall experienced on both Katandra and Kincumber Mountains allows

*Eucalyptus pilularis* to occur on the otherwise poorer Hawkesbury Sandstone soils, a species not present in the other sub-communities. The dominance of *Eucalyptus haemastoma* with *Corymbia gummifera* and *Angophora costata* in a woodland structure, together with a diverse heathy understorey, distinguish the Exposed Hawkesbury Woodland (E26) from this community, while the dominance of *Eucalyptus sieberi* and *Eucalyptus capitellata* separate it from the Somersby Plateau Forest (Unit E26d). The considerable drier environments supporting Dharug Arid Exposed Woodland (Unit E27) comprise *Corymbia eximia* and *Angophora bakeri* as important components, species that are absent from Unit E26b. *Eucalyptus pilularis* is also an important and dominant component of the Narrabeen Coastal Blackbutt Forest (Unit E22a), but the absence of sandstone-based understorey species such as *Banksia serrata, Leptospermum trinervium, Banksia spinulosa*, and *Lomatia silaifolia* separate the two.

## Equivalent Vegetation Types:

- Benson 1981 (Mangrove Creek): n/a
- Benson & Fallding 1981 (Brisbane Water) n/a
- Benson 1986 (Gosf-Lake Mac): (?) Low Woodland (Unit 10a)
- Clarke & Benson 1986 (Dharug): n/a
- Strom 1986 (Bouddi Peninsula): n/a
- Clarke & Benson 1987 (Mt White/ Mt Olive): n/a
- McRae 1990 (Bouddi Peninsula): n/a
- Binns 1996 (SF MFD): (?) MORf 20 *Banksia serrata – Eucalyptus gummifera – Eucalyptus haemastoma*
- Payne 1997 (Cockle Bay/ Bouddi): n/a
- Bell 1998 (Popran NP): n/a
- Bell 2002 (Wyong LGA): n/a

## Significant Species:

- Undescribed species – *none recorded*
- Threatened (TSC Act) – *none recorded*
- Rare (ROTAP) – *none recorded*

## Community Conservation Status:

*Reserve Representation* - this vegetation type is contained only within the Council managed Kincumber Mountain and Katandra Reserves.

*TSC Act (1995) Status* - not currently listed.

## Mapping Reliability & Included Units:

*High Resolution Area* – this vegetation type has been mapped from aerial photographic interpretation and ground truthing.

*Low Resolution Area* – this community is not expected to occur within the low resolution area.

## Vegetation Structure:

| Stratum | Mean height (m) | Min height (m) | Max height (m) | Mean cover (%) | Sdev | n |
|---|---|---|---|---|---|---|
| Emergent | | | | | | |
| Tallest | 15.80 | 2.00 | 30.00 | 29 | 18.8 | 5 |
| Middle 1 | 6.50 | 1.00 | 15.00 | 35 | 23.8 | 4 |
| Middle 2 | 2.67 | 1.00 | 7.00 | 55 | 13.2 | 3 |
| Middle 3 | | | | | | |
| Lowest | 0.68 | 0.10 | 2.00 | 25 | 10.0 | 4 |

## Key Diagnostic Species [based on 8 plots]:

| Life Form | Species | Community | All others | Fidelity |
|---|---|---|---|---|

| | | c/a | Freq. | c/a | Freq. | |
|---|---|---|---|---|---|---|
| Tree | *Angophora costata* | 2 | 88% | 2 | 30% | positive |
| | *Eucalyptus pilularis* | 5 | 75% | 3 | 13% | positive |
| | *Allocasuarina torulosa* | 4 | 50% | 2 | 27% | positive |
| | *Eucalyptus piperita* | 2 | 50% | 2 | 12% | positive |
| | *Syncarpia glomulifera subsp. glomulifera* | 2 | 50% | 2 | 28% | positive |
| | *Corymbia gummifera* | 1 | 63% | 2 | 29% | uninformative |
| | *Eucalyptus umbra* | 2 | 13% | 2 | 10% | uninformative |
| | *Angophora floribunda* | 1 | 13% | 2 | 19% | uninformative |
| | *Eucalyptus resinifera subsp. resinifera* | 1 | 13% | 3 | 2% | uninformative |
| Palm | *Livistona australis* | 1 | 25% | 1 | 15% | uninformative |
| Small tree | *Gmelina leichhardtii* | 1 | 13% | 0 | 0% | unique |
| | *Acacia maidenii* | 1 | 38% | 1 | 4% | uninformative |
| | *Banksia serrata* | 3 | 25% | 2 | 25% | uninformative |
| | *Glochidion ferdinandii* | 2 | 25% | 2 | 29% | uninformative |
| | *Acacia elata* | 2 | 25% | 2 | 6% | uninformative |
| | *Synoum glandulosum subsp. glandulosum* | 1 | 25% | 1 | 12% | uninformative |
| | *Tristaniopsis collina* | 3 | 13% | 1 | 0% | uninformative |
| Shrub | *Persoonia levis* | 2 | 100% | 1 | 33% | positive |
| | *Leptospermum polygalifolium* | 3 | 88% | 2 | 23% | positive |
| | *Gompholobium latifolium* | 2 | 88% | 1 | 14% | positive |
| | *Grevillea linearifolia* | 2 | 88% | 2 | 1% | positive |
| | *Persoonia linearis* | 2 | 88% | 1 | 25% | positive |
| | *Platysace lanceolata* | 2 | 88% | 1 | 14% | positive |
| | *Bossiaea obcordata* | 2 | 75% | 2 | 9% | positive |
| | *Acacia ulicifolia* | 2 | 50% | 1 | 23% | positive |
| | *Leptospermum trinervium* | 2 | 50% | 2 | 27% | positive |
| | *Pomaderris angustifolia* | 1 | 25% | 0 | 0% | unique |
| | *Leucopogon margarodes* | 2 | 13% | 0 | 0% | unique |
| | *Polyscias sambucifolia* | 1 | 63% | 1 | 17% | uninformative |
| | *Acacia brownii* | 2 | 38% | 1 | 1% | uninformative |
| | *Acacia oxycedrus* | 2 | 38% | 1 | 11% | uninformative |
| | *Banksia spinulosa* | 2 | 38% | 2 | 16% | uninformative |
| | *Hakea sericea* | 2 | 38% | 1 | 10% | uninformative |
| | *Breynia oblongifolia* | 1 | 38% | 1 | 33% | uninformative |
| | *Acacia myrtifolia* | 2 | 25% | 1 | 11% | uninformative |
| | *Lomatia silaifolia* | 2 | 25% | 1 | 12% | uninformative |
| | *Maytenus silvestris* | 2 | 25% | 1 | 9% | uninformative |
| | *Pimelea linifolia* | 2 | 25% | 1 | 20% | uninformative |
| | *Acacia suaveolens* | 1 | 25% | 1 | 28% | uninformative |
| | *Podolobium ilicifolium* | 1 | 25% | 2 | 12% | uninformative |
| | *Pultenaea flexilis* | 1 | 25% | 2 | 11% | uninformative |
| | *Acacia terminalis* | 4 | 13% | 1 | 9% | uninformative |
| | *Hakea teretifolia* | 3 | 13% | 1 | 17% | uninformative |
| | *Aotus ericoides* | 3 | 13% | 1 | 3% | uninformative |
| | *Petrophile pulchella* | 3 | 13% | 2 | 18% | uninformative |
| | *Elaeocarpus reticulatus* | 2 | 13% | 1 | 10% | uninformative |
| | *Epacris pulchella* | 2 | 13% | 2 | 14% | uninformative |
| | *Gompholobium virgatum var aspalathoides* | 2 | 13% | 1 | 2% | uninformative |
| | *Lambertia formosa* | 2 | 13% | 2 | 19% | uninformative |
| | *Pultenaea daphnoides* | 2 | 13% | 1 | 7% | uninformative |
| | *Woollsia pungens* | 2 | 13% | 1 | 10% | uninformative |
| | *Leucopogon lanceolatus var lanceolatus* | 2 | 13% | 1 | 5% | uninformative |
| | *Hakea dactyloides* | 2 | 13% | 1 | 20% | uninformative |
| | *Acacia longifolia* | 1 | 13% | 2 | 12% | uninformative |
| | *Banksia oblongifolia* | 1 | 13% | 2 | 19% | uninformative |
| | *Bossiaea heterophylla* | 1 | 13% | 2 | 10% | uninformative |
| | *Dillwynia retorta* | 1 | 13% | 2 | 6% | uninformative |
| | *Hibbertia empetrifolia subsp. empetrifolia* | 1 | 13% | 1 | 11% | uninformative |
| | *Isopogon anemonifolius* | 1 | 13% | 1 | 18% | uninformative |
| | *Lasiopetalum ferrugineum* | 1 | 13% | 1 | 5% | uninformative |
| | *Macrozamia communis* | 1 | 13% | 2 | 11% | uninformative |
| | *Monotoca scoparia* | 1 | 13% | 1 | 10% | uninformative |

| | | | | | | |
|---|---|---|---|---|---|---|
| | *Olearia tomentosa* | 1 | 13% | 1 | 1% | uninformative |
| | *Platylobium formosum* | 1 | 13% | 2 | 10% | uninformative |
| | *Platysace linearifolia* | 1 | 13% | 2 | 33% | uninformative |
| | *Xanthorrhoea latifolia subsp. latifolia* | 1 | 13% | 2 | 2% | uninformative |
| | *Xanthorrhoea macronema* | 1 | 13% | 2 | 3% | uninformative |
| Sub-shrub | *Astroloma pinifolium* | 1 | 13% | 1 | 1% | uninformative |
| Herb | *Correa reflexa* | 2 | 50% | 1 | 5% | positive |
| | *Brunoniella australis* | 1 | 50% | 2 | 6% | uninformative |
| | *Mitrasacme polymorpha* | 2 | 25% | 1 | 5% | uninformative |
| | *Pomax umbellata* | 2 | 25% | 2 | 16% | uninformative |
| | *Actinotus helianthi* | 2 | 13% | 1 | 7% | uninformative |
| | *Gonocarpus teucrioides* | 2 | 13% | 1 | 15% | uninformative |
| | *Goodenia heterophylla* | 2 | 13% | 1 | 7% | uninformative |
| | *Xanthosia pilosa* | 2 | 13% | 1 | 13% | uninformative |
| | *Schelhammera undulata* | 2 | 13% | 2 | 8% | uninformative |
| | *Pratia purpurascens* | 1 | 13% | 2 | 21% | uninformative |
| | *Viola hederacea* | 1 | 13% | 2 | 13% | uninformative |
| | *Dampiera purpurea* | 1 | 13% | 1 | 2% | uninformative |
| Grass | *Imperata cylindrica var major* | 2 | 75% | 2 | 28% | positive |
| | *Eragrostis leptostachya* | 1 | 13% | 0 | 0% | unique |
| | *Entolasia stricta* | 2 | 100% | 2 | 52% | constant |
| | *Themeda australis* | 2 | 38% | 2 | 24% | uninformative |
| | *Entolasia marginata* | 2 | 13% | 2 | 17% | uninformative |
| | *Poa affinis* | 1 | 13% | 2 | 7% | uninformative |
| Graminoid | *Dianella caerulea* | 2 | 75% | 1 | 50% | positive |
| | *Patersonia glabrata* | 2 | 75% | 2 | 6% | positive |
| | *Lomandra longifolia* | 3 | 100% | 2 | 43% | constant |
| | *Lomandra obliqua* | 2 | 25% | 2 | 19% | uninformative |
| | *Dianella revoluta var revoluta* | 2 | 13% | 1 | 5% | uninformative |
| | *Lomandra filiformis* | 2 | 13% | 1 | 9% | uninformative |
| | *Patersonia sericea* | 1 | 13% | 2 | 18% | uninformative |
| | *Dianella longifolia* | 1 | 13% | 1 | 1% | uninformative |
| Ground fern | *Pteridium esculentum* | 2 | 100% | 2 | 41% | constant |
| | *Lindsaea linearis* | 1 | 13% | 2 | 15% | uninformative |
| Ground orchid | *Acianthus fornicatus* | 1 | 13% | 2 | 0% | uninformative |
| Climber | *Billardiera scandens* | 1 | 63% | 1 | 29% | uninformative |
| | *Cassytha glabella forma glabella* | 1 | 50% | 2 | 14% | uninformative |
| | *Kennedia rubicunda* | 1 | 25% | 1 | 11% | uninformative |
| | *Sarcopetalum harveyanum* | 1 | 25% | 1 | 11% | uninformative |
| | *Cissus hypoglauca* | 1 | 38% | 1 | 17% | uninformative |
| | *Glycine clandestina* | 1 | 38% | 2 | 22% | uninformative |
| | *Hibbertia scandens* | 1 | 38% | 1 | 14% | uninformative |
| | *Empodisma minus* | 2 | 13% | 2 | 5% | uninformative |
| | *Pandorea pandorana subsp. pandorana* | 2 | 13% | 1 | 24% | uninformative |
| | *Cassytha pubescens* | 1 | 13% | 1 | 8% | uninformative |
| | *Clematis glycinoides var glycinoides* | 1 | 13% | 1 | 6% | uninformative |
| | *Desmodium rhytidophyllum* | 1 | 13% | 2 | 7% | uninformative |
| | *Dioscorea transversa* | 1 | 13% | 1 | 11% | uninformative |
| | *Eustrephus latifolius* | 1 | 13% | 1 | 25% | uninformative |
| | *Parsonsia straminea* | 1 | 13% | 1 | 20% | uninformative |
| | *Smilax australis* | 1 | 13% | 1 | 22% | uninformative |
| Sedge/ Rush | *Lepidosperma laterale* | 2 | 88% | 2 | 26% | positive |
| | *Lepyrodia scariosa* | 4 | 25% | 2 | 19% | uninformative |
| | *Cyathochaeta diandra* | 3 | 25% | 2 | 21% | uninformative |
| | *Lepidosperma concavum* | 1 | 13% | 2 | 1% | uninformative |

# Killcare Hawkesbury Woodland
## Exposed Hawkesbury Woodland

# Unit E26c
## REMS Unit 26

## General Description:
At Killcare Heights on the Bouddi Peninsula, an outcrop of Hawkesbury Sandstone geology supporting soils of the Somersby landscape occurs. Much of this area has been cleared for horticultural pursuits, and only remnant vegetation remains. Sandy colluvial soils support a canopy of *Angophora costata, Eucalyptus piperita, Corymbia gummifera, Syncarpia glomulifera* subsp. *glomulifera*, *Eucalyptus sieberi,* and *Eucalyptus resinifera*, with an understorey of *Pultenaea flexilis, Leptospermum polygalifolium, Ceratopetalum gummiferum, Glochidion ferdinandi, Polyscias sambuccifolia*, and *Entolasia stricta*. In places, *Syncarpia glomulifera* subsp. *glomulifera* is particularly dominant, and the weed *Lantana camara* is becoming invasive. There are strong similarities to vegetation in the Somersby area of the Somersby Plateau, but several aspects differ, such as the occurrence of the Killcare Hawkesbury Woodland less than two kilometres from the coast and at a much lower elevation (100-150m vs 250-300m ASL). Further survey and analysis may allow a better understanding of the relationships between the two.

## Known Floristic/ Structural Variations:
No variants have been recognised within this sub-community, however drainage lines can be expected support higher abundances of *Eucalyptus piperita* and *Syncarpia glomulifera*.

## Distribution:
*Within Gosford LGA* – restricted to the Killcare Heights/ Wards Hill area of the Bouddi Peninsula.

*Within LHCC Region* – NPWS (2000) have modelled 16504ha of their Exposed Hawkesbury Woodland (Unit 26) as remaining in the region, which would include this sub-community.

*Examples Within Gosford LGA*
- Wards Hill Road, Killcare Heights
- Maitland Bay Road, Killcare Heights

## Extent:
*Extant* - 59.64ha

## Relationship to Other Communities:

Killcare Hawkesbury Woodland is most similar to the Somersby Plateau Forest (Unit E26d), with which it shares a number of characteristic species such as *Eucalyptus sieberi, Syncarpia glomulifera* subsp. *glomulifera* and *Eucalyptus piperita* in the canopy. However, the occurrence of Unit E26c so close to the coast and at a considerably lower elevation sufficiently distinguishes the two. Understorey vegetation in Unit E26c also appears to comprise a greater proportion of more mesic species (such as *Polyscias sambuccifolia* and *Glochidion ferdinandi*), replacing the sclerophyllous heath species found in Unit E26d. Other forests and woodlands on Hawkesbury Sandstone remnants in the eastern parts of the LGA support Katandra Hawkesbury Woodland (Unit E26b), which comprises *Eucalyptus pilularis* as an important component of the canopy, and *Eucalyptus sieberi* is absent.

## Equivalent Vegetation Types:

- Benson 1981 (Mangrove Creek): n/a
- Benson & Fallding 1981 (Brisbane Water) (?) Open-forest to low open-forest – plateau tops (Unit 4P)
- Benson 1986 (Gosf-Lake Mac): (?) Low Woodland (Unit 10a)
- Clarke & Benson 1986 (Dharug): n/a
- Strom 1986 (Bouddi Peninsula): Woodland (Units 5.1.1, 5.1.2 & 5.1.3) & Low open woodland (Unit 6.2)
- Clarke & Benson 1987 (Mt White/ Mt Olive): n/a
- McRae 1990 (Bouddi Peninsula): Woodland/ open-heath (Unit 2.2)
- Binns 1996 (SF MFD): (?) MORf 20 *Banksia serrata – Eucalyptus gummifera – Eucalyptus haemastoma*
- Payne 1997 (Cockle Bay/ Bouddi): Woodland/ open-heath (Unit 2.2)
- Bell 1998 (Popran NP): n/a
- Bell 2002 (Wyong LGA): n/a

## Significant Species:

- Undescribed species – *none recorded*
- Threatened (TSC Act) – *none recorded*
- Rare (ROTAP) – *none recorded*

## Community Conservation Status:

*Reserve Representation* - this vegetation type is almost entirely in private ownership, with only a very small proportion within Bouddi NP.

*TSC Act (1995) Status* - not currently listed.

## Mapping Reliability & Included Units:

*High Resolution Area* – this vegetation type has been mapped from aerial photographic interpretation and ground truthing.

*Low Resolution Area* – this community is not expected to occur within the low resolution area.

## Vegetation Structure:

| Stratum | Mean height (m) | Min height (m) | Max height (m) | Mean cover (%) | Sdev | n |
|---|---|---|---|---|---|---|
| Emergent | | | | | | |
| Tallest | 21.00 | 18.00 | 24.00 | 65 | | 1 |
| Middle 1 | 10.00 | 5.00 | 15.00 | 35 | | 1 |
| Middle 2 | 3.00 | 2.00 | 4.00 | 15 | | 1 |
| Middle 3 | | | | | | |
| Lowest | 0.55 | 0.10 | 1.00 | 15 | | 1 |

## Key Diagnostic Species [based on 1 plot]:

| Life Form | Species | Community | | All others | | Fidelity |
|---|---|---|---|---|---|---|
| | | c/a | Freq. | c/a | Freq. | |
| Tree | *Syncarpia glomulifera subsp. glomulifera* | 4 | 100% | 2 | 28% | positive |
| | *Angophora costata* | 3 | 100% | 2 | 31% | positive |
| | *Corymbia gummifera* | 3 | 100% | 2 | 30% | positive |
| | *Eucalyptus piperita* | 3 | 100% | 2 | 13% | positive |
| | *Eucalyptus resinifera subsp. resinifera* | 3 | 100% | 2 | 2% | positive |
| | *Eucalyptus sieberi* | 2 | 100% | 3 | 5% | positive |
| | *Eucalyptus deanei* | 1 | 100% | 3 | 6% | uninformative |
| | *Eucalyptus punctata* | 1 | 100% | 2 | 14% | uninformative |
| | *Euroschinus falcata var falcata* | 1 | 100% | 1 | 0% | uninformative |
| Small tree | *Ceratopetalum gummiferum* | 3 | 100% | 2 | 5% | positive |
| | *Allocasuarina littoralis* | 2 | 100% | 1 | 14% | positive |
| | *Glochidion ferdinandii* | 2 | 100% | 2 | 28% | positive |
| | *Acacia irrorata subsp. irrorata* | 1 | 100% | 1 | 2% | uninformative |
| Shrub | *Leptospermum polygalifolium* | 3 | 100% | 2 | 24% | positive |
| | *Cassinia longifolia* | 2 | 100% | 1 | 0% | positive |
| | *Polyscias sambucifolia* | 2 | 100% | 1 | 17% | positive |
| | *Acacia ulicifolia* | 1 | 100% | 1 | 24% | uninformative |
| | *Breynia oblongifolia* | 1 | 100% | 1 | 33% | uninformative |
| | *Hibbertia empetrifolia subsp. empetrifolia* | 1 | 100% | 1 | 10% | uninformative |
| | *Macrozamia communis* | 1 | 100% | 2 | 11% | uninformative |
| | *Notelaea longifolia* | 1 | 100% | 1 | 16% | uninformative |
| | *Persoonia linearis* | 1 | 100% | 1 | 26% | uninformative |
| | *Pittosporum undulatum* | 1 | 100% | 1 | 14% | uninformative |
| | *Platylobium formosum* | 1 | 100% | 2 | 10% | uninformative |
| | *Pultenaea flexilis* | 1 | 100% | 1 | 11% | uninformative |
| Sub-shrub | *Lasiopetalum parviflorum* | 1 | 100% | 2 | 0% | uninformative |
| Herb | *Opercularia hispida* | 2 | 100% | 1 | 4% | positive |
| Grass | *Entolasia stricta* | 2 | 100% | 2 | 53% | constant |
| | *Imperata cylindrica var major* | 1 | 100% | 2 | 29% | uninformative |
| | *Oplismenus imbecillis* | 1 | 100% | 2 | 17% | uninformative |
| Graminoid | *Lomandra multiflora subsp. multiflora* | 2 | 100% | 1 | 6% | positive |
| | *Lomandra longifolia* | 2 | 100% | 2 | 44% | constant |
| | *Dianella caerulea* | 1 | 100% | 1 | 51% | uninformative |
| Ground fern | *Pteridium esculentum* | 1 | 100% | 2 | 42% | negative |
| Ground orchid | *Cryptostylis erecta* | 1 | 100% | 1 | 2% | uninformative |
| Climber | *Cissus hypoglauca* | 2 | 100% | 1 | 18% | positive |
| | *Geitonoplesium cymosum* | 2 | 100% | 1 | 24% | positive |
| | *Glycine clandestina* | 2 | 100% | 2 | 22% | positive |
| | *Pandorea pandorana subsp. pandorana* | 2 | 100% | 1 | 24% | positive |
| | *Smilax glyciphylla* | 2 | 100% | 1 | 19% | positive |
| | *Hibbertia dentata* | 1 | 100% | 1 | 10% | uninformative |
| | *Morinka jasminoides* | 1 | 100% | 1 | 15% | uninformative |
| | *Parsonsia straminea* | 1 | 100% | 1 | 19% | uninformative |
| | *Stephania japonica var discolor* | 1 | 100% | 1 | 17% | uninformative |
| Sedge/ Rush | *Lepidosperma laterale* | 2 | 100% | 2 | 27% | positive |
| | *Gahnia sieberiana* | 1 | 100% | 1 | 6% | uninformative |

# Somersby Plateau Forest
## Exposed Hawkesbury Woodland

# Unit E26d
## REMS Unit 26

## General Description:
Somersby Plateau Forest was once a relatively widespread community across the Somersby and Kulnura plateaux, although considerable amounts have been cleared historically for horticultural and agricultural pursuits. It occurs on exposed plateau tops and gentle slopes in heavily ironstone-influenced soils, and is often characterised by the presence of *Eucalyptus sieberi* in the canopy and *Doryanthes excelsa* in the understorey. Other canopy species present include *Eucalyptus umbra, Eucalyptus capitellata, Corymbia gummifera, Eucalyptus piperita, Syncarpia glomulifera* subsp*. glomulifera, Banksia serrata,* and *Angophora costata*. A variety of understorey shrubs and herbs also occur, with species such as *Acacia kulnurensis, Boronia pinnata, Dillwynia floribunda* var*. teretifolia, Acacia echinula*, *Acacia oxycedrus, Gompholobium grandifolium, Grevillea buxifolia* subsp*. phylicoides,* and *Hibbertia bracteata*. The higher rainfall received on the Somersby and Kulnura plateaux results in a more friable sandstone to develop, allowing the development of a vegetation type that is floristically distinct from that occurring elsewhere on Hawkesbury Sandstone in the region.

## Known Floristic/ Structural Variations:
No variants have yet been identified for this community.

## Distribution:
*Within Gosford LGA* – occurs at higher elevations principally in and around Somersby on the Somersby Plateau, and also on parts of the Kulnura Plateau.

*Within LHCC Region* – NPWS (2000) have not described or mapped a similar community, but have included this type in their Exposed Hawkesbury Woodland (Unit 26). Approximately 16504ha of this type has been mapped as remaining in the region.

*Examples Within Gosford LGA*
- Silvesters Road, Somersby
- Pacific Highway, Somersby

## Extent:
*Extant* - 491.99 ha

## Relationship to Other Communities:

Somersby Plateau Forest is generally floristically distinct from most other communities. The presence of *Eucalyptus sieberi, Eucalyptus piperita* and *Doryanthes excelsa* in most locations separates this community from other high elevation vegetation on Hawkesbury Sandstone. There is some overlap in species composition with the Hawkesbury *Banksia* Scrub-Woodland (Unit E29), particularly along the boundaries of the two, which are very indistinct in places. In such cases, definitive delineation is not possible, and indeed will vary markedly with fire history. In general, dense thickets of *Banksia ericifolia* var. *ericifolia* with *Angophora hispida*, accompanied with heathland, predominate in Unit E29. The more widespread Exposed Hawkesbury Woodland (Unit E26) is also floristically similar, but the more open woodland-like structure with a heathy understorey, and the dominance of *Eucalyptus haemastoma* differentiates the two. In dry sheltered gullies running off the plateau, Hawkesbury Peppermint-Apple Forest (Unit E25) occurs, which can be distinguished by the presence of *Eucalyptus piperita, Eucalyptus scias* subsp*. scias*, and *Angophora costata* in the canopy. This type generally also only occurs in drainage lines.

## Equivalent Vegetation Types:

- Benson 1981 (Mangrove Creek): n/a
- Benson & Fallding 1981 (Brisbane Water) Open-forest to low open-forest – plateau tops (Unit 4P)
- Benson 1986 (Gosf-Lake Mac): (?) Low Woodland (Unit 10a)
- Clarke & Benson 1986 (Dharug): n/a
- Strom 1986 (Bouddi Peninsula): n/a
- Clarke & Benson 1987 (Mt White/ Mt Olive): Plateau Forest (Unit C6)
- McRae 1990 (Bouddi Peninsula): n/a
- Binns 1996 (SF MFD): MORf 20 *Banksia serrata – Eucalyptus gummifera – Eucalyptus haemastoma*
- Payne 1997 (Cockle Bay/ Bouddi): n/a
- Bell 1998 (Popran NP): Hawkesbury Somersby Plateau Forest (Unit F2)
- Bell 2002 (Wyong LGA): Hawkesbury Exposed Kulnura Plateau Forest (Unit 38)

## Significant Species:

- Undescribed species – *none recorded*
- Threatened (TSC Act) – *Prostanthera junonis, Acacia bynoeana, Eucalyptus camfieldii, Tetratheca glandulosa*
- Rare (ROTAP) – *Grevillea oldei, "Acacia kulnurensis", Lomandra brevis*

## Community Conservation Status:

*Reserve Representation* - within Gosford, small portions of this vegetation type are contained within Popran NP.

*TSC Act (1995) Status* - not currently listed.

## Mapping Reliability & Included Units:

*High Resolution Area* – this vegetation type has been mapped from aerial photographic interpretation and ground truthing. Other sub-communities of the Exposed Hawkesbury Forests (Unit E26) and the Hawkesbury Peppermint-Apple Forest (Unit E25) may be included in some parts.

*Low Resolution Area* – this community is included within the modelling of Exposed Hawkesbury Woodland (Unit 26) of REMS, although further occurrences of this type are not expected in the low resolution area.

## Vegetation Structure:

| Stratum | Mean height (m) | Min height (m) | Max height (m) | Mean cover (%) | Sdev | n |
|---|---|---|---|---|---|---|
| Emergent | | | | | | |
| Tallest | 11.24 | 2.50 | 18.00 | 30 | 10.5 | 18 |
| Middle 1 | 4.13 | 0.10 | 15.00 | 38 | 22.4 | 18 |
| Middle 2 | 1.30 | 0.01 | 3.00 | 33 | 19.9 | 6 |
| Middle 3 | | | | | | |
| Lowest | 0.80 | 0.01 | 2.00 | 46 | 28.8 | 19 |

## Key Diagnostic Species [based on 18 plots]:

| Life Form | Species | Community | | All others | | Fidelity |
|---|---|---|---|---|---|---|
| | | c/a | Freq. | c/a | Freq. | |
| Tree | *Eucalyptus haemastoma* | 2 | 94% | 2 | 14% | positive |
| | *Corymbia gummifera* | 2 | 83% | 2 | 28% | positive |
| | *Eucalyptus sieberi* | 3 | 78% | 3 | 2% | positive |
| | ***Eucalyptus camfieldii* [TSC Vulnerable]** | **3** | **6%** | **0** | **0%** | **unique** |
| | *Angophora costata* | 2 | 33% | 2 | 31% | uninformative |
| | *Eucalyptus capitellata* | 2 | 17% | 4 | 1% | uninformative |
| | *Eucalyptus oblonga* | 2 | 17% | 2 | 4% | uninformative |
| | *Eucalyptus piperita* | 3 | 6% | 2 | 13% | uninformative |
| Small tree | *Banksia serrata* | 2 | 89% | 2 | 22% | positive |
| | *Allocasuarina littoralis* | 2 | 28% | 1 | 14% | uninformative |
| | *Xylomelum pyriforme* | 2 | 6% | 1 | 3% | uninformative |
| Shrub | *Persoonia levis* | 2 | 94% | 1 | 31% | positive |
| | *Lambertia formosa* | 2 | 89% | 2 | 15% | positive |
| | *Grevillea buxifolia* | 2 | 83% | 2 | 16% | positive |
| | *Persoonia isophylla* | 2 | 78% | 1 | 11% | positive |
| | *Leptospermum polygalifolium* | 3 | 67% | 2 | 22% | positive |
| | *Petrophile pulchella* | 2 | 67% | 2 | 16% | positive |
| | *Platysace linearifolia* | 2 | 67% | 2 | 31% | positive |
| | *Bossiaea obcordata* | 2 | 67% | 2 | 7% | positive |
| | *Leptospermum trinervium* | 3 | 61% | 2 | 26% | positive |
| | *Conospermum longifolium* | 2 | 61% | 1 | 10% | positive |
| | *Hakea sericea* | 2 | 56% | 1 | 9% | positive |
| | *Grevillea sericea* | 2 | 50% | 2 | 7% | positive |
| | *Phyllota phylicoides* | 2 | 50% | 2 | 17% | positive |
| | *Philotheca buxifolia* | 2 | 44% | 2 | 2% | positive |
| | *Acacia longissima* | 2 | 6% | 0 | 0% | unique |
| | *Choretrum candollei* | 1 | 6% | 0 | 0% | unique |
| | *Grevillea phylicoides* | 2 | 6% | 0 | 0% | unique |
| | *Philotheca hispidula* | 2 | 6% | 0 | 0% | unique |
| | *Hakea dactyloides* | 1 | 78% | 1 | 17% | uninformative |
| | *Isopogon anemonifolius* | 1 | 56% | 1 | 17% | uninformative |
| | *Lomatia silaifolia* | 1 | 56% | 1 | 10% | uninformative |
| | *Pimelea linifolia* | 1 | 56% | 1 | 19% | uninformative |
| | *Hibbertia bracteata* | 2 | 33% | 1 | 4% | uninformative |
| | *Hakea teretifolia* | 1 | 33% | 1 | 17% | uninformative |
| | *Styphelia laeta subsp. latifolia* | 1 | 33% | 1 | 3% | uninformative |
| | *Gompholobium grandiflorum* | 1 | 33% | 1 | 9% | uninformative |
| | *Gompholobium virgatum var aspalathoides* | 1 | 33% | 2 | 1% | uninformative |
| | *Xanthorrhoea latifolia subsp. latifolia* | 2 | 28% | 2 | 1% | uninformative |
| | *Epacris pulchella* | 2 | 28% | 2 | 13% | uninformative |
| | *Telopea speciosissima* | 1 | 28% | 1 | 2% | uninformative |
| | *Xanthorrhoea media* | 2 | 22% | 2 | 14% | uninformative |
| | *Pultenaea ferruginea* | 2 | 22% | 2 | 6% | uninformative |
| | *Monotoca scoparia* | 1 | 22% | 1 | 9% | uninformative |
| | *Pultenaea flexilis* | 3 | 17% | 1 | 11% | uninformative |
| | *Philotheca buxifolia subsp. obovata* | 2 | 17% | 2 | 0% | uninformative |
| | *Platysace lanceolata* | 1 | 17% | 2 | 16% | uninformative |
| | *Hibbertia aspera* | 1 | 17% | 1 | 3% | uninformative |
| | *Hibbertia empetrifolia subsp. empetrifolia* | 1 | 17% | 1 | 10% | uninformative |
| | *Gompholobium latifolium* | 3 | 11% | 1 | 15% | uninformative |
| | *Xanthorrhoea resinifera* | 2 | 11% | 1 | 8% | uninformative |
| | *Gompholobium huegelii* | 1 | 11% | 2 | 0% | uninformative |
| | *Woollsia pungens* | 1 | 11% | 1 | 10% | uninformative |

| | | | | | | |
|---|---|---|---|---|---|---|
| | *Kunzea capitata* | 1 | 11% | 2 | 4% | uninformative |
| | *Leptomeria acida* | 1 | 11% | 1 | 3% | uninformative |
| | ***Grevillea oldei* [ROTAP]** | **2** | **6%** | **2** | **1%** | **uninformative** |
| | *Acacia suaveolens* | 1 | 89% | 1 | 25% | uninformative |
| | *Acacia linifolia* | 1 | 56% | 1 | 12% | uninformative |
| | *Acacia myrtifolia* | 1 | 50% | 1 | 10% | uninformative |
| | *Banksia ericifolia subsp. ericifolia* | 3 | 39% | 3 | 15% | uninformative |
| | *Bossiaea heterophylla* | 2 | 39% | 2 | 9% | uninformative |
| | *Dillwynia retorta* | 2 | 39% | 2 | 4% | uninformative |
| | *Boronia ledifolia* | 1 | 39% | 2 | 10% | uninformative |
| | *Acacia ulicifolia* | 2 | 33% | 1 | 24% | uninformative |
| | *Acacia terminalis* | 1 | 33% | 1 | 8% | uninformative |
| | *Doryanthes excelsa* | 3 | 28% | 2 | 12% | uninformative |
| | *Banksia spinulosa* | 2 | 28% | 2 | 16% | uninformative |
| | *Bossiaea scolopendria* | 1 | 28% | 1 | 10% | uninformative |
| | *Bossiaea ensata* | 2 | 22% | 1 | 3% | uninformative |
| | *Banksia oblongifolia* | 1 | 22% | 2 | 18% | uninformative |
| | *Dillwynia sericea* | 1 | 17% | 2 | 4% | uninformative |
| | *Angophora hispida* | 1 | 17% | 2 | 7% | uninformative |
| | *Boronia floribunda* | 1 | 17% | 1 | 1% | uninformative |
| | *Comesperma ericinum* | 1 | 17% | 1 | 3% | uninformative |
| | *Acacia oxycedrus* | 2 | 11% | 1 | 11% | uninformative |
| | *Dillwynia floribunda* | 1 | 11% | 2 | 12% | uninformative |
| | *Epacris microphylla var microphylla* | 1 | 11% | 2 | 3% | uninformative |
| Sub-shrub | *Pultenaea rosmarinifolia* | 2 | 44% | 2 | 13% | positive |
| | *Conospermum tenuifolium* | 2 | 17% | 0 | 0% | unique |
| | *Hovea purpurea* | 2 | 11% | 0 | 0% | unique |
| | *Stypandra glauca* | 1 | 6% | 0 | 0% | unique |
| | *Hovea linearis* | 1 | 39% | 1 | 8% | uninformative |
| | *Tetratheca ericifolia* | 1 | 17% | 2 | 1% | uninformative |
| | *Hemigenia purpurea* | 1 | 11% | 2 | 4% | uninformative |
| | *Hibbertia monogyna* | 2 | 11% | 1 | 5% | uninformative |
| | *Hibbertia obtusifolia* | 2 | 11% | 1 | 1% | uninformative |
| | *Scaevola ramosissima* | 2 | 11% | 1 | 8% | uninformative |
| | *Leucopogon esquamatus* | 2 | 11% | 1 | 1% | uninformative |
| | ***Tetratheca glandulosa* [TSC Vulnerable]** | **2** | **6%** | **1** | **2%** | **uninformative** |
| Herb | *Actinotus minor* | 2 | 89% | 2 | 16% | positive |
| | *Dampiera stricta* | 1 | 39% | 1 | 11% | uninformative |
| | *Micrantheum ericoides* | 1 | 28% | 1 | 4% | uninformative |
| | *Phyllanthus hirtellus* | 2 | 22% | 1 | 18% | uninformative |
| | *Xanthosia tridentata* | 2 | 22% | 1 | 10% | uninformative |
| | *Hibbertia riparia* | 3 | 17% | 2 | 1% | uninformative |
| | *Goodenia bellidifolia subsp. bellidifolia* | 1 | 17% | 1 | 5% | uninformative |
| | *Xanthosia pilosa* | 1 | 17% | 1 | 13% | uninformative |
| | *Mitrasacme polymorpha* | 2 | 11% | 1 | 5% | uninformative |
| | *Pomax umbellata* | 2 | 11% | 2 | 16% | uninformative |
| | *Platysace ericoides* | 1 | 11% | 1 | 0% | uninformative |
| | *Stackhousia viminea* | 1 | 11% | 1 | 1% | uninformative |
| Grass | *Anisopogon avenaceus* | 3 | 78% | 1 | 13% | positive |
| | *Entolasia stricta* | 2 | 67% | 2 | 53% | constant |
| | *Entolasia marginata* | 1 | 17% | 2 | 17% | uninformative |
| | *Eragrostis brownii* | 1 | 11% | 1 | 3% | uninformative |
| Graminoid | *Patersonia sericea* | 2 | 67% | 2 | 16% | positive |
| | *Lomandra obliqua* | 2 | 56% | 2 | 18% | positive |
| | *Lomandra glauca* | 2 | 50% | 2 | 17% | positive |
| | *Xyris ustulata* | 1 | 6% | 0 | 0% | unique |
| | *Dianella prunina* | 1 | 39% | 1 | 3% | uninformative |
| | *Dianella revoluta var revoluta* | 1 | 22% | 1 | 4% | uninformative |

| | | | | | | |
|---|---|---|---|---|---|---|
| | *Patersonia glabrata* | 2 | 17% | 2 | 6% | uninformative |
| | *Dianella caerulea* | 1 | 17% | 1 | 52% | uninformative |
| | *Lomandra cylindrica* | 2 | 11% | 2 | 4% | uninformative |
| | *Lomandra longifolia* | 2 | 11% | 2 | 46% | negative |
| | *Lomandra filiformis* | 1 | 11% | 1 | 9% | uninformative |
| | ***Lomandra brevis* [ROTAP]** | **2** | **6%** | **1** | **1%** | **uninformative** |
| Ground fern | *Lindsaea linearis* | 2 | 78% | 1 | 12% | positive |
| | *Pteridium esculentum* | 1 | 33% | 2 | 43% | negative |
| | *Gleichenia dicarpa* | 1 | 11% | 3 | 7% | uninformative |
| Ground orchid | *Caleana major* | 1 | 6% | 0 | 0% | unique |
| | *Chiloglottis spp.* | 1 | 6% | 1 | 1% | uninformative |
| | *Cryptostylis erecta* | 1 | 6% | 1 | 2% | uninformative |
| Epiphytic orchid | *Cymbidium suave* | 1 | 11% | 1 | 5% | uninformative |
| Clubmoss | *Selaginella uliginosa* | 2 | 28% | 1 | 4% | uninformative |
| Climber | *Billardiera scandens* | 1 | 61% | 1 | 28% | uninformative |
| | *Cassytha glabella forma glabella* | 2 | 22% | 1 | 14% | uninformative |
| | *Cassytha pubescens* | 1 | 22% | 1 | 8% | uninformative |
| | *Mirbelia rubiifolia* | 1 | 11% | 2 | 6% | uninformative |
| Sedge/ Rush | *Lepyrodia scariosa* | 2 | 67% | 3 | 17% | positive |
| | *Caustis flexuosa* | 2 | 56% | 1 | 6% | positive |
| | *Cyathochaeta diandra* | 2 | 44% | 2 | 20% | positive |
| | *Baumea acuta* | 2 | 6% | 0 | 0% | unique |
| | *Lepidosperma laterale* | 2 | 22% | 2 | 27% | uninformative |
| | *Schoenus imberbis* | 2 | 17% | 2 | 5% | uninformative |
| | *Schoenus apogon* | 1 | 17% | 1 | 1% | uninformative |
| | *Baumea rubiginosa* | 2 | 11% | 1 | 2% | uninformative |
| | *Caustis pentandra* | 2 | 11% | 2 | 1% | uninformative |
| | *Gahnia sieberiana* | 1 | 11% | 1 | 6% | uninformative |
| | *Leptocarpus tenax* | 1 | 11% | 2 | 4% | uninformative |

# Bouddi Sandstone Coastal Heath
## Exposed Hawkesbury Woodland (Heath)

# Unit E26e
## REMS Unit 26a

## General Description:
On the windswept ridgetops of Bouddi Ridge in Bouddi National Park, and other parts of the Bouddi Peninsula, outcrops of Hawkesbury Sandstone support heath vegetation dominated by *Allocasuarina distyla* and *Banksia ericifolia* var. *ericifolia*. A range of other species is present, including interesting occurrences of stunted *Syncarpia glomulifera, Eucalyptus umbra, Eucalyptus scias* and *Angophora costata*, together with shrubs such as *Hakea teretifolia, Baeckea brevifolia, Platysace lanceolata, Isopogon anemonifolius, Xanthosia pilosa, Philotheca buxifolia, Xanthorrhoea media*, and *Dillwynia retorta*. This vegetation type is a coastal variation of the more inland coastal heaths, but is distinct and disjunct enough to be treated as a sub-community in its own right.

## Known Floristic/ Structural Variations:
No variants in this community have been identified.

## Distribution:
*Within Gosford LGA* – this vegetation type occurs only on the exposed Hawkesbury Sandstones of the Bouddi Peninsula.

*Within LHCC Region* – NPWS (2000) have modelled 2052ha of their Exposed Hawkesbury Woodland (Heath) (Unit 26a) as remaining in the region, which would include this sub-community.

*Examples Within Gosford LGA*
- Hawke Head Drive, Bouddi NP

## Extent:
*Extant* - 86.66 ha

## Relationship to Other Communities:
Bouddi Sandstone Coastal Heath is the only heath vegetation occurring directly on the coast on Hawkesbury Sandstone substrates. As such, the dominance of *Allocasuarina distyla* with *Banksia ericifolia* var. *ericifolia* sufficiently distinguishes it from the Hawkesbury Rock Pavement Heath (Unit E26a) and the Hawkesbury Coastal *Banksia* Scrub-Woodland (Unit E29a). Other coastal heaths on clay-based soils of the Narrabeen Sandstone series, such as the Coastal Headland

Shrubland (Unit E51c) and Coastal Headland Paperbark Scrub (Unit E51d), support clay-based species such as *Melaleuca nodosa, Dodonaea triquetra,* and *Westringia fruticosa*, and have far fewer sandstone-based species.

## Equivalent Vegetation Types:

- Benson 1981 (Mangrove Creek): n/a
- Benson & Fallding 1981 (Brisbane Water) n/a
- Benson 1986 (Gosf-Lake Mac): Open-heath (Unit 10a)
- Clarke & Benson 1986 (Dharug): n/a
- Strom 1986 (Bouddi Peninsula): Open heath (Units 5.3.1 & 5.3.2)
- Clarke & Benson 1987 (Mt White/ Mt Olive): n/a
- McRae 1990 (Bouddi Peninsula): Low shrubland/ open-heath (Unit 2.1)
- Binns 1996 (SF MFD): n/a
- Payne 1997 (Cockle Bay/ Bouddi): n/a
- Bell 1998 (Popran NP): n/a
- Bell 2002 (Wyong LGA): n/a

## Significant Species:

- Undescribed species – *none recorded*
- Threatened (TSC Act) – *none recorded*
- Rare (ROTAP) – *Rulingia hermannifolia (?)*

## Community Conservation Status:

*Reserve Representation* - within Gosford, areas of this vegetation type are almost all contained within Bouddi NP.

*TSC Act (1995) Status* - not currently listed.

## Mapping Reliability & Included Units:

*High Resolution Area* – this vegetation type has been mapped from aerial photographic interpretation and ground truthing.

*Low Resolution Area* – this community is not expected to occur within the low resolution area.

## Vegetation Structure:

| Stratum | Mean height (m) | Min height (m) | Max height (m) | Mean cover (%) | Sdev | n |
|---|---|---|---|---|---|---|
| Emergent | | | | | | |
| Tallest | 2.17 | 1.50 | 2.50 | 44 | 50.9 | 2 |
| Middle 1 | 0.77 | 0.30 | 1.50 | 73 | 17.7 | 2 |
| Middle 2 | | | | | | |
| Middle 3 | | | | | | |
| Lowest | 0.20 | 0.10 | 0.30 | 15 | | 1 |

## Key Diagnostic Species [based on 2 plots]:

| Life Form | Species | Community | | All others | | Fidelity |
|---|---|---|---|---|---|---|
| | | c/a | Freq. | c/a | Freq. | |
| Tree | *Eucalyptus umbra* | 2 | 100% | 2 | 10% | positive |
| | *Syncarpia glomulifera subsp. glomulifera* | 2 | 100% | 2 | 28% | positive |
| | *Angophora costata* | 1 | 100% | 2 | 30% | uninformative |
| | *Eucalyptus scias subsp. scias* | 1 | 50% | 2 | 1% | uninformative |
| Small tree | *Banksia serrata* | 1 | 50% | 2 | 25% | uninformative |

| | | | | | | |
|---|---|---|---|---|---|---|
| Shrub | *Pimelea linifolia* | 4 | 100% | 1 | 20% | positive |
| | *Acacia myrtifolia* | 3 | 100% | 1 | 11% | positive |
| | *Allocasuarina distyla* | 6 | 50% | 2 | 3% | positive |
| | *Pultenaea daphnoides* | 5 | 50% | 1 | 7% | positive |
| | *Leptospermum polyanthum* | 4 | 50% | 1 | 0% | positive |
| | *Polyscias sambucifolia* | 4 | 50% | 1 | 17% | positive |
| | *Banksia ericifolia subsp. ericifolia* | 3 | 50% | 3 | 16% | positive |
| | *Baeckea brevifolia* | 2 | 50% | 1 | 2% | positive |
| | *Baeckea diosmifolia* | 2 | 50% | 2 | 6% | positive |
| | *Dillwynia retorta* | 2 | 50% | 2 | 5% | positive |
| | *Dillwynia rudis* | 2 | 50% | 2 | 0% | positive |
| | *Epacris longiflora* | 2 | 50% | 1 | 1% | positive |
| | *Isopogon anethifolius* | 2 | 50% | 2 | 1% | positive |
| | *Leptospermum arachnoides* | 2 | 50% | 1 | 3% | positive |
| | *Leptospermum squarrosum* | 2 | 50% | 1 | 0% | positive |
| | *Philotheca buxifolia* | 2 | 50% | 2 | 4% | positive |
| | *Platysace lanceolata* | 2 | 50% | 1 | 16% | positive |
| | *Xanthorrhoea media* | 2 | 50% | 2 | 15% | positive |
| | *Hakea teretifolia* | 1 | 100% | 1 | 17% | uninformative |
| | *Lambertia formosa* | 1 | 100% | 2 | 18% | uninformative |
| | *Acacia suaveolens* | 1 | 50% | 1 | 28% | uninformative |
| | *Banksia oblongifolia* | 1 | 50% | 2 | 18% | uninformative |
| | *Banksia spinulosa* | 1 | 50% | 2 | 16% | uninformative |
| | *Dodonaea triquetra* | 1 | 50% | 1 | 17% | uninformative |
| | *Gompholobium latifolium* | 1 | 50% | 1 | 15% | uninformative |
| | *Hibbertia aspera* | 1 | 50% | 1 | 4% | uninformative |
| | *Lasiopetalum ferrugineum* | 1 | 50% | 1 | 5% | uninformative |
| | *Leptospermum polygalifolium* | 1 | 50% | 2 | 24% | uninformative |
| | *Leptospermum trinervium* | 1 | 50% | 2 | 27% | uninformative |
| | *Monotoca scoparia* | 1 | 50% | 1 | 10% | uninformative |
| | *Notelaea longifolia* | 1 | 50% | 1 | 16% | uninformative |
| | *Petrophile pulchella* | 1 | 50% | 2 | 18% | uninformative |
| | *Platysace linearifolia* | 1 | 50% | 2 | 32% | uninformative |
| | *Xanthorrhoea macronema* | 1 | 50% | 2 | 3% | uninformative |
| Sub-shrub | *Lasiopetalum parviflorum* | 2 | 50% | 1 | 0% | positive |
| | *Hibbertia virgata subsp. virgata* | 2 | 50% | 0 | 0% | unique |
| | *Hibbertia obtusifolia* | 1 | 50% | 2 | 1% | uninformative |
| | *Leucopogon esquamatus* | 1 | 50% | 1 | 1% | uninformative |
| Herb | *Gonocarpus teucrioides* | 4 | 50% | 1 | 15% | positive |
| | *Phyllanthus hirtellus* | 2 | 50% | 1 | 18% | positive |
| | *Xanthosia pilosa* | 2 | 50% | 1 | 13% | positive |
| | *Xanthosia tridentata* | 2 | 100% | 1 | 10% | positive |
| | *Actinotus helianthi* | 1 | 50% | 1 | 7% | uninformative |
| | *Dampiera stricta* | 1 | 50% | 1 | 12% | uninformative |
| | *Goodenia bellidifolia subsp. bellidifolia* | 1 | 50% | 1 | 5% | uninformative |
| | *Opercularia aspera* | 1 | 50% | 1 | 5% | uninformative |
| Grass | *Themeda australis* | 3 | 50% | 2 | 24% | positive |
| | *Entolasia stricta* | 4 | 50% | 2 | 53% | constant |
| Graminoid | *Lomandra glauca* | 2 | 100% | 2 | 18% | positive |
| | *Lomandra obliqua* | 5 | 100% | 2 | 19% | positive |
| | *Lomandra filiformis* | 1 | 50% | 1 | 9% | uninformative |
| | *Patersonia glabrata* | 1 | 50% | 2 | 7% | uninformative |
| | *Patersonia sericea* | 1 | 50% | 2 | 18% | uninformative |
| | *Lomandra longifolia* | 1 | 50% | 2 | 45% | negative |
| Ground fern | *Pteridium esculentum* | 1 | 50% | 2 | 42% | negative |
| Climber | *Mirbelia rubiifolia* | 2 | 50% | 1 | 6% | positive |
| | *Billardiera scandens* | 1 | 50% | 1 | 29% | uninformative |
| | *Glycine clandestina* | 1 | 50% | 2 | 22% | uninformative |

| | | | | | | |
|---|---|---|---|---|---|---|
| | *Kennedia rubicunda* | 1 | 50% | 1 | 11% | uninformative |
| | *Pandorea pandorana subsp. pandorana* | 1 | 50% | 1 | 24% | uninformative |
| | *Stephania japonica var discolor* | 1 | 50% | 1 | 17% | uninformative |
| Sedge/ Rush | *Lepyrodia scariosa* | 3 | 50% | 2 | 19% | positive |
| | *Lepidosperma concavum* | 2 | 50% | 1 | 1% | positive |
| | *Cyathochaeta diandra* | 1 | 100% | 2 | 20% | uninformative |

# Somersby Plateau Fernland-Woodland Unit E26f

## Exposed Hawkesbury Woodland REMS Unit 26

Distribution currently not mapped

## General Description:

On parts of the Somersby Plateau near Mangrove Trig and the upper catchment of Mooney Mooney Creek, a distinctive woodland occurs where *Eucalyptus sieberi, Eucalyptus piperita* and *Eucalyptus haemastoma* occur over an understorey largely dominated by *Glechenia discarpa, Gahnia sieberiana, Leptospermum polygalifolium* and other moisture loving species. In places, *Banksia ericifolia* becomes dominant with *Doryanthes excelsa*. This sub-community appears to represent a transitional vegetation type between the more sclerophyllous open woodlands of the Exposed Hawkesbury Woodland (Unit E26) and Somersby Plateau Forest (Unit Ed), and the Sandstone Hanging Swamps (Unit E54). Further research is required to clarify floristic relationships, however this sub-community does appear to be highly localised to the Somersby Plateau on sites with impervious clay subsoils. Accurate mapping of this vegetation type is required to enable conservation assessments to be made, and appropriate management to be implemented.

## Known Floristic/ Structural Variations:

This unit has not yet been accurately mapped, and it is currently contained within E26. No variants have been identified.

## Distribution:

*Within Gosford LGA* – this vegetation type occurs only on the Somersby Plateau between Somersby and Mangrove Mountain.

*Within LHCC Region* – NPWS (2000) have modelled 16504ha of their Exposed Hawkesbury Woodland (Unit 26) as remaining in the region, which would include this sub-community.

*Examples Within Gosford LGA*

- Pacific Highway crossing of Mooney Mooney Creek, near Mangrove Mountain
- Wisemans Ferry Road, Somersby

## Extent:

*Extant* - not currently mapped

## Relationship to Other Communities:

Somersby Plateau Fernland-Woodland is floristically similar to the Exposed Hawkesbury Woodland (Unit E26) and Somersby Plateau Forest (Unit E26d) through a sharing of canopy species such as *Eucalyptus sieberi* and *Eucalyptus*

*haemastoma*. However, the clear dominance of the ground fern *Glechenia dicarpa* in the understorey, in many places completely smothering the ground layer, sufficiently distinguishes the three. This sub-community is also similar to forms of the Sandstone Hanging Swamp (Unit E54) where *Glechenia dicarpa* is important, but the two can be separated on a structural basis. It is likely that floristic affinities of the Somersby Plateau Fernland-Woodland lie strongest with the Sandstone Hanging Swamps, but further research is required.

## Equivalent Vegetation Types:

- Benson 1981 (Mangrove Creek): n/a
- Benson & Fallding 1981 (Brisbane Water) (?) Open-forest to low open-forest – plateau tops (Unit 4P)
- Benson 1986 (Gosf-Lake Mac): (?) Low Woodland (Unit 10a)
- Clarke & Benson 1986 (Dharug): n/a
- Strom 1986 (Bouddi Peninsula): n/a
- Clarke & Benson 1987 (Mt White/ Mt Olive): (?) Plateau Forest (Unit C6)
- McRae 1990 (Bouddi Peninsula): n/a
- Binns 1996 (SF MFD): (?) MORf 20 *Banksia serrata – Eucalyptus gummifera – Eucalyptus haemastoma*
- Payne 1997 (Cockle Bay/ Bouddi): n/a
- Bell 1998 (Popran NP): n/a
- Bell 2002 (Wyong LGA): n/a

## Significant Species:

- Undescribed species – *none recorded*
- Threatened (TSC Act) – *Hibbertia procumbens* (on dryer sandy patches)
- Rare (ROTAP) – *none recorded*

## Community Conservation Status:

*Reserve Representation* - within Gosford, areas of this vegetation type are not known from reservation, although the upper Mooney Mooney Creek location occurs close to Brisbane Water NP.

*TSC Act (1995) Status* - not currently listed.

## Mapping Reliability & Included Units:

*High Resolution Area* – this vegetation type has not been mapped within the high resolution area.

*Low Resolution Area* – this vegetation type has not been mapped within the low resolution area.

## Vegetation Structure:

| Stratum | Mean height (m) | Min height (m) | Max height (m) | Mean cover (%) | Sdev | n |
|---|---|---|---|---|---|---|
| Emergent | | | | | | |
| Tallest | 16.70 | 5.00 | 28.00 | 47 | 20.0 | 10 |
| Middle 1 | 4.19 | 1.00 | 10.00 | 36 | 25.0 | 8 |
| Middle 2 | | | | | | |
| Middle 3 | | | | | | |
| Lowest | 1.37 | 0.10 | 3.00 | 48 | 33.3 | 10 |

## Key Diagnostic Species [based on 10 plots]:

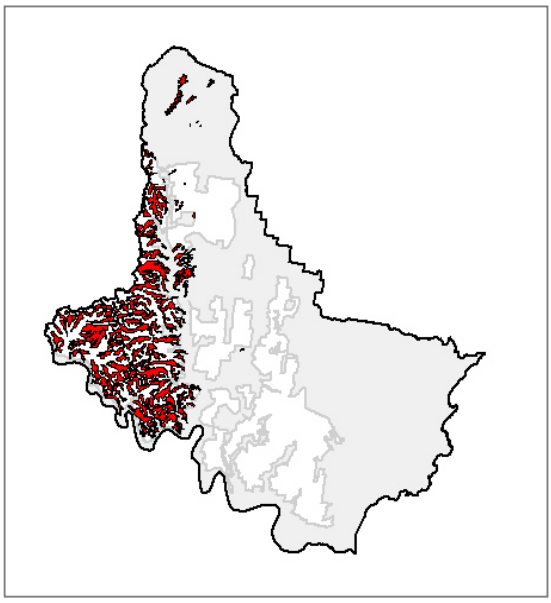
| Life Form | Species | Community | | All others | | Fidelity |
|---|---|---|---|---|---|---|
| | | c/a | Freq. | c/a | Freq. | |
| Tree | *Eucalyptus sieberi* | 4 | 60% | 3 | 4% | positive |
| | *Eucalyptus piperita* | 2 | 60% | 2 | 12% | positive |

| | | | | | | |
|---|---|---|---|---|---|---|
| | *Lophostemon confertus* | 1 | 10% | 0 | 0% | unique |
| | *Eucalyptus haemastoma* | 3 | 20% | 2 | 17% | uninformative |
| | *Angophora costata* | 2 | 20% | 2 | 31% | uninformative |
| | *Allocasuarina torulosa* | 1 | 20% | 2 | 27% | uninformative |
| | *Corymbia gummifera* | 2 | 10% | 2 | 31% | uninformative |
| | *Eucalyptus oblonga* | 1 | 10% | 2 | 5% | uninformative |
| Small tree | *Callicoma serratifolia* | 2 | 30% | 2 | 3% | uninformative |
| | *Acacia elata* | 1 | 10% | 2 | 6% | uninformative |
| Shrub | *Leptospermum polygalifolium* | 4 | 70% | 2 | 23% | positive |
| | *Doryanthes excelsa* | 3 | 50% | 2 | 11% | positive |
| | *Banksia ericifolia subsp. ericifolia* | 3 | 40% | 3 | 16% | positive |
| | *Bauera rubioides* | 2 | 40% | 1 | 4% | positive |
| | *Acacia longifolia* | 2 | 40% | 1 | 11% | positive |
| | *Platysace linearifolia* | 2 | 40% | 2 | 32% | positive |
| | *Hakea teretifolia* | 1 | 60% | 1 | 16% | uninformative |
| | *Hibbertia empetrifolia subsp. empetrifolia* | 1 | 50% | 1 | 10% | uninformative |
| | *Lomatia silaifolia* | 1 | 40% | 1 | 12% | uninformative |
| | *Persoonia isophylla* | 1 | 40% | 1 | 13% | uninformative |
| | *Persoonia levis* | 1 | 40% | 1 | 34% | uninformative |
| | *Acacia myrtifolia* | 1 | 30% | 1 | 11% | uninformative |
| | *Hakea dactyloides* | 1 | 30% | 1 | 20% | uninformative |
| | *Polyscias sambucifolia* | 1 | 30% | 1 | 17% | uninformative |
| | *Xanthorrhoea arborea* | 1 | 30% | 2 | 7% | uninformative |
| | *Pultenaea flexilis* | 1 | 30% | 2 | 11% | uninformative |
| | *Acacia terminalis* | 1 | 30% | 1 | 9% | uninformative |
| | *Banksia spinulosa* | 1 | 30% | 2 | 16% | uninformative |
| | *Callistemon citrinus* | 1 | 30% | 1 | 3% | uninformative |
| | *Aotus ericoides* | 1 | 30% | 1 | 2% | uninformative |
| | *Logania albiflora* | 4 | 20% | 1 | 1% | uninformative |
| | *Gompholobium virgatum var aspalathoides* | 2 | 20% | 1 | 2% | uninformative |
| | *Grevillea sericea* | 1 | 20% | 2 | 8% | uninformative |
| | *Lambertia formosa* | 1 | 20% | 2 | 18% | uninformative |
| | *Leptomeria acida* | 1 | 20% | 1 | 3% | uninformative |
| | *Petrophile pulchella* | 1 | 20% | 2 | 18% | uninformative |
| | *Sprengelia incarnata* | 1 | 20% | 2 | 2% | uninformative |
| | *Styphelia laeta subsp. latifolia* | 1 | 20% | 1 | 4% | uninformative |
| | *Acacia oxycedrus* | 3 | 10% | 1 | 11% | uninformative |
| | *Kunzea ambigua* | 3 | 10% | 1 | 3% | uninformative |
| | *Isopogon anemonifolius* | 2 | 10% | 1 | 18% | uninformative |
| | *Leptospermum arachnoides* | 2 | 10% | 1 | 3% | uninformative |
| Tree fern | *Cyathea cooperi* | 1 | 10% | 2 | 1% | uninformative |
| Sub-shrub | *Pultenaea rosmarinifolia* | 1 | 30% | 2 | 14% | uninformative |
| | *Hovea linearis* | 1 | 10% | 1 | 9% | uninformative |
| Herb | *Hibbertia riparia* | 1 | 20% | 2 | 1% | uninformative |
| | *Xanthosia tridentata* | 1 | 20% | 1 | 10% | uninformative |
| | *Actinotus minor* | 3 | 10% | 2 | 19% | uninformative |
| Grass | *Themeda australis* | 2 | 40% | 2 | 24% | positive |
| | *Entolasia stricta* | 1 | 50% | 2 | 53% | negative |
| | *Entolasia marginata* | 1 | 50% | 2 | 16% | uninformative |
| | *Imperata cylindrica var major* | 3 | 30% | 2 | 29% | uninformative |
| | *Anisopogon avenaceus* | 1 | 20% | 2 | 16% | uninformative |
| Graminoid | *Lomandra longifolia* | 1 | 50% | 2 | 44% | negative |
| | *Patersonia sericea* | 1 | 20% | 2 | 18% | uninformative |
| | *Dianella caerulea* | 1 | 20% | 1 | 51% | uninformative |
| Ground fern | *Gleichenia dicarpa* | 5 | 90% | 2 | 5% | positive |
| | *Pteridium esculentum* | 1 | 30% | 2 | 43% | negative |

| | | | | | | |
|---|---|---|---|---|---|---|
| | *Lindsaea linearis* | 1 | 30% | 2 | 15% | uninformative |
| | *Blechnum wattsii* | 4 | 20% | 1 | 0% | uninformative |
| | *Sticherus flabellatus var flabellatus* | 2 | 20% | 2 | 2% | uninformative |
| | *Calochlaena dubia* | 1 | 20% | 3 | 18% | uninformative |
| Ground orchid | *Chiloglottis spp.* | 1 | 10% | 1 | 1% | uninformative |
| | *Corybas spp.* | 1 | 10% | 2 | 1% | uninformative |
| Clubmoss | *Selaginella uliginosa* | 1 | 30% | 2 | 5% | uninformative |
| | *Lycopodium deuterodensum* | 2 | 10% | 2 | 0% | uninformative |
| Climber | *Smilax glyciphylla* | 1 | 40% | 1 | 19% | uninformative |
| | *Billardiera scandens* | 1 | 20% | 1 | 29% | uninformative |
| Sedge/ Rush | *Gahnia sieberiana* | 2 | 70% | 1 | 5% | positive |
| | *Leptocarpus tenax* | 3 | 10% | 2 | 4% | uninformative |
| | *Chorizandra sphaerocephala* | 2 | 10% | 4 | 0% | uninformative |

# Dharug Arid Exposed Woodland
## Exposed Yellow Bloodwood Woodland

# Unit E27
## REMS Unit 27



## General Description:
Dharug Arid Exposed Woodland occurs on exposed crests and slopes on Hawkesbury Sandstone geology in dry rainfall areas, typically within the Dharug National Park area. The canopy here is typified by the dominance of *Corymbia eximia* and *Angophora bakeri*, although other species such as *Eucalyptus racemosa, Corymbia gummifera* and *Eucalyptus sparsifolia* may also occur. Understorey vegetation is represented by a sparse-to-moderate coverage of shrub species such as *Leptospermum trinervium, Monotoca scoparia, Phyllota phylicoides, Banksia spinulosa, Boronia ledifolia,* and *Pultenaea flexilis*. This vegetation type is the dryer westerly equivalent of the widespread Exposed Hawkesbury Woodland complex (E26), and it extends outside of Gosford LGA into Hawkesbury LGA and beyond (Bell 1998).

## Known Floristic/ Structural Variations:
No variants have yet been identified for this community.

## Distribution:
*Within Gosford LGA* – occurs across most of the ridges and exposed slopes in the Dharug NP area.

*Within LHCC Region* – NPWS (2000) have mapped 26206ha in their Exposed Yellow Bloodwood Woodland (Unit 27) as remaining in the region.

*Examples Within Gosford LGA*
- Most ridges in Dharug NP

## Extent:
*Extant* - 8024.12 ha

## Relationship to Other Communities:
Dharug Arid Exposed Woodland is floristically distinct from most other communities. No other vegetation type is dominated by *Angophora bakeri* and *Corymbia eximia* over a heathy understorey. There is some overlap in species composition with the Exposed Hawkesbury Woodland (Unit E26), but that community only occasionally supports the two diagnostic canopy species.

## Equivalent Vegetation Types:

- Benson 1981 (Mangrove Creek): (?) *Eucalyptus eximia-Eucalyptus gummifera-Eucalyptus punctata* Woodland
- Benson & Fallding 1981 (Brisbane Water) n/a
- Benson 1986 (Gosf-Lake Mac): Hawkesbury Sandstone Complex (Unit 10a)
- Clarke & Benson 1986 (Dharug): (?) Low woodland (Unit C3)
- Strom 1986 (Bouddi Peninsula): n/a
- Clarke & Benson 1987 (Mt White/ Mt Olive): n/a
- McRae 1990 (Bouddi Peninsula): n/a
- Binns 1996 (SF MFD): *Angophora bakeri* (Unit MORov23)
- Payne 1997 (Cockle Bay/ Bouddi): n/a
- Bell 1998 (Popran NP): Hawkesbury Arid Exposed Woodland (Unit W1)
- Bell 2002 (Wyong LGA): n/a

## Significant Species:

- Undescribed species – *none recorded*
- Threatened (TSC Act) – *Darwinia glaucophylla, Persoonia hirsuta* subsp*. hirsuta Tetratheca glandulosa*
- Rare (ROTAP) – *Platysace clelandii, Eucalyptus prominula*

## Community Conservation Status:

*Reserve Representation* - within Gosford, this vegetation type is well conserved in Dharug and Popran NP's.

*TSC Act (1995) Status* - not currently listed.

## Mapping Reliability & Included Units:

*High Resolution Area* – not present in the high resolution area.

*Low Resolution Area* – this community is included within the modelling of Exposed Yellow Bloodwood Woodland (Unit 27) of REMS.

## Vegetation Structure:

| Stratum | Mean height (m) | Min height (m) | Max height (m) | Mean cover (%) | Sdev | n |
|---|---|---|---|---|---|---|
| Emergent | | | | | | |
| Tallest | 18.00 | 10.00 | 25.00 | 25 | 5.8 | 4 |
| Middle 1 | 4.38 | 1.00 | 10.00 | 38 | 22.5 | 4 |
| Middle 2 | 2.00 | 1.00 | 3.00 | 40 | | 1 |
| Middle 3 | | | | | | |
| Lowest | 0.55 | 0.10 | 1.00 | 19 | 21.4 | 4 |

## Key Diagnostic Species [based on 20 plots]:

| Life Form | Species | Community | | All others | | Fidelity |
|---|---|---|---|---|---|---|
| | | c/a | Freq. | c/a | Freq. | |
| Tree | *Corymbia eximia* | 3 | 90% | 1 | 3% | positive |
| | *Angophora bakeri* | 3 | 70% | 1 | 1% | positive |
| | *Corymbia gummifera* | 2 | 60% | 2 | 29% | positive |
| | *Eucalyptus punctata* | 2 | 45% | 2 | 13% | positive |
| | ***Eucalyptus prominula* [ROTAP]** | **3** | **10%** | **0** | **0%** | **unique** |
| | *Eucalyptus sparsifolia* | 2 | 25% | 0 | 0% | unique |
| | *Eucalyptus haemastoma* | 2 | 35% | 2 | 16% | uninformative |
| | *Eucalyptus racemosa* | 3 | 25% | 3 | 1% | uninformative |
| | *Eucalyptus umbra* | 2 | 20% | 2 | 10% | uninformative |

| | | | | | | |
|---|---|---|---|---|---|---|
| | *Angophora costata* | 1 | 20% | 2 | 31% | uninformative |
| | *Syncarpia glomulifera subsp. glomulifera* | 1 | 15% | 2 | 29% | uninformative |
| | *Eucalyptus squamosa* | 2 | 10% | 2 | 0% | uninformative |
| Small tree | *Allocasuarina littoralis* | 2 | 45% | 1 | 13% | positive |
| | *Banksia serrata* | 1 | 40% | 2 | 24% | uninformative |
| | *Acacia prominens* | 2 | 15% | 2 | 6% | uninformative |
| | *Xylomelum pyriforme* | 1 | 15% | 1 | 2% | uninformative |
| Shrub | *Platysace linearifolia* | 2 | 95% | 2 | 29% | positive |
| | *Leptospermum trinervium* | 2 | 90% | 2 | 24% | positive |
| | *Xanthorrhoea media* | 2 | 80% | 2 | 11% | positive |
| | *Phyllota phylicoides* | 2 | 70% | 2 | 15% | positive |
| | *Pultenaea elliptica* | 2 | 60% | 2 | 8% | positive |
| | *Grevillea buxifolia* | 2 | 55% | 2 | 17% | positive |
| | *Petrophile pulchella* | 2 | 55% | 2 | 16% | positive |
| | *Lambertia formosa* | 2 | 50% | 2 | 17% | positive |
| | *Persoonia linearis* | 2 | 50% | 1 | 25% | positive |
| | *Bossiaea stephensonii* | 3 | 40% | 3 | 3% | positive |
| | *Banksia oblongifolia* | 2 | 40% | 2 | 17% | positive |
| | *Hibbertia empetrifolia subsp. empetrifolia* | 2 | 40% | 1 | 9% | positive |
| | *Bossiaea rhombifolia subsp. rhombifolia* | 2 | 5% | 0 | 0% | unique |
| | *Dodonaea pinnata* | 1 | 5% | 0 | 0% | unique |
| | *Hibbertia cistoidea* | 2 | 5% | 0 | 0% | unique |
| | ***Persoonia hirsuta subsp. hirsuta* [TSC Endangered]** | **1** | **5%** | **0** | **0%** | **unique** |
| | *Phebalium squamulosum subsp. squamulosum* | 1 | 15% | 0 | 0% | unique |
| | *Persoonia levis* | 1 | 75% | 1 | 32% | uninformative |
| | *Isopogon anemonifolius* | 1 | 55% | 1 | 16% | uninformative |
| | *Monotoca scoparia* | 1 | 55% | 1 | 8% | uninformative |
| | *Conospermum longifolium* | 1 | 50% | 1 | 10% | uninformative |
| | *Pimelea linifolia* | 1 | 50% | 1 | 19% | uninformative |
| | *Acacia suaveolens* | 1 | 45% | 1 | 27% | uninformative |
| | *Hakea dactyloides* | 1 | 45% | 1 | 19% | uninformative |
| | *Acacia ulicifolia* | 2 | 35% | 1 | 23% | uninformative |
| | *Bossiaea heterophylla* | 1 | 35% | 2 | 9% | uninformative |
| | *Hakea sericea* | 1 | 30% | 1 | 10% | uninformative |
| | *Baeckea diosmifolia* | 2 | 25% | 2 | 5% | uninformative |
| | *Gompholobium glabratum* | 2 | 25% | 2 | 1% | uninformative |
| | *Bossiaea obcordata* | 2 | 25% | 2 | 9% | uninformative |
| | *Epacris pulchella* | 1 | 25% | 2 | 13% | uninformative |
| | *Gompholobium grandiflorum* | 1 | 25% | 1 | 9% | uninformative |
| | *Persoonia isophylla* | 1 | 25% | 1 | 13% | uninformative |
| | *Acacia linifolia* | 2 | 20% | 1 | 14% | uninformative |
| | *Angophora hispida* | 2 | 20% | 2 | 7% | uninformative |
| | *Dillwynia elegans* | 2 | 20% | 3 | 0% | uninformative |
| | *Pultenaea ferruginea* | 2 | 20% | 2 | 6% | uninformative |
| | *Dillwynia sericea* | 2 | 20% | 2 | 3% | uninformative |
| | *Banksia spinulosa* | 2 | 20% | 2 | 16% | uninformative |
| | *Boronia ledifolia* | 1 | 20% | 2 | 11% | uninformative |
| | *Bossiaea scolopendria* | 1 | 20% | 1 | 10% | uninformative |
| | *Hibbertia bracteata* | 1 | 20% | 1 | 5% | uninformative |
| | *Lomatia silaifolia* | 1 | 20% | 1 | 12% | uninformative |
| | *Podolobium ilicifolium* | 1 | 20% | 2 | 11% | uninformative |
| | *Acacia myrtifolia* | 1 | 15% | 1 | 11% | uninformative |
| | *Daviesia acicularis* | 1 | 15% | 1 | 0% | uninformative |
| | *Dillwynia floribunda* | 1 | 15% | 2 | 12% | uninformative |
| | *Leptospermum grandifolium* | 3 | 10% | 2 | 0% | uninformative |
| | *Leucopogon muticus* | 2 | 10% | 2 | 1% | uninformative |
| | *Pultenaea daphnoides* | 2 | 10% | 1 | 7% | uninformative |
| | *Acacia hispidula* | 2 | 10% | 2 | 0% | uninformative |

| | | | | | | |
|---|---|---|---|---|---|---|
| | *Banksia ericifolia subsp. ericifolia* | 2 | 10% | 3 | 16% | uninformative |
| | *Grevillea diffusa subsp. filipendula* | 2 | 10% | 2 | 12% | uninformative |
| | *Grevillea mucronulata* | 2 | 10% | 1 | 0% | uninformative |
| | *Comesperma ericinum* | 2 | 10% | 1 | 3% | uninformative |
| | *Hibbertia cistiflora subsp. cistiflora* | 2 | 10% | 1 | 1% | uninformative |
| | *Cryptandra amara* | 2 | 10% | 1 | 0% | uninformative |
| | *Dodonaea triquetra* | 1 | 10% | 1 | 17% | uninformative |
| | *Gompholobium latifolium* | 1 | 10% | 1 | 15% | uninformative |
| | *Grevillea sericea* | 1 | 10% | 2 | 9% | uninformative |
| | *Hakea teretifolia* | 1 | 10% | 1 | 18% | uninformative |
| | *Jacksonia scoparia* | 1 | 10% | 2 | 3% | uninformative |
| Sub-shrub | *Hibbertia nitida* | 1 | 5% | 0 | 0% | unique |
| | *Podolobium scandens* | 1 | 5% | 0 | 0% | unique |
| | *Hovea linearis* | 1 | 60% | 1 | 7% | uninformative |
| | *Scaevola ramosissima* | 1 | 50% | 1 | 6% | uninformative |
| | *Hibbertia linearis* | 1 | 25% | 1 | 3% | uninformative |
| | *Hemigenia purpurea* | 2 | 15% | 2 | 3% | uninformative |
| | *Pultenaea rosmarinifolia* | 1 | 15% | 2 | 15% | uninformative |
| Herb | *Pomax umbellata* | 2 | 40% | 2 | 15% | positive |
| | *Phyllanthus hirtellus* | 2 | 95% | 1 | 15% | positive |
| | *Lobellia dentata* | 1 | 5% | 0 | 0% | unique |
| | *Goodenia bellidifolia subsp. bellidifolia* | 1 | 45% | 1 | 3% | uninformative |
| | *Actinotus minor* | 2 | 35% | 2 | 18% | uninformative |
| | *Dampiera stricta* | 2 | 35% | 1 | 11% | uninformative |
| | *Gonocarpus tetragynus* | 2 | 25% | 2 | 4% | uninformative |
| | *Goodenia hederacea subsp. hederacea* | 1 | 25% | 1 | 4% | uninformative |
| | *Goodenia heterophylla* | 2 | 20% | 1 | 6% | uninformative |
| | *Actinotus helianthi* | 1 | 20% | 1 | 6% | uninformative |
| | *Hybanthus monopetalus* | 1 | 20% | 1 | 4% | uninformative |
| | *Thysanotus tuberosus subsp. tuberosus* | 1 | 15% | 1 | 1% | uninformative |
| | *Mitrasacme polymorpha* | 1 | 10% | 1 | 5% | uninformative |
| | *Platysace ericoides* | 1 | 10% | 1 | 0% | uninformative |
| | *Rhytidosporum procumbens* | 1 | 10% | 2 | 1% | uninformative |
| | *Xanthosia pilosa* | 1 | 10% | 1 | 13% | uninformative |
| Grass | *Themeda australis* | 2 | 45% | 2 | 23% | positive |
| | *Aristida calycina* | 1 | 5% | 0 | 0% | unique |
| | *Aristida acuta* | 1 | 10% | 0 | 0% | unique |
| | *Aristida benthamii* | 1 | 15% | 0 | 0% | unique |
| | *Entolasia stricta* | 2 | 100% | 2 | 51% | constant |
| | *Anisopogon avenaceus* | 1 | 55% | 2 | 14% | uninformative |
| | *Aristida vagans* | 1 | 30% | 1 | 4% | uninformative |
| | *Austrostipa pubescens* | 2 | 25% | 2 | 1% | uninformative |
| | *Panicum simile* | 1 | 20% | 2 | 4% | uninformative |
| | *Joycea pallida* | 3 | 15% | 2 | 1% | uninformative |
| | *Eragrostis brownii* | 1 | 15% | 1 | 3% | uninformative |
| | *Aristida warburgii* | 2 | 10% | 2 | 2% | uninformative |
| | *Entolasia marginata* | 2 | 10% | 2 | 17% | uninformative |
| | *Microlaena stipoides var stipoides* | 2 | 10% | 2 | 11% | uninformative |
| | *Eragrostis benthamii* | 1 | 10% | 1 | 0% | uninformative |
| Graminoid | *Lomandra obliqua* | 2 | 90% | 2 | 16% | positive |
| | *Lomandra glauca* | 2 | 70% | 2 | 15% | positive |
| | *Patersonia sericea* | 2 | 50% | 2 | 16% | positive |
| | *Lomandra cylindrica* | 2 | 40% | 2 | 3% | positive |
| | *Dianella prunina* | 1 | 30% | 1 | 3% | uninformative |
| | *Haemodorum planifolium* | 1 | 25% | 1 | 1% | uninformative |
| | *Lomandra filiformis* | 2 | 20% | 1 | 8% | uninformative |
| | *Lomandra gracilis* | 1 | 20% | 1 | 6% | uninformative |
| | *Lomandra multiflora subsp. multiflora* | 1 | 20% | 1 | 6% | uninformative |

| | | | | | | |
|---|---|---|---|---|---|---|
| | *Lomandra confertifolia* | 2 | 15% | 2 | 3% | uninformative |
| | *Dianella caerulea* | 1 | 15% | 1 | 52% | uninformative |
| | *Dianella revoluta var revoluta* | 1 | 15% | 1 | 5% | uninformative |
| | *Patersonia longifolia* | 1 | 15% | 3 | 0% | uninformative |
| | *Patersonia glabrata* | 2 | 10% | 2 | 7% | uninformative |
| | *Lomandra longifolia* | 1 | 5% | 2 | 47% | negative |
| Ground fern | *Pteridium esculentum* | 1 | 25% | 2 | 43% | negative |
| | *Lindsaea linearis* | 1 | 20% | 2 | 15% | uninformative |
| | *Schizaea bifida* | 1 | 10% | 1 | 4% | uninformative |
| Ground orchid | *Cryptostylis subulata* | 1 | 5% | 1 | 2% | uninformative |
| | *Glossodia major* | 1 | 5% | 2 | 0% | uninformative |
| Epiphytic orchid | *Dendrobium speciosum* | 1 | 5% | 1 | 1% | uninformative |
| Climber | *Cassytha glabella forma glabella* | 1 | 35% | 2 | 13% | uninformative |
| | *Mirbelia rubiifolia* | 1 | 25% | 2 | 5% | uninformative |
| | *Cassytha pubescens* | 1 | 15% | 1 | 8% | uninformative |
| | *Glycine clandestina* | 2 | 10% | 2 | 23% | uninformative |
| | *Hardenbergia violacea* | 1 | 10% | 1 | 10% | uninformative |
| Mistletoe | *Dendrophthoe vitellina* | 2 | 5% | 0 | 0% | unique |
| Sedge/ Rush | *Cyathochaeta diandra* | 3 | 75% | 2 | 18% | positive |
| | *Ptilothrix deusta* | 3 | 45% | 2 | 7% | positive |
| | *Caustis flexuosa* | 1 | 30% | 1 | 7% | uninformative |
| | *Lepyrodia scariosa* | 3 | 25% | 2 | 19% | uninformative |
| | *Lepidosperma laterale* | 1 | 25% | 2 | 27% | uninformative |
| | *Lepyrodia muelleri* | 2 | 15% | 2 | 1% | uninformative |
| | *Schoenus imberbis* | 2 | 15% | 2 | 5% | uninformative |

# Hawkesbury Dwarf Apple Woodland Unit E28

## Scribbly Gum – Dwarf apple Woodland REMS Unit 28

## General Description:

Hawkesbury Dwarf Apple Woodland represents a transitional vegetation type within the Hawkesbury Sandstone scrubby woodlands. Dwarf Apple (*Angophora hispida*) is the most common canopy dominant, although *Eucalyptus haemastoma, Corymbia eximia, Eucalyptus squamosa* or *Angophora bakeri* may also be present in low numbers. Associated with these species is a range of heathy understorey plants, such as *Lambertia formosa, Banksia oblongifolia, Petrophile pulchella, Baeckea diosmifolia, Isopogon anemonifolius, Ptilothrix deusta, Cyathochaeta diandra,* and *Leucopogon microphyllus*. This vegetation type occurs within parts of Dharug National Park and the Mangrove Creek catchment area, and then extends to the west into the adjacent Yengo National Park, ultimately ending in Wollemi National Park near the Colo River (Bell 1998).

## Known Floristic/ Structural Variations:

No variants have yet been identified for this community, although the impact of fire events is important in determining floristic composition.

## Distribution:

*Within Gosford LGA* – occurs in several locations on the Hawkesbury Sandstone plateaus in the west of the LGA, generally west from the Dharug NP area.

*Within LHCC Region* – NPWS (2000) have mapped 896ha in their Scribbly Gum – Dwarf apple Woodland (Unit 28) as remaining in the region.

*Examples Within Gosford LGA*

- Old Convict Road, along boundary of Mangrove Creek catchment area
- Above Mangrove Creek, eastern sections of Dharug NP

## Extent:

*Extant* - 733.71 ha

## Relationship to Other Communities:

Hawkesbury Dwarf Apple Woodland is floristically distinct from most other communities. There is some overlap in species composition with the Hawkesbury *Banksia* Scrub-Woodland (Unit E29), however the dense thickets of *Banksia*

*ericifolia* var. *ericifolia* in Unit E29, and the low abundance or absence of *Angophora hispida*, sufficiently distinguish the two. Unit E28 is also a much dryer scrub community, and often supports an open structure rather than a closed scrub.

## Equivalent Vegetation Types:

- Benson 1981 (Mangrove Creek): n/a
- Benson & Fallding 1981 (Brisbane Water) n/a
- Benson 1986 (Gosf-Lake Mac): Open-Scrub (Unit 10a)
- Clarke & Benson 1986 (Dharug): n/a
- Strom 1986 (Bouddi Peninsula): n/a
- Clarke & Benson 1987 (Mt White/ Mt Olive): n/a
- McRae 1990 (Bouddi Peninsula): n/a
- Binns 1996 (SF MFD): n/a
- Payne 1997 (Cockle Bay/ Bouddi): n/a
- Bell 1998 (Popran NP): (?) Hawkesbury Coastal *Banksia* Shrubland (Unit S1)
- Bell 2002 (Wyong LGA): (?) Hawkesbury *Banksia* Scrub-Woodland (Unit 37)

## Significant Species:

- Undescribed species – *none recorded*
- Threatened (TSC Act) – *Hibbertia procumbens, Acacia bynoeana, Tetratheca glandulosa*
- Rare (ROTAP) – *none recorded*

## Community Conservation Status:

*Reserve Representation* - within Gosford, this vegetation type is known from Dharug and Popran NP's.

*TSC Act (1995) Status* - not currently listed.

## Mapping Reliability & Included Units:

*High Resolution Area* – not present in the high resolution area.

*Low Resolution Area* – this community is included within the modelling of Scribbly Gum – Dwarf Apple Woodland (Unit 28) of REMS.

## Vegetation Structure:

| Stratum | Mean height (m) | Min height (m) | Max height (m) | Mean cover (%) | Sdev | n |
|---|---|---|---|---|---|---|
| Emergent | | | | | | |
| Tallest | 5.50 | 4.00 | 7.00 | 5 | | 1 |
| Middle 1 | 2.00 | 1.00 | 3.00 | 55 | | 1 |
| Middle 2 | | | | | | |
| Middle 3 | | | | | | |
| Lowest | 0.20 | 0.01 | 0.40 | 25 | | 1 |

## Key Diagnostic Species [based on 3 plots]:

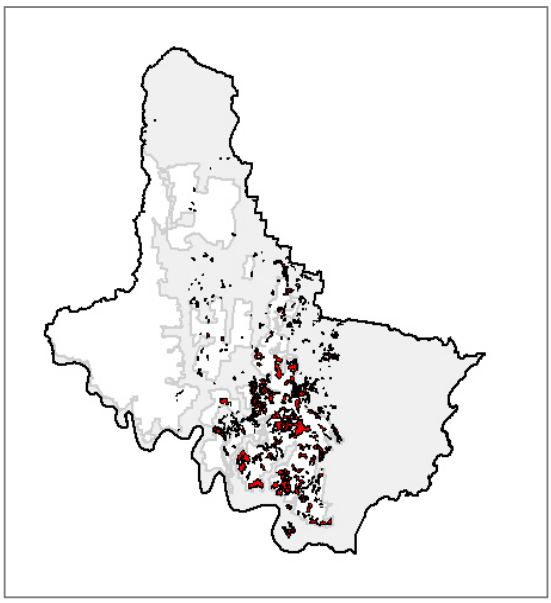
| Life Form | Species | Community | | All others | | Fidelity |
|---|---|---|---|---|---|---|
| | | c/a | Freq. | c/a | Freq. | |
| Tree | *Eucalyptus haemastoma* | 2 | 67% | 2 | 17% | positive |
| | *Eucalyptus squamosa* | 1 | 33% | 2 | 1% | uninformative |
| | *Eucalyptus umbra* | 1 | 33% | 2 | 10% | uninformative |
| Shrub | *Angophora hispida* | 4 | 100% | 2 | 7% | positive |
| | *Banksia ericifolia subsp. ericifolia* | 2 | 100% | 3 | 16% | positive |

| | | | | | | |
|---|---|---|---|---|---|---|
| | *Banksia oblongifolia* | 2 | 100% | 2 | 18% | positive |
| | *Leucopogon microphyllus* | 2 | 100% | 2 | 7% | positive |
| | *Platysace linearifolia* | 2 | 100% | 2 | 32% | positive |
| | *Acacia oxycedrus* | 5 | 67% | 1 | 11% | positive |
| | *Bossiaea scolopendria* | 5 | 67% | 1 | 10% | positive |
| | *Phyllota phylicoides* | 3 | 67% | 2 | 18% | positive |
| | *Pultenaea elliptica* | 3 | 67% | 2 | 10% | positive |
| | *Grevillea diffusa subsp. filipendula* | 2 | 67% | 2 | 11% | positive |
| | *Hakea dactyloides* | 2 | 67% | 1 | 20% | positive |
| | *Persoonia isophylla* | 2 | 67% | 1 | 14% | positive |
| | *Petrophile pulchella* | 2 | 67% | 2 | 18% | positive |
| | *Pultenaea euchila* | 1 | 33% | 0 | 0% | unique |
| | *Leptospermum trinervium* | 1 | 100% | 2 | 27% | uninformative |
| | *Persoonia lanceolata* | 1 | 67% | 1 | 6% | uninformative |
| | *Baeckea imbricata* | 4 | 33% | 2 | 1% | uninformative |
| | *Lambertia formosa* | 3 | 33% | 2 | 18% | uninformative |
| | *Baeckea diosmifolia* | 2 | 33% | 2 | 6% | uninformative |
| | *Isopogon anemonifolius* | 2 | 33% | 1 | 18% | uninformative |
| | *Epacris pulchella* | 2 | 33% | 2 | 14% | uninformative |
| | *Pimelea linifolia* | 2 | 33% | 1 | 20% | uninformative |
| | *Xanthorrhoea glauca* | 2 | 33% | 2 | 0% | uninformative |
| | *Xanthorrhoea resinifera* | 2 | 33% | 1 | 8% | uninformative |
| | *Hakea teretifolia* | 2 | 33% | 1 | 17% | uninformative |
| | *Gompholobium glabratum* | 2 | 33% | 2 | 2% | uninformative |
| | *Grevillea buxifolia* | 2 | 33% | 2 | 19% | uninformative |
| | *Boronia ledifolia* | 2 | 33% | 1 | 11% | uninformative |
| | *Acacia linifolia* | 1 | 33% | 1 | 14% | uninformative |
| | *Acacia suaveolens* | 1 | 33% | 1 | 28% | uninformative |
| | *Acacia ulicifolia* | 1 | 33% | 1 | 24% | uninformative |
| | *Boronia pinnata* | 1 | 33% | 2 | 5% | uninformative |
| | *Dillwynia sericea* | 1 | 33% | 2 | 4% | uninformative |
| | *Eriostemon australasius* | 1 | 33% | 2 | 6% | uninformative |
| | *Hakea sericea* | 1 | 33% | 1 | 11% | uninformative |
| | *Hibbertia cistiflora subsp. cistiflora* | 1 | 33% | 2 | 1% | uninformative |
| | *Hibbertia empetrifolia subsp. empetrifolia* | 1 | 33% | 1 | 11% | uninformative |
| | *Leptospermum squarrosum* | 1 | 33% | 2 | 0% | uninformative |
| | *Zieria laevigata* | 1 | 33% | 1 | 1% | uninformative |
| Sub-shrub | *Pultenaea rosmarinifolia* | 2 | 67% | 2 | 14% | positive |
| | ***Darwinia glaucophylla* [TSC Vulnerable]** | **5** | **33%** | **4** | **0%** | **uninformative** |
| | *Hemigenia purpurea* | 4 | 33% | 2 | 4% | uninformative |
| | *Hovea linearis* | 1 | 33% | 1 | 9% | uninformative |
| Herb | *Pseudanthus orientalis* | 2 | 33% | 0 | 0% | unique |
| | *Stylidium lineare* | 1 | 33% | 0 | 0% | unique |
| | *Actinotus minor* | 2 | 33% | 2 | 19% | uninformative |
| | ***Hibbertia procumbens* [TSC Endangered]** | **2** | **33%** | **2** | **0%** | **uninformative** |
| | *Hibbertia riparia* | 2 | 33% | 2 | 1% | uninformative |
| | *Laxmannia gracilis* | 2 | 33% | 1 | 1% | uninformative |
| | *Rhytidosporum procumbens* | 2 | 33% | 2 | 1% | uninformative |
| | *Dampiera stricta* | 2 | 33% | 1 | 12% | uninformative |
| | *Gonocarpus teucrioides* | 1 | 33% | 1 | 15% | uninformative |
| | *Goodenia bellidifolia subsp. bellidifolia* | 1 | 33% | 1 | 5% | uninformative |
| | *Xanthosia tridentata* | 1 | 33% | 1 | 10% | uninformative |
| Grass | *Aristida ramosa* | 2 | 33% | 0 | 0% | unique |
| | *Entolasia stricta* | 2 | 67% | 2 | 53% | constant |
| | *Aristida warburgii* | 2 | 33% | 2 | 2% | uninformative |
| Graminoid | *Lomandra glauca* | 2 | 100% | 2 | 17% | positive |
| | *Patersonia sericea* | 2 | 67% | 2 | 18% | positive |
| | *Lomandra obliqua* | 2 | 33% | 2 | 19% | uninformative |

| | | | | | | |
|---|---|---|---|---|---|---|
| | *Lomandra longifolia* | 0 | 0% | 2 | 45% | negative |
| Ground fern | *Lindsaea linearis* | 2 | 33% | 2 | 15% | uninformative |
| | *Pteridium esculentum* | 0 | 0% | 2 | 43% | negative |
| Climber | *Mirbelia rubiifolia* | 2 | 33% | 1 | 6% | uninformative |
| | *Cassytha glabella forma glabella* | 1 | 33% | 2 | 14% | uninformative |
| Sedge/ Rush | *Cyathochaeta diandra* | 3 | 100% | 2 | 20% | positive |
| | *Lepidosperma filiforme* | 5 | 67% | 2 | 1% | positive |
| | *Ptilothrix deusta* | 4 | 67% | 2 | 8% | positive |
| | *Schoenus imberbis* | 2 | 67% | 2 | 5% | positive |
| | *Lepyrodia scariosa* | 5 | 33% | 2 | 19% | uninformative |
| | *Guringalia dimorpha* | 5 | 33% | 2 | 1% | uninformative |
| | *Caustis pentandra* | 2 | 33% | 1 | 1% | uninformative |
| | *Leptocarpus tenax* | 2 | 33% | 2 | 4% | uninformative |
| | *Lepyrodia muelleri* | 2 | 33% | 2 | 2% | uninformative |

# Hawkesbury *Banksia* Scrub-Woodland Unit E29

## Hawkesbury Coastal *Banksia* Woodland (Scrub) REMS Unit 29a



## General Description:

Hawkesbury *Banksia* Scrub-Woodland is a structurally variable vegetation community, ranging from a tall dense scrub dominated by *Banksia ericifolia* var*. ericifolia*, to a more open scrub or low heath with scattered eucalypt emergents. Both forms can occur in a mosaic pattern at the one location, depending on fire history of the site. Species typical of the sparse emergent layer can include any one of *Eucalyptus haemastoma, Banksia serrata, Eucalyptus umbra, Angophora costata,* or *Corymbia gummifera*. Below this, *Banksia ericifolia* var*. ericifolia* can be dominant (with occasional *Angophora hispida*)*,* and a variety of other shrubs such as *Banksia oblongifolia*, *Epacris pulchella*, *Hakea dactyloides*, *Lambertia formosa*, *Leptospermum trinervium, Platysace linearifolia, Acacia linifolia, Acacia suaveolens,* and *Hakea teretifolia*. Sedges and herbs are also prominent, and include *Lepyrodia scariosa, Cyathochaeta diandra, Ptilothrix deusta, Actinotus minor,* and *Xanthosia pilosa*.

## Known Floristic/ Structural Variations:

No variants have yet been identified for this community, although the mosaic nature of the scrub-heath growth forms may be regarded as such.

## Distribution:

*Within Gosford LGA* – occurs in several locations on the Hawkesbury Sandstone plateaus, particularly in the Brisbane Water NP area in the east.

*Within LHCC Region* – NPWS (2000) have mapped 5732ha in their Hawkesbury Plateau *Banksia* Scrub (Unit 29) as remaining in the region.

*Examples Within Gosford LGA*

- Off Wisemans Ferry Road, Somersby
- Peats Ridge area

## Extent:

*Extant* - 3609.36 ha

## Relationship to Other Communities:

Hawkesbury *Banksia* Scrub-Woodland is floristically and structurally distinct from most other communities. There is some overlap in species composition with the Somersby Plateau Forest (Unit E26d), particularly along the boundaries of the two, which are very indistinct. In such cases, definitive delineation is not possible, and indeed will vary markedly with fire history. In general, dense thickets of *Banksia ericifolia* var. *ericifolia*, accompanied by heathland, are uncommon in Unit E26d.

## Equivalent Vegetation Types:

- Benson 1981 (Mangrove Creek): n/a
- Benson & Fallding 1981 (Brisbane Water) Closed to open-scrub (Unit 8)
- Benson 1986 (Gosf-Lake Mac): Open-Scrub (Unit 10a)
- Clarke & Benson 1986 (Dharug): Scrubland (Unit C4)
- Strom 1986 (Bouddi Peninsula): n/a
- Clarke & Benson 1987 (Mt White/ Mt Olive): *Banksia/ Hakea* Shrublands (Unit C3)
- McRae 1990 (Bouddi Peninsula): n/a
- Binns 1996 (SF MFD): n/a
- Payne 1997 (Cockle Bay/ Bouddi): n/a
- Bell 1998 (Popran NP): Hawkesbury Coastal *Banksia* Shrubland (Unit S1)
- Bell 2002 (Wyong LGA): Hawkesbury *Banksia* Scrub-Woodland (Unit 37)

## Significant Species:

- Undescribed species – *none recorded*
- Threatened (TSC Act) – *Hibbertia procumbens, Prostanthera junonis, Tetratheca glandulosa*
- Rare (ROTAP) – *Grevillea oldei, Acacia "kulnurensis"*

## Community Conservation Status:

*Reserve Representation* - within Gosford, this vegetation type is known from Brisbane Water, Dharug and Popran NP's.

*TSC Act (1995) Status* - not currently listed.

## Mapping Reliability & Included Units:

*High Resolution Area* – this vegetation type has been mapped from aerial photographic interpretation and ground truthing. Sub-communities of the Exposed Hawkesbury Forests (Unit E26) may be included in some parts.

*Low Resolution Area* – this community is included within the modelling of Hawkesbury Coastal *Banksia* Woodland (Scrub) (Unit 29a) of REMS.

## Vegetation Structure:

| Stratum | Mean height (m) | Min height (m) | Max height (m) | Mean cover (%) | Sdev | n |
|---|---|---|---|---|---|---|
| Emergent | | | | | | |
| Tallest | 8.71 | 4.00 | 20.00 | 11 | 8.7 | 7 |
| Middle 1 | 2.58 | 0.50 | 6.00 | 77 | 10.4 | 3 |
| Middle 2 | 1.00 | 0.50 | 1.50 | 15 | | 1 |
| Middle 3 | | | | | | |
| Lowest | 3.01 | 0.10 | 10.00 | 73 | 27.1 | 7 |

## Key Diagnostic Species [based on 16 plots]:

| Life Form | Species | Community | | All others | | Fidelity |
|---|---|---|---|---|---|---|
| | | c/a | Freq. | c/a | Freq. | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Tree | *Eucalyptus haemastoma* | 2 | 63% | 2 | 15% | positive |
| | *Corymbia gummifera* | 3 | 25% | 2 | 30% | uninformative |
| | *Eucalyptus oblonga* | 3 | 13% | 2 | 4% | uninformative |
| | *Eucalyptus piperita* | 1 | 13% | 2 | 13% | uninformative |
| | *Eucalyptus umbra* | 1 | 13% | 2 | 10% | uninformative |
| | *Eucalyptus squamosa* | 2 | 6% | 1 | 1% | uninformative |
| Small tree | *Banksia serrata* | 2 | 31% | 2 | 25% | uninformative |
| | *Allocasuarina littoralis* | 1 | 13% | 2 | 15% | uninformative |
| Shrub | *Banksia ericifolia subsp. ericifolia* | 4 | 88% | 2 | 13% | positive |
| | *Banksia oblongifolia* | 2 | 88% | 2 | 16% | positive |
| | *Leptospermum trinervium* | 4 | 81% | 2 | 25% | positive |
| | *Angophora hispida* | 2 | 69% | 2 | 5% | positive |
| | *Hakea teretifolia* | 2 | 69% | 1 | 15% | positive |
| | *Petrophile pulchella* | 2 | 69% | 2 | 16% | positive |
| | *Platysace linearifolia* | 2 | 69% | 2 | 31% | positive |
| | *Epacris pulchella* | 2 | 56% | 2 | 12% | positive |
| | *Hakea dactyloides* | 2 | 56% | 1 | 18% | positive |
| | *Grevillea diffusa subsp. filipendula* | 2 | 50% | 2 | 10% | positive |
| | *Phyllota phylicoides* | 2 | 50% | 2 | 17% | positive |
| | *Acacia oxycedrus* | 2 | 44% | 1 | 10% | positive |
| | *Grevillea buxifolia* | 2 | 44% | 2 | 18% | positive |
| | *Xanthorrhoea media* | 2 | 44% | 2 | 14% | positive |
| | *Darwinia fascicularis subsp. fascicularis* | 5 | 6% | 0 | 0% | unique |
| | *Isopogon anemonifolius* | 1 | 75% | 1 | 16% | uninformative |
| | *Acacia suaveolens* | 1 | 69% | 1 | 26% | uninformative |
| | *Lambertia formosa* | 1 | 63% | 2 | 17% | uninformative |
| | *Leucopogon microphyllus* | 1 | 63% | 2 | 6% | uninformative |
| | *Bossiaea scolopendria* | 1 | 50% | 1 | 9% | uninformative |
| | *Dillwynia floribunda* | 1 | 44% | 2 | 11% | uninformative |
| | *Pultenaea elliptica* | 2 | 38% | 2 | 9% | uninformative |
| | *Baeckea diosmifolia* | 2 | 31% | 2 | 5% | uninformative |
| | *Bossiaea heterophylla* | 2 | 31% | 2 | 10% | uninformative |
| | *Styphelia laeta subsp. latifolia* | 1 | 31% | 1 | 3% | uninformative |
| | *Pimelea linifolia* | 1 | 31% | 1 | 20% | uninformative |
| | *Woollsia pungens* | 1 | 31% | 1 | 9% | uninformative |
| | *Persoonia lanceolata* | 1 | 31% | 1 | 6% | uninformative |
| | *Leptospermum arachnoides* | 1 | 31% | 2 | 2% | uninformative |
| | *Kunzea capitata* | 2 | 25% | 1 | 4% | uninformative |
| | *Hibbertia cistiflora subsp. cistiflora* | 2 | 25% | 2 | 1% | uninformative |
| | *Epacris microphylla var microphylla* | 2 | 25% | 1 | 3% | uninformative |
| | *Eriostemon australasius* | 1 | 25% | 2 | 5% | uninformative |
| | *Pultenaea ferruginea* | 1 | 25% | 2 | 6% | uninformative |
| | *Micromyrtus ciliata* | 1 | 25% | 1 | 0% | uninformative |
| | *Hakea propinqua* | 1 | 25% | 1 | 1% | uninformative |
| | *Persoonia isophylla* | 2 | 19% | 1 | 14% | uninformative |
| | *Hibbertia empetrifolia subsp. empetrifolia* | 2 | 19% | 1 | 10% | uninformative |
| | *Hakea sericea* | 1 | 19% | 1 | 10% | uninformative |
| | *Leucopogon ericoides* | 1 | 19% | 1 | 2% | uninformative |
| | *Philotheca buxifolia subsp. buxifolia* | 1 | 19% | 4 | 0% | uninformative |
| | *Conospermum longifolium* | 1 | 19% | 1 | 12% | uninformative |
| | *Gompholobium grandiflorum* | 1 | 19% | 1 | 10% | uninformative |
| | *Acacia ulicifolia* | 1 | 19% | 1 | 24% | uninformative |
| | *Allocasuarina distyla* | 1 | 19% | 2 | 3% | uninformative |
| | *Boronia ledifolia* | 1 | 19% | 2 | 11% | uninformative |
| | *Brachyloma daphnoides subsp. daphnoides* | 1 | 19% | 1 | 3% | uninformative |
| | *Dillwynia sericea* | 4 | 13% | 2 | 4% | uninformative |
| | *Boronia pinnata* | 4 | 13% | 2 | 5% | uninformative |
| | *Grevillea speciosa* | 4 | 13% | 1 | 2% | uninformative |

| | | | | | | |
|---|---|---|---|---|---|---|
| | *Styphelia triflora* | 3 | 13% | 1 | 1% | uninformative |
| | *Hibbertia acicularis* | 2 | 13% | 1 | 4% | uninformative |
| | *Isopogon anethifolius* | 2 | 13% | 2 | 1% | uninformative |
| | *Leptomeria acida* | 2 | 13% | 1 | 3% | uninformative |
| | *Leucopogon muticus* | 2 | 13% | 2 | 1% | uninformative |
| | *Xanthorrhoea resinifera* | 2 | 13% | 1 | 8% | uninformative |
| | *Gompholobium glabratum* | 2 | 13% | 2 | 2% | uninformative |
| | *Grevillea sericea* | 2 | 13% | 2 | 9% | uninformative |
| | *Dodonaea triquetra* | 1 | 13% | 1 | 17% | uninformative |
| | *Conospermum taxifolium* | 1 | 13% | 1 | 0% | uninformative |
| | *Acacia myrtifolia* | 1 | 13% | 1 | 11% | uninformative |
| | *Banksia spinulosa* | 1 | 13% | 2 | 17% | uninformative |
| | *Sprengelia incarnata* | 1 | 13% | 2 | 2% | uninformative |
| | *Monotoca scoparia* | 1 | 13% | 1 | 10% | uninformative |
| | *Persoonia levis* | 1 | 13% | 1 | 35% | uninformative |
| | *Philotheca buxifolia* | 1 | 13% | 2 | 3% | uninformative |
| Sub-shrub | *Pultenaea rosmarinifolia* | 2 | 44% | 1 | 14% | positive |
| | *Hemigenia purpurea* | 1 | 31% | 2 | 3% | uninformative |
| | *Hibbertia monogyna* | 1 | 19% | 1 | 5% | uninformative |
| | *Leucopogon esquamatus* | 2 | 13% | 1 | 1% | uninformative |
| | *Tetratheca shiressii* | 2 | 13% | 2 | 2% | uninformative |
| | *Hovea linearis* | 1 | 13% | 1 | 9% | uninformative |
| | *Tetratheca thymifolia* | 1 | 13% | 1 | 4% | uninformative |
| | ***Tetratheca glandulosa* [TSC Vulnerable]** | **1** | **6%** | **2** | **2%** | **uninformative** |
| Herb | *Actinotus minor* | 2 | 88% | 2 | 17% | positive |
| | *Dampiera stricta* | 2 | 31% | 1 | 12% | uninformative |
| | *Xanthosia tridentata* | 2 | 19% | 1 | 10% | uninformative |
| | *Laxmannia gracilis* | 1 | 19% | 1 | 1% | uninformative |
| | *Micrantheum ericoides* | 1 | 19% | 1 | 4% | uninformative |
| | *Goodenia bellidifolia subsp. bellidifolia* | 1 | 19% | 1 | 5% | uninformative |
| | *Drosera auriculata* | 2 | 13% | 2 | 3% | uninformative |
| | *Goodenia hederacea subsp. hederacea* | 2 | 13% | 1 | 5% | uninformative |
| | *Burchardia umbellata* | 1 | 13% | 1 | 2% | uninformative |
| | *Phyllanthus hirtellus* | 1 | 13% | 2 | 19% | uninformative |
| | ***Hibbertia procumbens* [TSC Endangered]** | **2** | **6%** | **2** | **0%** | **uninformative** |
| Grass | *Entolasia stricta* | 2 | 44% | 2 | 54% | constant |
| | *Anisopogon avenaceus* | 2 | 25% | 2 | 16% | uninformative |
| | *Tetrarrhena juncea* | 2 | 13% | 2 | 3% | uninformative |
| Graminoid | *Lomandra glauca* | 2 | 44% | 2 | 17% | positive |
| | *Patersonia sericea* | 1 | 56% | 2 | 17% | uninformative |
| | *Lomandra obliqua* | 1 | 25% | 2 | 19% | uninformative |
| | *Lomandra filiformis* | 2 | 19% | 1 | 8% | uninformative |
| | *Xyris gracilis* | 5 | 13% | 2 | 1% | uninformative |
| | *Lomandra multiflora subsp. multiflora* | 1 | 13% | 1 | 6% | uninformative |
| | *Lomandra longifolia* | 1 | 13% | 2 | 46% | negative |
| Ground fern | *Lindsaea linearis* | 2 | 25% | 2 | 15% | uninformative |
| | *Schizaea bifida* | 1 | 13% | 1 | 4% | uninformative |
| Ground orchid | *Glossodia minor* | 1 | 13% | 1 | 0% | uninformative |
| | *Cryptostylis erecta* | 1 | 6% | 1 | 2% | uninformative |
| Clubmoss | *Selaginella uliginosa* | 2 | 13% | 2 | 5% | uninformative |
| Climber | *Cassytha glabella forma glabella* | 1 | 44% | 2 | 13% | uninformative |
| | *Mirbelia rubiifolia* | 2 | 25% | 1 | 5% | uninformative |
| | *Empodisma minus* | 2 | 19% | 2 | 5% | uninformative |
| Sedge/ Rush | *Cyathochaeta diandra* | 2 | 81% | 2 | 18% | positive |
| | *Lepyrodia scariosa* | 3 | 75% | 2 | 17% | positive |
| | *Ptilothrix deusta* | 3 | 44% | 2 | 7% | positive |
| | *Schoenus lepidosperma subsp. pachylepis* | 2 | 6% | 0 | 0% | unique |
| | *Leptocarpus tenax* | 3 | 25% | 2 | 3% | uninformative |

| | | | | | |
|---|---|---|---|---|---|
| *Lepidosperma filiforme* | 2 | 25% | 2 | 1% | uninformative |
| *Schoenus imberbis* | 1 | 25% | 2 | 5% | uninformative |
| *Caustis flexuosa* | 1 | 19% | 1 | 8% | uninformative |
| *Guringalia dimorpha* | 5 | 13% | 2 | 1% | uninformative |
| *Gahnia sieberiana* | 1 | 13% | 1 | 6% | uninformative |
| *Schoenus ericetorum* | 1 | 13% | 1 | 3% | uninformative |

# Hawkesbury *Banksia* Wet Scrub — Unit E29b

## Hawkesbury Coastal *Banksia* Woodland (Scrub) — REMS Unit 29a

Distribution currently not mapped

## General Description:

On rocky sandstone benches in the central-west of the LGA, stunted heath and scrub vegetation occurs in locations where drainage is impeded due to impervious clay layers within the friable sandstone layers. In these areas, Hawkesbury *Banksia* Wet Scrub develops in places where available soil moisture is higher than in other dryer heaths. This sub-community effectively forms a transitional vegetation type between the Hawkesbury Rocky Pavement Heath (Unit E26a), Hawkesbury *Banksia* Scrub-Woodland (Unit E29), and the Sandstone Hanging Swamps (Unit E54). Characteristically, this vegetation type supports a higher proportion of moisture-loving plants such as *Hakea teretifolia, Banksia oblongifolia* and *Leptospermum juniperinum*, and sedges such as *Leptocarpus tenax* and *Lepyrodia scariosa*. Further sampling and analysis is required to clarify floristic relationships.

## Known Floristic/ Structural Variations:

This community has not yet been mapped due to its known occurrence within the low resolution zone, and limited ground truthing. It is currently included within E29. No variants in this community have been identified.

## Distribution:

*Within Gosford LGA* – this vegetation type occurs in restricted locations on the exposed Hawkesbury Sandstones in the Popran NP – Kariong area.

*Within LHCC Region* – NPWS (2000) have modelled 5732ha of their Hawkesbury Plateau *Banksia* Scrub (Unit 29) remaining in the region, which would include this sub-community.

*Examples Within Gosford LGA*

- Pacific Highway, Mt White
- Mt Olive area, Popran NP

## Extent:

*Extant* - not currently mapped

## Relationship to Other Communities:

Hawkesbury *Banksia* Wet Scrub is most similar to the Hawkesbury *Banksia* Scrub-Woodland (Unit E29). However, the two can be separated on the higher abundances of moisture loving species (such as *Hakea teretifolia, Banksia*

*oblongifolia, Leptospermum juniperinum*, *Leptocarpus tenax* and *Lepyrodia scariosa*) in the former, and the dominance of more sclerophyllous species (such as *Leptospermum trinervium, Cyathochaeta diandra*) in the latter. *Banksia ericifolia* is generally less dominant in the Hawkesbury *Banksia* Wet Scrub than in the Hawkesbury *Banksia* Scrub-Woodland, although this is dependant on fire interval. It is possible that the two sub-communities form a continuum across the landscape in response to fire interval and soil moisture availability. Sandstone Hanging Swamps (Unit E54) may also be considered similar to the Hawkesbury *Banksia* Wet Scrub due to the sharing of some mesic species, however that community supports several more shrub and ground layer species restricted to highly impeded sites (such as *Almaleea paludosa*).

## Equivalent Vegetation Types:

- Benson 1981 (Mangrove Creek): n/a
- Benson & Fallding 1981 (Brisbane Water) Closed to open-scrub (Unit 8)
- Benson 1986 (Gosf-Lake Mac): Open-Scrub (Unit 10a)
- Clarke & Benson 1986 (Dharug): Scrubland (Unit C4)
- Strom 1986 (Bouddi Peninsula): n/a
- Clarke & Benson 1987 (Mt White/ Mt Olive): *Banksia/ Hakea* Shrublands (Unit C3)
- McRae 1990 (Bouddi Peninsula): n/a
- Binns 1996 (SF MFD): n/a
- Payne 1997 (Cockle Bay/ Bouddi): n/a
- Bell 1998 (Popran NP): Hawkesbury Coastal Restioid Heath (Unit H2)
- Bell 2002 (Wyong LGA): (?) Hawkesbury *Banksia* Scrub-Woodland (Unit 37)

## Significant Species:

- Undescribed species – *none recorded*
- Threatened (TSC Act) – *none recorded*
- Rare (ROTAP) – *none recorded*

## Community Conservation Status:

*Reserve Representation* - small areas of this community are contained within Popran NP, and Brisbane Water NP is also likely to support it.

*TSC Act (1995) Status* - not currently listed.

## Mapping Reliability & Included Units:

*High Resolution Area* – this vegetation type has not been mapped in the high resolution area.

*Low Resolution Area* – this community has not been mapped within the low resolution area, although it may be included in any of the Heath or Scrub categories of NPWS (2000).

## Vegetation Structure:

| Stratum | Mean height (m) | Min height (m) | Max height (m) | Mean cover (%) | Sdev | n |
|---|---|---|---|---|---|---|
| Emergent | | | | | | |
| Tallest | 19.00 | 18.00 | 20.00 | 5 | | 1 |
| Middle 1 | 4.00 | 3.00 | 5.00 | 90 | | 1 |
| Middle 2 | | | | | | |
| Middle 3 | | | | | | |
| Lowest | 0.55 | 0.10 | 1.00 | 60 | | 1 |

## Key Diagnostic Species [based on 3 plots]:

| Life Form | Species | Community | | All others | | Fidelity |
|---|---|---|---|---|---|---|
| | | c/a | Freq. | c/a | Freq. | |
| Tree | *Eucalyptus haemastoma* | 2 | 33% | 2 | 17% | uninformative |
| | *Eucalyptus punctata* | 1 | 33% | 2 | 14% | uninformative |
| Shrub | *Banksia oblongifolia* | 4 | 100% | 2 | 18% | positive |
| | *Leptospermum juniperinum* | 4 | 100% | 2 | 2% | positive |
| | *Hakea dactyloides* | 2 | 100% | 1 | 19% | positive |
| | *Platysace linearifolia* | 2 | 100% | 2 | 32% | positive |
| | *Hakea teretifolia* | 5 | 67% | 1 | 17% | positive |
| | *Banksia ericifolia subsp. ericifolia* | 5 | 67% | 3 | 16% | positive |
| | *Xanthorrhoea resinifera* | 5 | 67% | 1 | 8% | positive |
| | *Pultenaea elliptica* | 3 | 67% | 2 | 10% | positive |
| | *Epacris pulchella* | 2 | 67% | 2 | 14% | positive |
| | *Persoonia lanceolata* | 3 | 67% | 1 | 6% | positive |
| | *Acacia myrtifolia* | 1 | 67% | 1 | 11% | uninformative |
| | *Acacia oxycedrus* | 1 | 67% | 2 | 11% | uninformative |
| | *Leptospermum trinervium* | 1 | 67% | 2 | 27% | uninformative |
| | *Angophora hispida* | 2 | 33% | 2 | 8% | uninformative |
| | *Epacris obtusifolia* | 2 | 33% | 2 | 2% | uninformative |
| | *Kunzea capitata* | 2 | 33% | 2 | 5% | uninformative |
| | *Persoonia isophylla* | 2 | 33% | 1 | 14% | uninformative |
| | *Acacia linifolia* | 1 | 33% | 1 | 14% | uninformative |
| | *Acacia suaveolens* | 1 | 33% | 1 | 28% | uninformative |
| | *Acacia terminalis* | 1 | 33% | 1 | 9% | uninformative |
| | *Baeckea diosmifolia* | 1 | 33% | 2 | 6% | uninformative |
| | *Bossiaea scolopendria* | 1 | 33% | 1 | 10% | uninformative |
| | *Callistemon citrinus* | 1 | 33% | 1 | 4% | uninformative |
| | *Doryanthes excelsa* | 1 | 33% | 2 | 12% | uninformative |
| | *Epacris microphylla var microphylla* | 1 | 33% | 2 | 3% | uninformative |
| | *Grevillea diffusa subsp. filipendula* | 1 | 33% | 2 | 12% | uninformative |
| | *Lambertia formosa* | 1 | 33% | 2 | 18% | uninformative |
| | *Leptospermum polygalifolium* | 1 | 33% | 2 | 24% | uninformative |
| | *Leucopogon microphyllus* | 1 | 33% | 2 | 8% | uninformative |
| | *Persoonia levis* | 1 | 33% | 1 | 34% | uninformative |
| | *Petrophile pulchella* | 1 | 33% | 2 | 18% | uninformative |
| | *Pimelea linifolia* | 1 | 33% | 1 | 20% | uninformative |
| | *Pultenaea paleacea* | 1 | 33% | 1 | 2% | uninformative |
| | *Sprengelia incarnata* | 1 | 33% | 2 | 2% | uninformative |
| Sub-shrub | *Pultenaea rosmarinifolia* | 3 | 67% | 1 | 14% | positive |
| | *Hemigenia purpurea* | 2 | 33% | 2 | 4% | uninformative |
| | *Gompholobium pinnatum* | 1 | 33% | 1 | 0% | uninformative |
| | *Tetratheca thymifolia* | 1 | 33% | 1 | 4% | uninformative |
| Herb | *Actinotus minor* | 3 | 100% | 2 | 19% | positive |
| | *Dampiera stricta* | 5 | 67% | 1 | 12% | positive |
| | *Goodenia dimorpha var angustifolia* | 5 | 33% | 0 | 0% | unique |
| | *Blandfordia grandiflora* | 1 | 33% | 1 | 1% | uninformative |
| | *Burchardia umbellata* | 1 | 33% | 1 | 3% | uninformative |
| | *Stackhousia viminea* | 1 | 33% | 1 | 2% | uninformative |
| Grass | *Panicum simile* | 1 | 33% | 1 | 5% | uninformative |
| | *Entolasia stricta* | 0 | 0% | 2 | 54% | negative |
| Graminoid | *Xyris gracilis* | 2 | 33% | 2 | 1% | uninformative |
| | *Lomandra glauca* | 1 | 33% | 2 | 18% | uninformative |
| | *Lomandra longifolia* | 0 | 0% | 2 | 45% | negative |
| Ground fern | *Lindsaea linearis* | 2 | 33% | 2 | 15% | uninformative |
| | *Pteridium esculentum* | 0 | 0% | 2 | 43% | negative |
| Clubmoss | *Selaginella uliginosa* | 1 | 33% | 2 | 5% | uninformative |
| Climber | *Cassytha glabella forma glabella* | 2 | 33% | 1 | 14% | uninformative |
| | *Empodisma minus* | 2 | 33% | 2 | 5% | uninformative |

| | | | | | | |
|---|---|---|---|---|---|---|
| Sedge/ Rush | *Leptocarpus tenax* | 5 | 100% | 2 | 4% | positive |
| | *Lepyrodia scariosa* | 3 | 100% | 2 | 19% | positive |
| | *Guringalia dimorpha* | 1 | 67% | 5 | 1% | uninformative |
| | *Hypolaena fastigiata* | 5 | 33% | 1 | 2% | uninformative |
| | *Eurychorda complanata* | 3 | 33% | 2 | 0% | uninformative |
| | *Cyathochaeta diandra* | 2 | 33% | 2 | 21% | uninformative |
| | *Baloskion tetraphyllum subsp. meiostachyum* | 1 | 33% | 2 | 3% | uninformative |
| | *Gymnoschoenus sphaerocephalus* | 1 | 33% | 5 | 0% | uninformative |
| | *Lepidosperma filiforme* | 1 | 33% | 2 | 2% | uninformative |
| | *Schoenus ericetorum* | 1 | 33% | 1 | 4% | uninformative |

# Coastal Sand Apple–Blackbutt Forest Unit E33a

## Coastal Sand Apple – Blackbutt Forest REMS Unit 33

## General Description:

Coastal Sand Apple - Blackbutt Forest occurs in coastal areas on Quaternary Pleistocene Sand deposits, in areas protected from seaward exposure and with good drainage. This vegetation type is characteristic of the NSW North Coast, and becomes very disjunct in the Central Coast area. In most locations, Blackbutt (*Eucalyptus pilularis*), Red Bloodwood (*Corymbia gummifera*) and Smooth-barked Apple (*Angophora costata*) dominate the tree layer, often with *Banksia serrata*. Understorey vegetation typically includes a range of Fabaceae species, together with *Monotoca scoparia, Eriostemon australasius, Monotoca elliptica, Pteridium esculentum, Themeda australis, Gonocarpus teucrioides,* and *Amperea xiphoclada* var. *xiphoclada*. Grasstrees (eg: *Xanthorrhoea arborea*) are often locally common.

## Known Floristic/ Structural Variations:

(a) Type variant (mapped as E33ai) – in the typical variant, the canopy comprises varying combinations of *Eucalyptus pilularis, Corymbia gummifera* and *Angophora costata* over a range of sclerophyllous understorey species on deep coastal sand deposits.

(b) Perched variant (mapped as E33aii) - in some areas, such as in parts of Bouddi NP along The Scenic Road, a similar forest occurs in a perched sand body on top of Narrabeen Sandstone base rock.

(c) Bangalay variant (mapped as E33aiii) – in at least one location in Wyrrabalong NP, the canopy includes *Eucalyptus botryoides* x *saligna,* where it forms a conspicuous component, and may form a distinct sub-community with further survey.

## Distribution:

*Within Gosford LGA* – occurs along the perched sand masses along the coast, mostly in Bouddi NP and Wyrrabalong NP areas, but also on the Umina sandplain.

*Within LHCC Region* – NPWS (2000) have mapped 9356ha of their Coastal Sand Apple-Blackbutt Forest remaining within the region.

*Examples Within Gosford LGA*

- Southern parts of Wyrrabalong NP, Forresters Beach
- Hillview Street, Umina
- The Scenic Road, Bouddi NP

## Extent:

*Extant* - 126.05 ha

## Relationship to Other Communities:

Coastal Sand Apple - Blackbutt Forest is floristically similar to Coastal Sand Wallum Heath (Unit 34a), although structurally they are quite distinct. The two can be separated by the lack of a distinct tree layer in that community, while the dense heath or scrub vegetation with *Banksia aemula* is characteristic. The Umina Sands Coastal Woodland (Unit E33b) is very similar floristically and structurally, however the presence of *Angophora floribunda* and *Eucalyptus botryoides* in the canopy can be used in splitting the two. Understorey floristics between these two sub-communities are very similar.

## Equivalent Vegetation Types:

- Benson 1981 (Mangrove Creek): n/a
- Benson & Fallding 1981 (Brisbane Water) n/a
- Benson 1986 (Gosf-Lake Mac): Open-Forest (Unit 9k)
- Clarke & Benson 1986 (Dharug): n/a
- Strom 1986 (Bouddi Peninsula): Low woodland (Units 2.1.1 & 2.2.2)
- Clarke & Benson 1987 (Mt White/ Mt Olive): n/a
- McRae 1990 (Bouddi Peninsula): Woodland (Unit 3.3)
- Binns 1996 (SF MFD): n/a
- Payne 1997 (Cockle Bay/ Bouddi): n/a
- Bell 1998 (Popran NP): n/a
- Bell 2002 (Wyong LGA): Coastal Sand Blackbutt-Apple Forest (Unit 8)

## Significant Species:

- Undescribed species – *none recorded*
- Threatened (TSC Act) – *none recorded*
- Rare (ROTAP) – *none recorded*

## Community Conservation Status:

*Reserve Representation* - within Gosford, areas of this vegetation type are present in Bouddi and Wyrrabalong NP's.

*TSC Act (1995) Status* - not currently listed.

## Mapping Reliability & Included Units:

*High Resolution Area* – this vegetation type has been mapped from aerial photographic interpretation and ground truthing.

*Low Resolution Area* – no occurrence within the low resolution area expected.

## Vegetation Structure:

| Stratum | Mean height (m) | Min height (m) | Max height (m) | Mean cover (%) | Sdev | n |
|---|---|---|---|---|---|---|
| Emergent | | | | | | |
| Tallest | 16.88 | 8.00 | 30.00 | 42 | 14.6 | 10 |
| Middle 1 | 4.08 | 1.00 | 10.00 | 26 | 17.4 | 11 |
| Middle 2 | 1.17 | 0.50 | 2.00 | 58 | 3.5 | 2 |
| Middle 3 | | | | | | |
| Lowest | 1.08 | 0.10 | 3.00 | 43 | 35.2 | 10 |

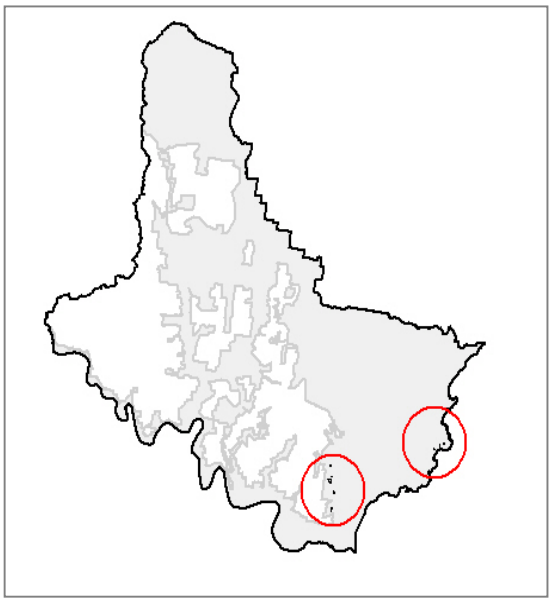
## Key Diagnostic Species [based on 14 plots]:

| Life Form | Species | Community | | All others | | Fidelity |
|---|---|---|---|---|---|---|
| | | c/a | Freq. | c/a | Freq. | |
| Tree | *Corymbia gummifera* | 3 | 73% | 2 | 29% | positive |
| | *Angophora costata* | 2 | 45% | 2 | 30% | positive |
| | *Eucalyptus pilularis* | 2 | 45% | 3 | 13% | positive |
| | *Eucalyptus saligna X botryoides* | 4 | 18% | 3 | 0% | uninformative |
| | *Angophora floribunda* | 2 | 18% | 2 | 19% | uninformative |
| | *Eucalyptus robusta* | 2 | 18% | 3 | 8% | uninformative |
| | *Allocasuarina torulosa* | 3 | 9% | 2 | 27% | uninformative |
| | *Eucalyptus punctata* | 3 | 9% | 2 | 14% | uninformative |
| | *Eucalyptus tereticornis* | 2 | 9% | 3 | 2% | uninformative |
| | *Melaleuca quinquenervia* | 2 | 9% | 3 | 3% | uninformative |
| | *Syncarpia glomulifera subsp. glomulifera* | 1 | 9% | 2 | 29% | uninformative |
| Palm | *Livistona australis* | 1 | 18% | 1 | 15% | uninformative |
| Small tree | *Banksia serrata* | 3 | 64% | 2 | 24% | positive |
| | *Allocasuarina littoralis* | 1 | 45% | 2 | 14% | uninformative |
| | *Glochidion ferdinandii* | 1 | 36% | 2 | 28% | uninformative |
| | *Endiandra sieberi* | 1 | 18% | 1 | 0% | uninformative |
| | *Acacia irrorata subsp. irrorata* | 1 | 9% | 1 | 2% | uninformative |
| | *Alphitonia excelsa* | 1 | 9% | 1 | 9% | uninformative |
| | *Xylomelum pyriforme* | 1 | 9% | 1 | 3% | uninformative |
| Shrub | *Macrozamia communis* | 2 | 73% | 2 | 10% | positive |
| | *Monotoca elliptica* | 2 | 55% | 2 | 1% | positive |
| | *Ricinocarpos pinifolius* | 2 | 55% | 1 | 5% | positive |
| | *Platysace lanceolata* | 2 | 45% | 1 | 15% | positive |
| | *Xanthorrhoea australis* | 6 | 18% | 0 | 0% | unique |
| | *Acacia suaveolens* | 1 | 73% | 1 | 27% | uninformative |
| | *Breynia oblongifolia* | 1 | 73% | 1 | 32% | uninformative |
| | *Acacia ulicifolia* | 1 | 64% | 1 | 23% | uninformative |
| | *Gompholobium latifolium* | 1 | 45% | 1 | 14% | uninformative |
| | *Platylobium formosum* | 1 | 45% | 2 | 9% | uninformative |
| | *Bossiaea heterophylla* | 2 | 36% | 2 | 10% | uninformative |
| | *Eriostemon australasius* | 2 | 36% | 1 | 5% | uninformative |
| | *Persoonia levis* | 1 | 36% | 1 | 34% | uninformative |
| | *Xanthorrhoea arborea* | 1 | 36% | 2 | 6% | uninformative |
| | *Podocarpus spinulosus* | 3 | 27% | 1 | 1% | uninformative |
| | *Pultenaea flexilis* | 3 | 27% | 1 | 11% | uninformative |
| | *Comesperma ericinum* | 2 | 27% | 1 | 3% | uninformative |
| | *Leptospermum polygalifolium* | 2 | 27% | 2 | 24% | uninformative |
| | *Acacia longifolia* | 1 | 27% | 2 | 11% | uninformative |
| | *Aotus ericoides* | 1 | 27% | 1 | 2% | uninformative |
| | *Leptospermum trinervium* | 1 | 27% | 2 | 27% | uninformative |
| | *Pittosporum revolutum* | 1 | 27% | 1 | 12% | uninformative |
| | *Bossiaea ensata* | 2 | 18% | 1 | 3% | uninformative |
| | *Dodonaea triquetra* | 2 | 18% | 1 | 17% | uninformative |
| | *Leucopogon ericoides* | 2 | 18% | 1 | 3% | uninformative |
| | *Pimelea linifolia* | 2 | 18% | 1 | 20% | uninformative |
| | *Polyscias sambucifolia* | 2 | 18% | 1 | 18% | uninformative |
| | *Elaeocarpus reticulatus* | 1 | 18% | 1 | 9% | uninformative |
| | *Maytenus silvestris* | 1 | 18% | 1 | 9% | uninformative |
| | *Monotoca scoparia* | 1 | 18% | 1 | 10% | uninformative |
| | *Notelaea longifolia* | 1 | 18% | 1 | 16% | uninformative |
| | *Omalanthus populifolius* | 1 | 18% | 1 | 5% | uninformative |
| | *Pittosporum undulatum* | 1 | 18% | 1 | 14% | uninformative |
| | *Dillwynia glaberrima* | 5 | 9% | 1 | 0% | uninformative |
| | *Xanthorrhoea media* | 3 | 9% | 2 | 15% | uninformative |
| | *Xanthorrhoea resinifera* | 4 | 9% | 1 | 9% | uninformative |
| | *Banksia aemula* | 2 | 9% | 1 | 1% | uninformative |
| | *Dillwynia floribunda* | 2 | 9% | 2 | 12% | uninformative |
| | *Gompholobium grandiflorum* | 2 | 9% | 1 | 10% | uninformative |
| | *Isopogon anemonifolius* | 2 | 9% | 1 | 18% | uninformative |
| | *Leptospermum laevigatum* | 2 | 9% | 3 | 2% | uninformative |
| Sub-shrub | *Tetratheca ericifolia* | 1 | 27% | 2 | 1% | uninformative |
| | *Astroloma pinifolium* | 1 | 9% | 1 | 1% | uninformative |
| | *Hibbertia linearis* | 1 | 9% | 1 | 4% | uninformative |
| | *Hovea linearis* | 1 | 9% | 1 | 9% | uninformative |
| Herb | *Gonocarpus teucrioides* | 2 | 64% | 1 | 13% | positive |

| | | | | | | |
|---|---|---|---|---|---|---|
| | *Pomax umbellata* | 2 | 64% | 2 | 15% | positive |
| | *Arthropodium minus* | 1 | 9% | 0 | 0% | unique |
| | *Amperea xiphoclada* | 1 | 36% | 2 | 3% | uninformative |
| | *Hybanthus monopetalus* | 1 | 36% | 1 | 4% | uninformative |
| | *Phyllanthus hirtellus* | 2 | 27% | 1 | 18% | uninformative |
| | *Correa reflexa* | 1 | 27% | 1 | 5% | uninformative |
| | *Mitrasacme polymorpha* | 1 | 27% | 1 | 4% | uninformative |
| | *Actinotus helianthi* | 5 | 18% | 1 | 7% | uninformative |
| | *Vernonia cinerea var cinerea* | 2 | 18% | 1 | 2% | uninformative |
| | *Chamaesyce hirta* | 2 | 18% | 2 | 0% | uninformative |
| | *Hibbertia diffusa* | 1 | 18% | 2 | 4% | uninformative |
| | *Xanthosia pilosa* | 1 | 18% | 1 | 13% | uninformative |
| | *Dampiera purpurea* | 2 | 9% | 1 | 2% | uninformative |
| | *Dampiera stricta* | 1 | 9% | 1 | 12% | uninformative |
| | *Goodenia heterophylla* | 1 | 9% | 1 | 7% | uninformative |
| | *Opercularia aspera* | 2 | 9% | 1 | 5% | uninformative |
| | *Poranthera microphylla* | 2 | 9% | 2 | 6% | uninformative |
| | *Pseuderanthemum variabile* | 2 | 9% | 2 | 17% | uninformative |
| Grass | *Themeda australis* | 2 | 45% | 2 | 24% | positive |
| | *Imperata cylindrica var major* | 2 | 73% | 2 | 28% | positive |
| | *Entolasia marginata* | 1 | 18% | 2 | 17% | uninformative |
| | *Poa affinis* | 1 | 18% | 2 | 6% | uninformative |
| | *Microlaena stipoides var stipoides* | 3 | 9% | 2 | 11% | uninformative |
| | *Cymbopogon refractus* | 1 | 9% | 2 | 3% | uninformative |
| | *Entolasia stricta* | 2 | 36% | 2 | 54% | negative |
| Graminoid | *Dianella caerulea* | 2 | 91% | 1 | 50% | positive |
| | *Lomandra longifolia* | 2 | 100% | 2 | 43% | constant |
| | *Lomandra filiformis* | 2 | 9% | 1 | 9% | uninformative |
| | *Patersonia glabrata* | 2 | 9% | 2 | 7% | uninformative |
| | *Patersonia sericea* | 1 | 9% | 2 | 18% | uninformative |
| Ground fern | *Pteridium esculentum* | 4 | 91% | 2 | 41% | constant |
| Epiphytic orchid | *Cymbidium suave* | 1 | 9% | 1 | 5% | uninformative |
| Climber | *Hardenbergia violacea* | 2 | 45% | 1 | 9% | positive |
| | *Billardiera scandens* | 1 | 45% | 1 | 29% | uninformative |
| | *Eustrephus latifolius* | 2 | 36% | 1 | 24% | uninformative |
| | *Smilax glyciphylla* | 1 | 36% | 1 | 19% | uninformative |
| | *Parsonsia straminea* | 1 | 27% | 1 | 19% | uninformative |
| | *Cassytha glabella forma glabella* | 2 | 18% | 1 | 14% | uninformative |
| | *Desmodium varians* | 2 | 18% | 2 | 10% | uninformative |
| | *Geitonoplesium cymosum* | 2 | 18% | 1 | 24% | uninformative |
| | *Glycine clandestina* | 2 | 18% | 2 | 23% | uninformative |
| | *Smilax australis* | 2 | 18% | 1 | 22% | uninformative |
| | *Hibbertia scandens* | 1 | 18% | 1 | 14% | uninformative |
| | *Hibbertia saligna* | 5 | 9% | 1 | 2% | uninformative |
| | *Polymeria calycina* | 2 | 9% | 2 | 0% | uninformative |
| | *Cissus antarctica* | 1 | 9% | 1 | 10% | uninformative |
| | *Cissus hypoglauca* | 1 | 9% | 1 | 18% | uninformative |
| | *Clematis aristata* | 1 | 9% | 1 | 10% | uninformative |
| | *Desmodium rhytidophyllum* | 1 | 9% | 2 | 8% | uninformative |
| | *Kennedia rubicunda* | 1 | 9% | 1 | 11% | uninformative |
| | *Marsdenia suaveolens* | 1 | 9% | 1 | 2% | uninformative |
| | *Pandorea pandorana subsp. pandorana* | 1 | 9% | 1 | 24% | uninformative |
| | *Passiflora herbertiana subsp. herbertiana* | 1 | 9% | 1 | 1% | uninformative |
| Sedge/ Rush | *Baloskion tetraphyllum subsp. meiostachyum* | 2 | 36% | 2 | 2% | uninformative |
| | *Lepidosperma concavum* | 2 | 9% | 1 | 1% | uninformative |
| | *Lepidosperma laterale* | 2 | 9% | 2 | 27% | uninformative |
| | *Carex maculata* | 1 | 9% | 1 | 1% | uninformative |
| | *Hypolaena fastigiata* | 1 | 9% | 2 | 2% | uninformative |

# Umina Sands Coastal Woodland
## Coastal Sand Apple – Blackbutt Forest

# Unit E33b
## REMS Unit 33



## General Description:
Umina Sands Coastal Woodland is a recognised Endangered Ecological Community, although the current data analysis could not distinguish it from other coastal sand communities. It is described here as a variant of the Coastal Sand Apple – Blackbutt Forest, as understorey components largely remain very similar to those within that community. Overstorey components do differ, however, with Bangalay (*Eucalyptus botryoides*) and *Angophora floribunda* generally being the most obvious. Remnants of a similar vegetation type are also present around the highly modified Avoca and Copacabana areas, where *Angophora floribunda* appears less abundant.

## Known Floristic/ Structural Variations:
(a) Type variant (mapped as E33bi) – certain areas on the Umina sandplain represent the type variant, where *Eucalyptus botryoides* and *Angophora floribunda* form prominent components of the canopy on level to undulating sand sheets.

(b) Avoca-Copacabana variant (mapped as E33bii) – in highly modified parts of Avoca and Copacabana, remnant trees of *Eucalyptus botryoides* and *Banksia integrifolia* within urban settlements suggest that a similar vegetation type once existed there. *Angophora floribunda* appears to be absent from these areas.

## Distribution:
*Within Gosford LGA* – occurs on the Umina sandplain in a highly fragmented state, and also in parts of Avoca and Copacabana.

*Within LHCC Region* – NPWS (2000) have not delineated or mapped this vegetation type for the region, although components do occur within their Coastal Sand Apple-Blackbutt Forest.

*Examples Within Gosford LGA*
- Adjacent Umina Oval, Umina (variant a)
- Coast Road, North Avoca (variant b)

## Extent:
*Extant* - 12.84 ha

## Relationship to Other Communities:

Umina Sands Coastal Woodland is floristically very similar to Coastal Sand Apple-Blackbutt Forest (Unit E33a), with which it forms a mosaic on the Umina sandplain. The main floristic difference is in the canopy, where *Eucalyptus botryoides* and *Angophora floribunda* tend to replace *Eucalyptus pilularis* and *Corymbia gummifera*, although in places the latter species and *Angophora costata* occur within Unit E33b. In the understorey, species such as *Isolepis nodosa* and *Podocarpus spinulosus* are more prevalent in Unit 33b, but other components are similar.

## Equivalent Vegetation Types:

- Benson 1981 (Mangrove Creek): n/a
- Benson & Fallding 1981 (Brisbane Water) (?) Open-forest – coastal alluvial flats (Unit 3)
- Benson 1986 (Gosf-Lake Mac): n/a
- Clarke & Benson 1986 (Dharug): n/a
- Strom 1986 (Bouddi Peninsula): n/a
- Clarke & Benson 1987 (Mt White/ Mt Olive): n/a
- McRae 1990 (Bouddi Peninsula): n/a
- Binns 1996 (SF MFD): n/a
- Payne 1997 (Cockle Bay/ Bouddi): n/a
- Bell 1998 (Popran NP): n/a
- Bell 2002 (Wyong LGA): (?) Coastal Sand Bangalay – Paperbark Forest (Unit 9)

## Significant Species:

- Undescribed species – *none recorded*
- Threatened (TSC Act) – *none recorded*
- Rare (ROTAP) – *none recorded*

## Community Conservation Status:

*Reserve Representation* - within Gosford, no areas are known within conservation reserves.

*TSC Act (1995) Status* - not currently listed.

## Mapping Reliability & Included Units:

*High Resolution Area* – this vegetation type has been mapped from aerial photographic interpretation and ground truthing.

*Low Resolution Area* – no occurrence within the low resolution area expected.

## Vegetation Structure:

| Stratum | Mean height (m) | Min height (m) | Max height (m) | Mean cover (%) | Sdev | n |
|---|---|---|---|---|---|---|
| Emergent | | | | | | |
| Tallest | 13.00 | 5.00 | 20.00 | 30 | 12.2 | 7 |
| Middle 1 | 4.93 | 1.00 | 8.00 | 22 | 31.1 | 7 |
| Middle 2 | 1.67 | 1.00 | 2.00 | 40 | 13.2 | 3 |
| Middle 3 | | | | | | |
| Lowest | 1.06 | 0.10 | 3.00 | 46 | 36.0 | 7 |

## Key Diagnostic Species [based on 7 plots]:

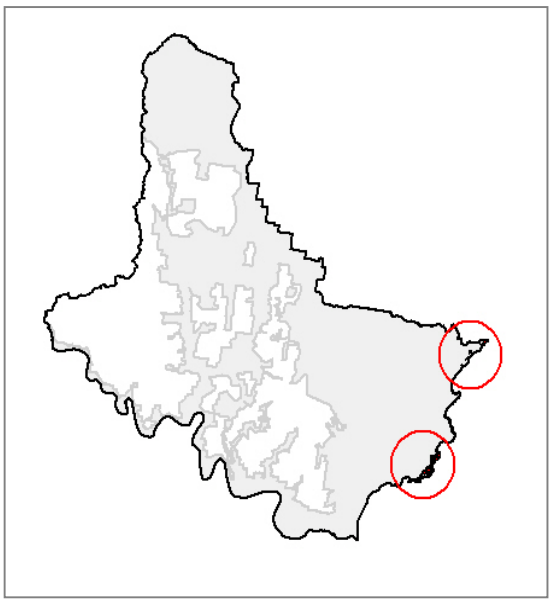
| Life Form | Species | Community | | All others | | Fidelity |
|---|---|---|---|---|---|---|
| | | c/a | Freq. | c/a | Freq. | |
| Tree | *Angophora floribunda* | 3 | 100% | 2 | 17% | positive |
| | *Eucalyptus botryoides* | 3 | 57% | 1 | 1% | positive |
| | *Angophora costata* | 4 | 14% | 2 | 31% | uninformative |
| | *Melaleuca quinquenervia* | 4 | 14% | 2 | 3% | uninformative |

| | | | | | | |
|---|---|---|---|---|---|---|
| Small tree | *Banksia serrata* | 2 | 100% | 2 | 24% | positive |
| | *Glochidion ferdinandii* | 3 | 86% | 2 | 27% | positive |
| | *Allocasuarina littoralis* | 2 | 86% | 1 | 13% | positive |
| Shrub | *Macrozamia communis* | 3 | 100% | 2 | 10% | positive |
| | *Breynia oblongifolia* | 2 | 100% | 1 | 32% | positive |
| | *Platysace lanceolata* | 2 | 100% | 1 | 14% | positive |
| | *Acacia suaveolens* | 2 | 57% | 1 | 27% | positive |
| | *Banksia integrifolia subsp. integrifolia* | 3 | 43% | 1 | 7% | positive |
| | *Bossiaea heterophylla* | 2 | 43% | 2 | 10% | positive |
| | *Hibbertia vestita* | 1 | 14% | 0 | 0% | unique |
| | *Monotoca elliptica* | 1 | 71% | 2 | 2% | uninformative |
| | *Ricinocarpos pinifolius* | 1 | 43% | 1 | 5% | uninformative |
| | *Acacia longifolia* | 3 | 29% | 1 | 11% | uninformative |
| | *Podocarpus spinulosus* | 3 | 29% | 3 | 1% | uninformative |
| | *Gompholobium latifolium* | 2 | 29% | 1 | 15% | uninformative |
| | *Persoonia levis* | 1 | 29% | 1 | 34% | uninformative |
| | *Pittosporum revolutum* | 1 | 29% | 1 | 12% | uninformative |
| | *Acacia ulicifolia* | 4 | 14% | 1 | 24% | uninformative |
| | *Duboisia myoporoides* | 2 | 14% | 1 | 6% | uninformative |
| | *Eriostemon australasius* | 2 | 14% | 2 | 6% | uninformative |
| | *Leptospermum trinervium* | 2 | 14% | 2 | 28% | uninformative |
| | *Xanthorrhoea arborea* | 2 | 14% | 2 | 7% | uninformative |
| | *Acacia uncinata* | 1 | 14% | 1 | 0% | uninformative |
| | *Aotus ericoides* | 1 | 14% | 1 | 3% | uninformative |
| | *Astrotricha floccosa* | 1 | 14% | 1 | 5% | uninformative |
| | *Dodonaea triquetra* | 1 | 14% | 1 | 17% | uninformative |
| | *Elaeocarpus reticulatus* | 1 | 14% | 1 | 10% | uninformative |
| | *Hakea sericea* | 1 | 14% | 1 | 11% | uninformative |
| | *Maytenus silvestris* | 1 | 14% | 1 | 9% | uninformative |
| | *Persoonia linearis* | 1 | 14% | 1 | 26% | uninformative |
| Herb | *Pomax umbellata* | 2 | 86% | 2 | 15% | positive |
| | *Gonocarpus teucrioides* | 2 | 57% | 1 | 14% | positive |
| | *Phyllanthus hirtellus* | 2 | 43% | 1 | 18% | positive |
| | *Commelina cyanea* | 1 | 43% | 1 | 7% | uninformative |
| | *Hybanthus monopetalus* | 1 | 29% | 1 | 5% | uninformative |
| | *Hydrocotyle laxiflora* | 2 | 14% | 2 | 8% | uninformative |
| | *Caesia parviflora* | 1 | 14% | 1 | 2% | uninformative |
| | *Oxalis perennans* | 1 | 14% | 1 | 1% | uninformative |
| Grass | *Themeda australis* | 2 | 71% | 2 | 23% | positive |
| | *Imperata cylindrica var major* | 2 | 57% | 2 | 29% | positive |
| | *Dichelachne parva* | 2 | 14% | 0 | 0% | unique |
| | *Microlaena stipoides var stipoides* | 3 | 29% | 2 | 10% | uninformative |
| | *Dichelachne crinita* | 2 | 29% | 1 | 0% | uninformative |
| | *Digitaria ramularis* | 2 | 29% | 2 | 3% | uninformative |
| | *Entolasia stricta* | 2 | 43% | 2 | 53% | constant |
| | *Echinopogon ovatus* | 1 | 14% | 2 | 5% | uninformative |
| Graminoid | *Dianella caerulea* | 2 | 100% | 1 | 50% | positive |
| | *Lomandra longifolia* | 2 | 100% | 2 | 44% | constant |
| Ground fern | *Pteridium esculentum* | 6 | 86% | 2 | 42% | constant |
| Climber | *Hardenbergia violacea* | 2 | 57% | 1 | 10% | positive |
| | *Eustrephus latifolius* | 1 | 43% | 1 | 24% | uninformative |
| | *Billardiera scandens* | 2 | 29% | 1 | 29% | uninformative |
| | *Pandorea pandorana subsp. pandorana* | 2 | 29% | 1 | 24% | uninformative |
| | *Glycine clandestina* | 1 | 29% | 2 | 22% | uninformative |
| | *Cassytha glabella forma glabella* | 2 | 14% | 1 | 14% | uninformative |
| | *Hibbertia scandens* | 2 | 14% | 1 | 14% | uninformative |
| | *Cayratia clematidea* | 1 | 14% | 1 | 7% | uninformative |
| | *Clematis glycinoides var glycinoides* | 1 | 14% | 1 | 6% | uninformative |

| | | | | | | |
|---|---|---|---|---|---|---|
| | *Kennedia rubicunda* | 1 | 14% | 1 | 11% | uninformative |
| | *Parsonsia straminea* | 1 | 14% | 1 | 20% | uninformative |
| | *Smilax glyciphylla* | 1 | 14% | 1 | 20% | uninformative |
| Sedge/ Rush | *Baloskion tetraphyllum subsp. meiostachyum* | 2 | 43% | 2 | 2% | positive |
| | *Cyperus exaltatus* | 1 | 14% | 0 | 0% | unique |
| | *Isolepis nodosa* | 3 | 14% | 2 | 1% | uninformative |

# Coastal Sand Wallum Heath
## Coastal Sand Wallum Woodland-Heath

# Unit E34a
## REMS Unit 34a



## General Description:
Occurring on the older coastal dune systems, Coastal Sand Wallum Heath represents a vegetation type with no apparent tree layer, although small localised patches of stunted tree species (eg: *Corymbia gummifera, Angophora costata, Eucalyptus piperita*) may occur in places. More typical, however, is a dense low heath to tall scrub where Wallum Banksia (*Banksia aemula*) is characteristic, with other common shrub species such as *Pimelea linifolia, Ricinocarpus pinifolius, Allocasuarina distyla, Monotoca scoparia, Lambertia formosa*, and several *Acacia* and Fabaceous species. This vegetation type occurs in generally more exposed areas than the better structured forests and woodlands.

## Known Floristic/ Structural Variations:
(a) Type variant (mapped as E34ai) – Coastal Sand Wallum Heath located on the Bombi Moors of Bouddi NP is the typical form of this vegetation type, occurring on perched aeolian sand masses. In this form, structure can vary from very low heath to tall heath or scrub, but always with *Banksia aemula* present.

(b) Intermediate variant (mapped as E34aii) - where the layer of sand thins out over bedrock material, an intermediate wallum heath occurs with species such as *Allocasuarina distyla* becoming more prominent.

## Distribution:
*Within Gosford LGA* – occurs mostly within Bouddi and Wyrrabalong NP's on perched sand masses, but also in unreserved nearby areas.

*Within LHCC Region* – NPWS (2000) have mapped 1914ha of their Coastal Sand Wallum-Woodland Heath remaining within the region.

*Examples Within Gosford LGA*
- Bombi Moors, Bouddi NP (variant a)
- South of Crackneck Point, Wyrrabalong NP (variant a)

## Extent:
*Extant* - 155.74 ha

## Relationship to Other Communities:

Coastal Sand Wallum Heath is floristically similar to Coastal Sand Blackbutt-Apple Forest (Unit 33), although structurally they are quite distinct. The two can be separated by the presence of a distinct tree layer in the latter community (*Eucalyptus pilularis, Corymbia gummifera, Angophora costata, Banksia serrata*), and with the dense heath or scrub vegetation of *Banksia aemula* characteristically very rare or absent. Other heath communities support a different suite of understorey species, and soils are not as obviously sandy.

## Equivalent Vegetation Types:

- Benson 1981 (Mangrove Creek): n/a
- Benson & Fallding 1981 (Brisbane Water) n/a
- Benson 1986 (Gosf-Lake Mac): Open-Heath (Unit 21b)
- Clarke & Benson 1986 (Dharug): n/a
- Strom 1986 (Bouddi Peninsula): Closed heath (Units 2.2.1, 2.2.2 & 4.7.1) & Open scrub (Unit 2.3)
- Clarke & Benson 1987 (Mt White/ Mt Olive): n/a
- McRae 1990 (Bouddi Peninsula): Open-heath (Unit 3.1) & (?) Low open-woodland (Unit 3.2)
- Binns 1996 (SF MFD): n/a
- Payne 1997 (Cockle Bay/ Bouddi): Open-heath (Unit 3.1) & (?) Low open-woodland (Unit 3.2)
- Bell 1998 (Popran NP): n/a
- Bell 2002 (Wyong LGA): Coastal Sand Wallum Heath-Scrub (Unit 7)

## Significant Species:

- Undescribed species – *none recorded*
- Threatened (TSC Act) – *none recorded*
- Rare (ROTAP) – *none recorded*

## Community Conservation Status:

*Reserve Representation* - within Gosford, areas of this vegetation type are present in Bouddi NP and Wyrrabalong NP.

*TSC Act (1995) Status* - not currently listed.

## Mapping Reliability & Included Units:

*High Resolution Area* – this vegetation type has been mapped from aerial photographic interpretation with ground truthing. Small areas of other coastal sand-based communities may be included within polygons.

*Low Resolution Area* – no occurrence within the low resolution area expected.

## Vegetation Structure:

| Stratum | Mean height (m) | Min height (m) | Max height (m) | Mean cover (%) | Sdev | n |
|---|---|---|---|---|---|---|
| Emergent | | | | | | |
| Tallest | 3.88 | 1.50 | 8.00 | 52 | 40.7 | 3 |
| Middle 1 | 2.00 | 2.00 | 2.00 | 100 | | 1 |
| Middle 2 | 1.00 | 0.50 | 1.50 | 30 | | 1 |
| Middle 3 | | | | | | |
| Lowest | 1.50 | 1.00 | 2.00 | 51 | 70.0 | 2 |

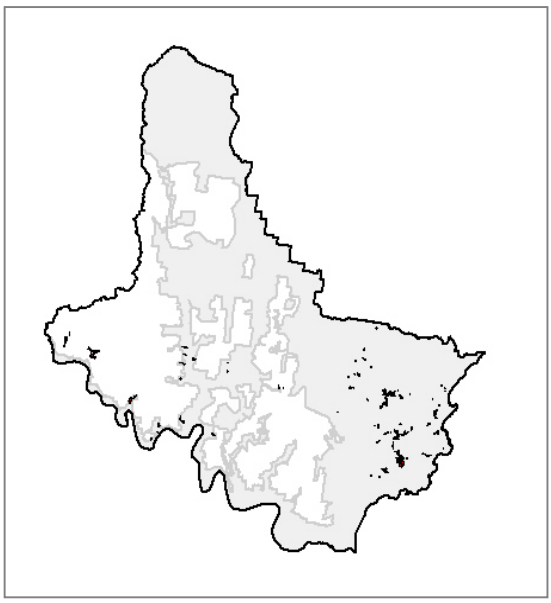
## Key Diagnostic Species [based on 3 plots]:

| Life Form | Species | Community | | All others | | Fidelity |
|---|---|---|---|---|---|---|
| | | c/a | Freq. | c/a | Freq. | |
| Tree | *Elaeocarpus obovatus* | 1 | 33% | 1 | 0% | uninformative |
| Small tree | *Banksia serrata* | 2 | 33% | 2 | 25% | uninformative |

| | | | | | | |
|---|---|---|---|---|---|---|
| | *Cupaniopsis anacardioides* | 1 | 33% | 2 | 2% | uninformative |
| Shrub | *Pimelea linifolia* | 3 | 100% | 1 | 20% | positive |
| | *Eriostemon australasius* | 6 | 67% | 2 | 5% | positive |
| | *Acacia ulicifolia* | 3 | 67% | 1 | 24% | positive |
| | *Allocasuarina distyla* | 3 | 67% | 2 | 3% | positive |
| | *Isopogon anemonifolius* | 3 | 67% | 1 | 18% | positive |
| | *Calytrix tetragona* | 4 | 33% | 0 | 0% | unique |
| | *Acacia quadrilateralis* | 1 | 33% | 0 | 0% | unique |
| | *Acacia suaveolens* | 1 | 100% | 1 | 27% | uninformative |
| | *Banksia aemula* | 1 | 100% | 2 | 0% | uninformative |
| | *Bossiaea scolopendria* | 1 | 100% | 1 | 10% | uninformative |
| | *Ricinocarpos pinifolius* | 1 | 100% | 1 | 5% | uninformative |
| | *Banksia integrifolia subsp. integrifolia* | 1 | 67% | 1 | 7% | uninformative |
| | *Bossiaea heterophylla* | 4 | 33% | 2 | 10% | uninformative |
| | *Platysace linearifolia* | 4 | 33% | 2 | 32% | uninformative |
| | *Woollsia pungens* | 4 | 33% | 1 | 10% | uninformative |
| | *Acacia longifolia* | 3 | 33% | 1 | 11% | uninformative |
| | *Leucopogon microphyllus* | 3 | 33% | 2 | 8% | uninformative |
| | *Macrozamia communis* | 2 | 33% | 2 | 11% | uninformative |
| | *Bossiaea ensata* | 1 | 33% | 1 | 3% | uninformative |
| | *Dillwynia glaberrima* | 1 | 33% | 5 | 0% | uninformative |
| | *Dodonaea triquetra* | 1 | 33% | 1 | 17% | uninformative |
| | *Exocarpos cupressiformis* | 1 | 33% | 1 | 5% | uninformative |
| | *Hakea teretifolia* | 1 | 33% | 1 | 17% | uninformative |
| | *Kunzea capitata* | 1 | 33% | 2 | 5% | uninformative |
| | *Leptospermum laevigatum* | 1 | 33% | 3 | 2% | uninformative |
| | *Leptospermum trinervium* | 1 | 33% | 2 | 27% | uninformative |
| | *Notelaea longifolia* | 1 | 33% | 1 | 16% | uninformative |
| | *Podocarpus spinulosus* | 1 | 33% | 3 | 1% | uninformative |
| Sub-shrub | *Euryomyrtus ramosissima* | 1 | 33% | 0 | 0% | unique |
| | *Hibbertia monogyna* | 1 | 33% | 1 | 5% | uninformative |
| Herb | *Actinotus helianthi* | 5 | 67% | 1 | 6% | positive |
| | *Amperea xiphoclada* | 2 | 67% | 1 | 4% | positive |
| | *Gonocarpus teucrioides* | 1 | 100% | 1 | 14% | uninformative |
| | *Correa reflexa* | 2 | 33% | 1 | 5% | uninformative |
| | *Dampiera purpurea* | 1 | 33% | 1 | 2% | uninformative |
| | *Dampiera stricta* | 1 | 33% | 1 | 12% | uninformative |
| | *Senecio lautus* | 1 | 33% | 1 | 1% | uninformative |
| | *Xanthosia pilosa* | 1 | 33% | 1 | 13% | uninformative |
| Grass | *Anisopogon avenaceus* | 1 | 33% | 2 | 16% | uninformative |
| | *Entolasia stricta* | 0 | 0% | 2 | 54% | negative |
| Graminoid | *Lomandra glauca* | 5 | 67% | 2 | 18% | positive |
| | *Lomandra longifolia* | 4 | 67% | 2 | 44% | constant |
| | *Dianella caerulea* | 2 | 33% | 1 | 51% | uninformative |
| | *Haemodorum planifolium* | 1 | 33% | 1 | 2% | uninformative |
| | *Patersonia sericea* | 1 | 33% | 2 | 18% | uninformative |
| Ground fern | *Pteridium esculentum* | 4 | 67% | 2 | 42% | constant |
| | *Schizaea bifida* | 1 | 33% | 1 | 4% | uninformative |
| Climber | *Hardenbergia violacea* | 1 | 67% | 1 | 10% | uninformative |
| | *Hibbertia saligna* | 5 | 33% | 1 | 2% | uninformative |
| | *Cassytha glabella forma glabella* | 3 | 33% | 1 | 14% | uninformative |
| | *Marsdenia rostrata* | 1 | 33% | 1 | 5% | uninformative |
| Sedge/ Rush | *Saropsis fastigiata* | 3 | 33% | 0 | 0% | unique |
| | *Lepidosperma limicola* | 3 | 33% | 1 | 0% | uninformative |
| | *Hypolaena fastigiata* | 3 | 33% | 1 | 2% | uninformative |
| | *Gahnia clarkei* | 1 | 33% | 2 | 11% | uninformative |
| | *Lepidosperma laterale* | 1 | 33% | 2 | 27% | uninformative |

# Swamp Mahogany – Paperbark Forest Unit E37

## Swamp Mahogany – Paperbark Forest REMS Unit 37



## General Description:

Swamp Mahogany-Paperbark Forest is typified by the presence of *Eucalyptus robusta* in the canopy, and may occur with a range of associates including *Melaleuca linariifolia, Melaleuca sieberi, Melaleuca styphelioides*, *Eucalyptus resinifera, Eucalyptus tereticornis*, and *Angophora floribunda*. The understorey is variable, often with a dense shrub layer of species such as *Acacia longifolia, Omalanthus nutans*, and *Pultenaea villosa*, and the sedge *Gahnia clarkei*. This type is common around coastal estuaries and flats where drainage is impeded, and is also present as backswamps along major tributaries of the Hawkesbury River. Several variants of this Swamp Mahogany complex have been identified, and are dealt with separately as sub-units in the following profiles.

## Known Floristic/ Structural Variations:

No variants have been identified in this vegetation type (but see sub-units following).

## Distribution:

*Within Gosford LGA* – along major tributaries of many floodplain creek systems, such as the Erina and Narrara Creek floodplains. Also present as backswamps in tributaries of the Hawkesbury River.

*Within LHCC Region* – NPWS (2000) have mapped 4763ha of their Swamp Mahogany-Paperbark Swamp Forest (Unit 37) remaining in the region.

*Examples Within Gosford LGA*

- Cockle Bay Nature Reserve
- Erina Creek floodplain, Erina
- Mangrove Creek, Lower Mangrove

## Extent:

*Extant* - 274.20ha

## Relationship to Other Communities:

This vegetation type forms a mosaic with the other identified Swamp Mahogany sub-communities (Units E37a-e). It can be separated from these through the lack of a prominent canopy of *Melaleuca biconvexa* (as in E37a); the lack of *Eucalyptus longifolia* (E37b); the lack of a dense understorey of *Blechnum indicum* and *Baloskion tetraphyllum* (E37c); the lack of *Eucalyptus amplifolia* and *Eucalyptus saligna* (E37d); and the lack of *Melaleuca quinquenervia* as a dense

canopy component (E37e). The Narrabeen Alluvial Sedge Woodland (Unit E42) also shares *Eucalyptus robusta*, but that community is heavily sedge-dominated, and supports *Angophora costata, Eucalyptus resinifera, Melaleuca linariifolia* and *Melaleuca sieberi*.

## Equivalent Vegetation Types:

- Benson 1981 (Mangrove Creek): n/a
- Benson & Fallding 1981 (Brisbane Water) n/a
- Benson 1986 (Gosf-Lake Mac): Open Forest (Unit 27a)
- Clarke & Benson 1986 (Dharug): Forest/ Swamp Forest (Unit A6)
- Strom 1986 (Bouddi Peninsula): Open forest (Units 1.2.1 & ?1.2.2)
- Clarke & Benson 1987 (Mt White/ Mt Olive): Swamp Mahogany Forest (Unit A4)
- McRae 1990 (Bouddi Peninsula): Woodland (Unit 4.2)
- Binns 1996 (SF MFD): n/a
- Payne 1997 (Cockle Bay/ Bouddi): Woodland (Unit 4.2)
- Bell 1998 (Popran NP): Alluvial Mahogany Swamp Forest (Unit SF2)
- Bell 2002 (Wyong LGA): Alluvial Floodplain Shrub Swamp Forest (Unit 20)

## Significant Species:

- Undescribed species – *none recorded*
- Threatened (TSC Act) – *Melaleuca biconvexa (?)*
- Rare (ROTAP) – *none recorded*

## Community Conservation Status:

*Reserve Representation* - within Gosford, this vegetation type is known from Cockle Bay NR.

*TSC Act (1995) Status* - included within the *Sydney Coastal Estuary Swamp Forest Complex* EEC.

## Mapping Reliability & Included Units:

*High Resolution Area* – this vegetation type has been mapped from aerial photographic interpretation and ground truthing. Small areas of other swamp forest vegetation within the Unit E37 complex may be included in the mapping.

*Low Resolution Area* – modelled locations on floodplains of major tributaries, based on NPWS (2000).

## Vegetation Structure:

| Stratum | Mean height (m) | Min height (m) | Max height (m) | Mean cover (%) | Sdev | n |
|---|---|---|---|---|---|---|
| Emergent | | | | | | |
| Tallest | 17.72 | 8.00 | 25.00 | 43 | 21.8 | 11 |
| Middle 1 | 7.94 | 4.00 | 14.00 | 32 | 21.3 | 11 |
| Middle 2 | 2.43 | 1.00 | 4.00 | 53 | 31.0 | 4 |
| Middle 3 | 1.19 | 0.10 | 3.00 | 74 | 36.1 | 11 |
| Lowest | 0.87 | 0.10 | 2.00 | 60 | 43.6 | 3 |

## Key Diagnostic Species [based on 15 plots]:

| Life Form | Species | Community | | All others | | Fidelity |
|---|---|---|---|---|---|---|
| | | c/a | Freq. | c/a | Freq. | |
| Tree | *Eucalyptus robusta* | 3 | 93% | 2 | 5% | positive |
| | *Casuarina glauca* | 3 | 47% | 2 | 4% | positive |
| | *Melaleuca quinquenervia* | 1 | 27% | 4 | 2% | uninformative |
| | *Acmena smithii* | 2 | 20% | 2 | 14% | uninformative |
| | *Angophora floribunda* | 2 | 7% | 2 | 19% | uninformative |

| | | | | | | |
|---|---|---|---|---|---|---|
| | *Ceratopetalum apetalum* | 2 | 7% | 3 | 5% | uninformative |
| | *Eucalyptus botryoides* | 1 | 7% | 2 | 2% | uninformative |
| Palm | *Livistona australis* | 3 | 7% | 1 | 16% | uninformative |
| Small tree | *Melaleuca linariifolia* | 3 | 80% | 2 | 4% | positive |
| | *Melia azedarach* | 1 | 7% | 0 | 0% | unique |
| | *Glochidion ferdinandii* | 1 | 73% | 2 | 27% | uninformative |
| | *Acacia irrorata subsp. irrorata* | 2 | 20% | 1 | 2% | uninformative |
| | *Acacia parramattensis* | 2 | 13% | 1 | 4% | uninformative |
| | *Callicoma serratifolia* | 1 | 13% | 2 | 4% | uninformative |
| | *Callistemon salignus* | 2 | 13% | 2 | 3% | uninformative |
| | *Melaleuca styphelioides* | 3 | 13% | 1 | 3% | uninformative |
| | *Synoum glandulosum subsp. glandulosum* | 1 | 13% | 1 | 13% | uninformative |
| Shrub | *Leptospermum polygalifolium* | 3 | 33% | 2 | 24% | uninformative |
| | *Melaleuca ericifolia* | 2 | 33% | 2 | 2% | uninformative |
| | *Polyscias sambucifolia* | 1 | 33% | 1 | 17% | uninformative |
| | *Duboisia myoporoides* | 2 | 27% | 1 | 5% | uninformative |
| | *Acacia floribunda* | 1 | 27% | 1 | 4% | uninformative |
| | *Breynia oblongifolia* | 1 | 27% | 1 | 33% | uninformative |
| | *Acacia longifolia* | 1 | 20% | 2 | 11% | uninformative |
| | *Callistemon citrinus* | 1 | 20% | 1 | 3% | uninformative |
| | *Dodonaea triquetra* | 1 | 20% | 1 | 17% | uninformative |
| | *Omalanthus populifolius* | 1 | 20% | 1 | 4% | uninformative |
| | *Goodenia ovata* | 2 | 13% | 1 | 3% | uninformative |
| | *Leptospermum arachnoides* | 1 | 13% | 2 | 3% | uninformative |
| | *Leptospermum juniperinum* | 1 | 13% | 2 | 2% | uninformative |
| | *Rapanea howittiana* | 1 | 13% | 1 | 1% | uninformative |
| Herb | *Hydrocotyle laxiflora* | 2 | 40% | 2 | 7% | positive |
| | *Pratia purpurascens* | 2 | 40% | 2 | 20% | positive |
| | *Viola hederacea* | 2 | 40% | 2 | 12% | positive |
| | *Lycopus australis* | 2 | 7% | 0 | 0% | unique |
| | *Ranunculus lappaceus* | 2 | 7% | 0 | 0% | unique |
| | *Viola betonicifolia* | 2 | 7% | 0 | 0% | unique |
| | *Isachne globosa* | 1 | 13% | 0 | 0% | unique |
| | *Ranunculus inundatus* | 2 | 13% | 0 | 0% | unique |
| | *Commelina cyanea* | 1 | 33% | 1 | 6% | uninformative |
| | *Lobelia alata* | 1 | 20% | 2 | 2% | uninformative |
| | *Gonocarpus tetragynus* | 2 | 13% | 2 | 5% | uninformative |
| | *Hydrocotyle peduncularis* | 2 | 13% | 2 | 3% | uninformative |
| | *Pseuderanthemum variabile* | 2 | 13% | 2 | 17% | uninformative |
| | *Vernonia cinerea var cinerea* | 1 | 13% | 1 | 2% | uninformative |
| Grass | *Entolasia marginata* | 2 | 80% | 2 | 14% | positive |
| | *Imperata cylindrica var major* | 1 | 40% | 2 | 29% | uninformative |
| | *Oplismenus imbecillis* | 2 | 27% | 2 | 17% | uninformative |
| | *Hemarthria uncinata* | 2 | 20% | 4 | 1% | uninformative |
| | *Oplismenus aemulus* | 1 | 20% | 2 | 4% | uninformative |
| | *Paspalidium distans* | 2 | 13% | 1 | 4% | uninformative |
| | *Phragmites australis* | 2 | 13% | 4 | 2% | uninformative |
| | *Digitaria parviflora* | 1 | 13% | 1 | 4% | uninformative |
| | *Entolasia stricta* | 2 | 7% | 2 | 55% | negative |
| Graminoid | *Thelionema caespitosum* | 1 | 20% | 0 | 0% | unique |
| | *Dianella caerulea* | 1 | 40% | 1 | 51% | uninformative |
| | *Lomandra longifolia* | 2 | 13% | 2 | 46% | negative |
| Ground fern | *Hypolepis muelleri* | 4 | 60% | 2 | 5% | positive |
| | *Blechnum indicum* | 3 | 40% | 1 | 1% | positive |
| | *Calochlaena dubia* | 3 | 33% | 3 | 18% | uninformative |
| | *Adiantum aethiopicum* | 2 | 33% | 2 | 12% | uninformative |
| | *Pteridium esculentum* | 1 | 20% | 2 | 43% | negative |
| Climber | *Parsonsia straminea* | 2 | 40% | 1 | 19% | positive |

| | | | | | | |
|---|---|---|---|---|---|---|
| | *Geitonoplesium cymosum* | 1 | 40% | 1 | 23% | uninformative |
| | *Glycine clandestina* | 1 | 40% | 2 | 22% | uninformative |
| | *Stephania japonica var discolor* | 1 | 40% | 1 | 16% | uninformative |
| | *Eustrephus latifolius* | 2 | 27% | 1 | 25% | uninformative |
| | *Pandorea pandorana subsp. pandorana* | 1 | 27% | 1 | 24% | uninformative |
| | *Rubus moluccanus var trilobus* | 1 | 20% | 1 | 7% | uninformative |
| | *Sarcopetalum harveyanum* | 1 | 20% | 1 | 11% | uninformative |
| | *Billardiera scandens* | 2 | 13% | 1 | 30% | uninformative |
| | *Cissus hypoglauca* | 2 | 13% | 1 | 18% | uninformative |
| | *Morinda jasminoides* | 2 | 13% | 1 | 15% | uninformative |
| | *Tylophora barbata* | 1 | 13% | 1 | 4% | uninformative |
| Sedge/ Rush | *Gahnia clarkei* | 2 | 67% | 2 | 9% | positive |
| | *Baumea juncea* | 2 | 40% | 5 | 3% | positive |
| | *Carex appressa* | 4 | 27% | 2 | 4% | uninformative |
| | *Isolepis inundata* | 1 | 20% | 2 | 0% | uninformative |
| | *Lepidosperma quadrangulatum* | 2 | 13% | 5 | 0% | uninformative |
| | *Baumea articulata* | 1 | 13% | 2 | 1% | uninformative |
| | *Juncus continuus* | 1 | 13% | 2 | 1% | uninformative |
| | *Lepidosperma laterale* | 1 | 13% | 2 | 28% | uninformative |

# Alluvial Paperbark Sedge Forest
## Swamp Mahogany – Paperbark Forest

# Unit E37a
## REMS Unit 37

## General Description:
Alluvial Paperbark Sedge Forest is typified by a canopy layer of *Eucalyptus robusta,* and dense stands of *Melaleuca biconvexa, Melaleuca linariifolia, Melaleuca styphelioides, Callistemon salignus,* and *Livistona australis*. The understorey is characterised by a dense layer of the sedge *Gahnia clarkei*, with relatively few other species present. Young plants of *Livistona australis* may also be obvious in the ground or shrub layer. This type represents the moister form of the Alluvial Bluegum – Paperbark Forest (Unit E5a), in which drainage is heavily impeded. The Alluvial Paperbark Sedge Forest tends to occur more on wider floodplains of major tributaries, while the Alluvial Bluegum – Paperbark Forest occurs closer to creek lines. The two are sometimes present along the same creekline, particularly in the adjacent Wyong LGA.

## Known Floristic/ Structural Variations:
No variants have been identified in this vegetation type.

## Distribution:
*Within Gosford LGA* – along major tributaries of many floodplain creek systems, such as the Erina and Narrara Creek floodplains.

*Within LHCC Region* – NPWS (2000) have mapped 4763ha of their Swamp Mahogany-Paperbark Swamp Forest (Unit 37) remaining in the region, which includes this community.

*Examples Within Gosford LGA*
- Lisarow Wetland, near Lisarow railway station
- Wells Street, Erina
- Avoca Drive near Picketts Valley

## Extent:
*Extant* - 68.08 ha

## Relationship to Other Communities:
This vegetation type is most closely related to the Alluvial Bluegum – Paperbark Forest (Unit E5a) through a sharing of *Melaleuca biconvexa* and other paperbarks, and *Livistona australis*. However, the two can be separated on the absence of *Eucalyptus robusta* in Unit E37a, and the presence of *Syncarpia glomulifera, Eucalyptus deanei* and *E. saligna* in the canopy of Unit E5a. The mesic elements in Unit E5a (eg: *Ficus coronata, Acmena smithii, Synoum glandulosum,*

*Cryptocarya microneura*) are also replaced by more swampy ones in Unit E37a, while *Gahnia clarkei* is normally only sparsely distributed in Unit E5a, but forms monospecific dense stands in Unit E37a. Coastal Sand Swamp Forest (Unit E37e) may also be considered similar, but that community occurs on sandy substrates and comprises *Melaleuca quinquenervia* as the dominant canopy species.

## Equivalent Vegetation Types:

- Benson 1981 (Mangrove Creek): n/a
- Benson & Fallding 1981 (Brisbane Water) n/a
- Benson 1986 (Gosf-Lake Mac): Closed Forest (Unit 8b)
- Clarke & Benson 1986 (Dharug): n/a
- Strom 1986 (Bouddi Peninsula): n/a
- Clarke & Benson 1987 (Mt White/ Mt Olive): n/a
- McRae 1990 (Bouddi Peninsula): n/a
- Binns 1996 (SF MFD): n/a
- Payne 1997 (Cockle Bay/ Bouddi): n/a
- Bell 1998 (Popran NP): (?) Alluvial Mahogany Swamp Forest (Unit SF2)
- Bell 2002 (Wyong LGA): Alluvial Robusta-Paperbark Sedge-Palm Forest (Unit 17)

## Significant Species:

- Undescribed species – *none recorded*
- Threatened (TSC Act) – *Melaleuca biconvexa*
- Rare (ROTAP) – *none recorded*

## Community Conservation Status:

*Reserve Representation* - within Gosford, this vegetation type is not known in reservation.

*TSC Act (1995) Status* - included within the *Sydney Coastal Estuary Swamp Forest Complex* EEC.

## Mapping Reliability & Included Units:

*High Resolution Area* – this vegetation type has been mapped from aerial photographic interpretation and ground truthing. Small areas of other swamp forest vegetation within Unit E37 may be included in the mapping.

*Low Resolution Area* – no occurrence within the low resolution area expected.

## Vegetation Structure:

| Stratum | Mean height (m) | Min height (m) | Max height (m) | Mean cover (%) | Sdev | n |
|---|---|---|---|---|---|---|
| Emergent | | | | | | |
| Tallest | 21.72 | 12.00 | 35.00 | 34 | 23.4 | 9 |
| Middle 1 | 12.33 | 3.00 | 20.00 | 42 | 23.3 | 9 |
| Middle 2 | 4.00 | 1.00 | 10.00 | 20 | 9.4 | 5 |
| Middle 3 | | | | | | |
| Lowest | 0.92 | 0.10 | 3.00 | 62 | 33.8 | 9 |

## Key Diagnostic Species [based on 9 plots]:

| Life Form | Species | Community | | All others | | Fidelity |
|---|---|---|---|---|---|---|
| | | c/a | Freq. | c/a | Freq. | |
| Tree | *Eucalyptus robusta* | 3 | 78% | 3 | 7% | positive |
| | *Casuarina glauca* | 2 | 56% | 3 | 5% | positive |
| | *Acmena smithii* | 1 | 67% | 2 | 13% | uninformative |
| | *Melaleuca quinquenervia* | 3 | 11% | 2 | 3% | uninformative |

| | | | | | | |
|---|---|---|---|---|---|---|
| | *Eucalyptus resinifera subsp. resinifera* | 3 | 11% | 2 | 2% | uninformative |
| | *Claoxylon australe* | 1 | 11% | 1 | 3% | uninformative |
| | *Cryptocarya microneura* | 1 | 11% | 2 | 6% | uninformative |
| Palm | *Livistona australis* | 1 | 44% | 1 | 15% | uninformative |
| Small tree | *Glochidion ferdinandii* | 2 | 100% | 2 | 27% | positive |
| | ***Melaleuca biconvexa* [TSC Vulnerable]** | **5** | **89%** | **3** | **1%** | **positive** |
| | *Melaleuca linariifolia* | 2 | 44% | 2 | 6% | positive |
| | *Callistemon salignus* | 1 | 44% | 2 | 2% | uninformative |
| | *Ficus coronata* | 3 | 33% | 1 | 4% | uninformative |
| | *Melaleuca styphelioides* | 1 | 33% | 3 | 3% | uninformative |
| Shrub | *Pittosporum undulatum* | 2 | 56% | 1 | 13% | positive |
| | *Omalanthus populifolius* | 1 | 56% | 1 | 4% | uninformative |
| | *Rapanea variabilis* | 3 | 22% | 1 | 15% | uninformative |
| | *Alpinia caerulea* | 2 | 22% | 1 | 0% | uninformative |
| | *Pittosporum revolutum* | 1 | 22% | 1 | 12% | uninformative |
| | *Psychotria loniceroides* | 1 | 11% | 1 | 3% | uninformative |
| | *Acacia longifolia* | 1 | 11% | 2 | 12% | uninformative |
| Herb | *Persicaria praetermissa* | 2 | 11% | 0 | 0% | unique |
| | *Persicaria decipiens* | 1 | 11% | 0 | 0% | unique |
| | *Commelina cyanea* | 2 | 33% | 1 | 7% | uninformative |
| | *Viola hederacea* | 2 | 33% | 2 | 13% | uninformative |
| | *Centella asiatica* | 2 | 11% | 2 | 1% | uninformative |
| | *Hydrocotyle peduncularis* | 2 | 11% | 2 | 4% | uninformative |
| Grass | *Oplismenus imbecillis* | 2 | 67% | 2 | 16% | positive |
| | *Entolasia marginata* | 2 | 33% | 2 | 16% | uninformative |
| | *Entolasia stricta* | 2 | 11% | 2 | 54% | negative |
| Graminoid | *Lomandra longifolia* | 0 | 0% | 2 | 46% | negative |
| Ground fern | *Hypolepis muelleri* | 3 | 100% | 2 | 5% | positive |
| | *Blechnum camfieldii* | 2 | 11% | 0 | 0% | unique |
| | *Blechnum indicum* | 2 | 33% | 2 | 2% | uninformative |
| | *Calochlaena dubia* | 1 | 22% | 3 | 18% | uninformative |
| | *Pteridium esculentum* | 0 | 0% | 2 | 43% | negative |
| Climber | *Parsonsia straminea* | 2 | 100% | 1 | 18% | positive |
| | *Morinda jasminoides* | 2 | 67% | 1 | 14% | positive |
| | *Pandorea pandorana subsp. pandorana* | 2 | 44% | 1 | 23% | positive |
| | *Stephania japonica var discolor* | 1 | 22% | 1 | 17% | uninformative |
| | *Smilax australis* | 1 | 33% | 1 | 22% | uninformative |
| Sedge/ Rush | *Gahnia clarkei* | 5 | 78% | 2 | 10% | positive |
| | *Carex appressa* | 2 | 78% | 3 | 3% | positive |
| | *Juncus polyanthemus* | 2 | 11% | 0 | 0% | unique |
| | *Philydrum lanuginosum* | 1 | 11% | 0 | 0% | unique |
| | *Carex fascicularis* | 1 | 33% | 1 | 0% | uninformative |
| | *Carex maculata* | 1 | 22% | 1 | 1% | uninformative |

# Alluvial Floodplain Woollybutt Forest — Unit E37b

## Swamp Mahogany – Paperbark Forest — REMS Unit 37

## General Description:

Alluvial Floodplain Woollybutt Forest is a variant currently known from only two locations within the Gosford LGA. While Woollybutt (*Eucalyptus longifolia*) is certainly present in these areas, it is not a dominant component, instead occurring within a *Eucalyptus robusta/ Angophora floribunda* shrubby forest. No detailed site data has yet been collected for this sub-community, and hence relationships between it and other sub-communities cannot be determined. *Eucalyptus longifolia*, while locally common and a community dominant in areas such as the Porters Creek catchment in Wyong Shire, is uncommon in Gosford LGA and should be considered locally significant.

## Known Floristic/ Structural Variations:

No variants have yet been recognised for this sub-community.

## Distribution:

*Within Gosford LGA* – currently known only from one location on the Erina Creek floodplain, near Erina. A second location supporting Woollybutt apparently occurs on the western footslopes of Cockrone Lake (R. Payne, pers. comm.), which presumably supports a similar range of species.

*Within LHCC Region* – NPWS (2000) have mapped 4763ha of their Swamp Mahogany-Paperbark Swamp Forest (Unit 37) remaining in the region, which includes this community.

*Examples Within Gosford LGA*

- Off Wells Street, Erina
- Cockrone Lake

## Extent:

*Extant* - 0.51 ha

## Relationship to Other Communities:

At present, the inclusion of *Eucalyptus longifolia* in the canopy of this sub-community sufficiently distinguishes this type from other similar vegetation within the broader Unit E37. Detailed survey work and analysis is required in this type to better understand floristic relationships, particularly within the wider Gosford-Wyong region.

## Equivalent Vegetation Types:

- Benson 1981 (Mangrove Creek): n/a
- Benson & Fallding 1981 (Brisbane Water) n/a
- Benson 1986 (Gosf-Lake Mac): Open-Forest (Unit 27a)
- Clarke & Benson 1986 (Dharug): n/a
- Strom 1986 (Bouddi Peninsula): n/a
- Clarke & Benson 1987 (Mt White/ Mt Olive): n/a
- McRae 1990 (Bouddi Peninsula): n/a
- Binns 1996 (SF MFD): n/a
- Payne 1997 (Cockle Bay/ Bouddi): n/a
- Bell 1998 (Popran NP): n/a
- Bell 2002 (Wyong LGA): (?) Alluvial Woollybutt Swamp Forest (Unit 19)

## Significant Species:

- Undescribed species – *none recorded*
- Threatened (TSC Act) – *Melaleuca biconvexa (?)*
- Rare (ROTAP) – *none recorded*

## Community Conservation Status:

*Reserve Representation* - within Gosford, this vegetation type is not known in reservation.

*TSC Act (1995) Status* - not currently listed.

## Mapping Reliability & Included Units:

*High Resolution Area* – this vegetation type has been mapped from ground truthing at the only locations known. Small unmapped areas may be included in other swamp forest vegetation within the Unit E37 complex.

*Low Resolution Area* – no occurrence within the low resolution area expected.

## Vegetation Structure:

No structural data is yet available for this community.

## Key Diagnostic Species [no plots available]:

Diagnostic species have not been generated for this community due to a lack of suitable floristic data, and uncertainty between the composition of this and related communities. Woollybutt (*Eucalyptus longifolia*) is very rare in Gosford LGA, and is characteristic. There is no equivalent community within the REMS classification (NPWS 2000) upon which to draw a representative list, hence the species below are based on brief notes from a site inspection.

| Life Form | Species | Community | | All others | | Fidelity |
|---|---|---|---|---|---|---|
| | | c/a | Freq. | c/a | Freq. | |
| Tree | *Eucalyptus longifolia* | - | - | - | - | - |
| | *Eucalyptus robusta* | - | - | - | - | - |
| | *Angophora costata* | - | - | - | - | - |
| Small tree | *Melaleuca linariifolia* | - | - | - | - | - |
| | *Glochidion ferdinandii* | - | - | - | - | - |
| | *Callistemon salignus* | - | - | - | - | - |
| | *Acacia irrorata subsp. irrorata* | - | - | - | - | - |
| | *Melaleuca styphelioides* | - | - | - | - | - |
| Shrub | *Leptospermum polygalifolium* | - | - | - | - | - |
| | *Acacia longifolia* | - | - | - | - | - |
| | *Polyscias sambucifolia* | - | - | - | - | - |

| | | | | | | |
|---|---|---|---|---|---|---|
| | *Goodenia ovata* | - | - | - | - | - |
| | *Leptospermum juniperinum* | - | - | - | - | - |
| | *Breynia oblongifolia* | - | - | - | - | - |
| | *Dodonaea triquetra* | - | - | - | - | - |
| | *Rapanea howittiana* | - | - | - | - | - |
| Herb | *Pratia purpurascens* | - | - | - | - | - |
| | *Commelina cyanea* | - | - | - | - | - |
| | *Viola hederacea* | - | - | - | - | - |
| | *Hydrocotyle peduncularis* | - | - | - | - | - |
| | *Viola betonicifolia* | - | - | - | - | - |
| | *Ranunculus inundatus* | - | - | - | - | - |
| | *Hydrocotyle laxiflora* | - | - | - | - | - |
| | *Lobelia alata* | - | - | - | - | - |
| | *Gonocarpus tetragynus* | - | - | - | - | - |
| | *Ranunculus lappaceus* | - | - | - | - | - |
| | *Pseuderanthemum variabile* | - | - | - | - | - |
| | *Vernonia cinerea var cinerea* | - | - | - | - | - |
| Grass | *Entolasia marginata* | - | - | - | - | - |
| | *Oplismenus imbecillis* | - | - | - | - | - |
| | *Imperata cylindrica var major* | - | - | - | - | - |
| | *Phragmites australis* | - | - | - | - | - |
| | *Entolasia stricta* | - | - | - | - | - |
| Graminoid | *Dianella caerulea* | - | - | - | - | - |
| | *Lomandra longifolia* | - | - | - | - | - |
| Ground fern | *Hypolepis muelleri* | - | - | - | - | - |
| | *Calochlaena dubia* | - | - | - | - | - |
| | *Pteridium esculentum* | - | - | - | - | - |
| Climber | *Parsonsia straminea* | - | - | - | - | - |
| | *Geitonoplesium cymosum* | - | - | - | - | - |
| | *Glycine clandestina* | - | - | - | - | - |
| | *Eustrephus latifolius* | - | - | - | - | - |
| | *Pandorea pandorana subsp. pandorana* | - | - | - | - | - |
| | *Billardiera scandens* | - | - | - | - | - |
| Sedge/ Rush | *Gahnia clarkei* | - | - | - | - | - |
| | *Juncus continuus* | - | - | - | - | - |
| | *Lepidosperma laterale* | - | - | - | - | - |

# Alluvial Floodplain *Blechnum* Forest — Unit E37c

## Swamp Mahogany – Paperbark Forest — REMS Unit 37

## General Description:

Alluvial Floodplain *Blechnum* Forest is a variant currently known from only one location within the Gosford LGA. In this sub-community, stunted *Eucalyptus robusta* occur over a waterlogged understorey with high levels of *Blechnum indicum* and *Baloskion tetraphyllum* subsp. *meiostachyum*. This vegetation type is a relatively common form of swamp forest occurring in sand dune swales on the North Coast, but in the Gosford area appears to be very unusual, and may occur at its southern limit of distribution.

## Known Floristic/ Structural Variations:

No variants have yet been recognised for this sub-community. A similar vegetation type is present within Cockle Bay NR, but apparently lacks the characteristic *Blechnum indicum*, and also supports *Banksia robur* (data from R. Payne).

## Distribution:

*Within Gosford LGA* – currently known only from one location on the Erina Creek floodplain, behind the Council works depot near Erina. A second location supporting similar vegetation apparently occurs in the Cockle Bay NR (R. Payne, pers. comm.).

*Within LHCC Region* – NPWS (2000) have mapped 4763ha of their Swamp Mahogany-Paperbark Swamp Forest (Unit 37) remaining in the region, which includes this community.

*Examples Within Gosford LGA*

- Immediately east of the Council works depot, Erina
- Cockle Bay NR

## Extent:

*Extant* - 0.66 ha

## Relationship to Other Communities:

At present, the characteristic dominance of *Baloskion tetraphyllum* and *Blechnum indicum* in this sub-community sufficiently distinguishes this type from other similar vegetation within the broader Unit E37 complex. Detailed survey work and analysis is required in this type to better understand floristic relationships.

## Equivalent Vegetation Types:

- Benson 1981 (Mangrove Creek): n/a
- Benson & Fallding 1981 (Brisbane Water) n/a
- Benson 1986 (Gosf-Lake Mac): Open-Forest (Unit 27a)
- Clarke & Benson 1986 (Dharug): n/a
- Strom 1986 (Bouddi Peninsula): n/a
- Clarke & Benson 1987 (Mt White/ Mt Olive): n/a
- McRae 1990 (Bouddi Peninsula): n/a
- Binns 1996 (SF MFD): n/a
- Payne 1997 (Cockle Bay/ Bouddi): n/a
- Bell 1998 (Popran NP): n/a
- Bell 2002 (Wyong LGA): Coastal Sand Mahogany – Paperbark Swamp Forest (Unit 10b, Norahville variant)
  (?) Alluvial Floodplain Shrub Swamp Forest (Unit 20)

## Significant Species:

- Undescribed species – *none recorded*
- Threatened (TSC Act) – *none recorded*
- Rare (ROTAP) – *none recorded*

## Community Conservation Status:

*Reserve Representation* - within Gosford, this vegetation type is not known in reservation.

*TSC Act (1995) Status* - not currently listed.

## Mapping Reliability & Included Units:

*High Resolution Area* – this vegetation type has been mapped from ground truthing at the only location known. Small, unmapped areas may be included in other swamp forest vegetation within the Unit E37 complex.

*Low Resolution Area* – no occurrence within the low resolution area expected.

## Vegetation Structure:

| Stratum | Mean height (m) | Min height (m) | Max height (m) | Mean cover (%) | Sdev | n |
|---|---|---|---|---|---|---|
| Emergent | | | | | | |
| Tallest | 10.00 | 10.00 | 10.00 | 50 | | 1 |
| Middle 1 | 4.00 | 4.00 | 4.00 | 10 | | 1 |
| Middle 2 | 2.00 | 2.00 | 2.00 | 80 | | 1 |
| Middle 3 | | | | | | |
| Lowest | 1.00 | 1.00 | 1.00 | 50 | | 1 |

## Key Diagnostic Species [based on 1 plot]:

| Life Form | Species | Community | | All others | | Fidelity |
|---|---|---|---|---|---|---|
| | | c/a | Freq. | c/a | Freq. | |
| Tree | *Eucalyptus robusta* | 1 | 100% | 3 | 8% | uninformative |
| Shrub | *Acacia floribunda* | 2 | 100% | 1 | 5% | positive |
| | *Banksia robur* | 2 | 100% | 3 | 1% | positive |
| | *Callistemon citrinus* | 2 | 100% | 1 | 4% | positive |
| | *Leptospermum arachnoides* | 1 | 100% | 2 | 3% | uninformative |
| | *Pultenaea daphnoides* | 1 | 100% | 1 | 7% | uninformative |
| Grass | *Hemarthria uncinata* | 5 | 100% | 2 | 1% | positive |
| | *Entolasia marginata* | 2 | 100% | 2 | 16% | positive |

| | | | | | | |
|---|---|---|---|---|---|---|
| | *Entolasia stricta* | 0 | 0% | 2 | 53% | negative |
| Graminoid | *Lomandra longifolia* | 0 | 0% | 2 | 45% | negative |
| Ground fern | *Pteridium esculentum* | 1 | 100% | 2 | 42% | negative |
| Climber | *Stephania japonica var discolor* | 1 | 100% | 1 | 17% | uninformative |
| Sedge/ Rush | *Baloskion tetraphyllum subsp. meiostachyum* | 5 | 100% | 2 | 3% | positive |

# Alluvial Floodplain Redgum Forest
## Swamp Mahogany – Paperbark Forest

# Unit E37d
## REMS Unit 37

## General Description:
Alluvial Floodplain Redgum Forest is a variant currently known from only one location within the Gosford LGA, on the Erina floodplain. In this sub-community, dominant canopy species include *Eucalyptus amplifolia, Eucalyptus saligna, Eucalyptus robusta*, and *Casuarina glauca. Melaleuca* species, particularly *Melaleuca biconvexa*, are prominent, above a sedgey understorey of *Gahnia clarkei*. No detailed site data has yet been collected for this sub-community, and hence relationships between it and other sub-communities cannot be determined. The occurrence of *Eucalyptus amplifolia*, however, in such a high rainfall area is of interest, and its co-occurrence with species such as *Eucalyptus saligna* perhaps suggest an ecotonal alliance between the swamp forests and the mountain gully moist forests.

## Known Floristic/ Structural Variations:
No variants have yet been recognised for this sub-community.

## Distribution:
*Within Gosford LGA* – currently known only from one location on the Erina Creek floodplain, mainly on the northern side of Erina Creek, but extending to near Narrawa Avenue.

*Within LHCC Region* – NPWS (2000) have mapped 4763ha of their Swamp Mahogany-Paperbark Swamp Forest (Unit 37) remaining in the region, which includes this community.

*Examples Within Gosford LGA*
- Opposite Narrawa Avenue, Erina
- Pomana Road, Empire Bay

## Extent:
*Extant* - 12.43 ha

## Relationship to Other Communities:
At present, the characteristic presence of *Eucalyptus amplifolia* with *Eucalyptus saligna, Eucalyptus robusta* and *Casuarina glauca* in this sub-community sufficiently distinguishes this type from other similar vegetation within the broader Unit E37 complex. Detailed survey work and analysis is required in this type to better understand floristic relationships.

## Equivalent Vegetation Types:

- Benson 1981 (Mangrove Creek): n/a
- Benson & Fallding 1981 (Brisbane Water) n/a
- Benson 1986 (Gosf-Lake Mac): Open-Forest (Unit 27a)
- Clarke & Benson 1986 (Dharug): n/a
- Strom 1986 (Bouddi Peninsula): Tall open forest (Unit 1.1)
- Clarke & Benson 1987 (Mt White/ Mt Olive): n/a
- McRae 1990 (Bouddi Peninsula): n/a
- Binns 1996 (SF MFD): n/a
- Payne 1997 (Cockle Bay/ Bouddi): n/a
- Bell 1998 (Popran NP): n/a
- Bell 2002 (Wyong LGA): (?) Alluvial Footslopes Redgum Forest (Unit 15)

## Significant Species:

- Undescribed species – *none recorded*
- Threatened (TSC Act) – *Melaleuca biconvexa*
- Rare (ROTAP) – *none recorded*

## Community Conservation Status:

*Reserve Representation* - within Gosford, this vegetation type is not known in reservation.

*TSC Act (1995) Status* - not currently listed.

## Mapping Reliability & Included Units:

*High Resolution Area* – this vegetation type has been mapped from ground truthing at the only location known. Small, unmapped areas may be included in other swamp forest vegetation within the Unit E37 complex.

*Low Resolution Area* – no occurrence within the low resolution area expected.

## Vegetation Structure:

No structural data is yet available for this community.

## Key Diagnostic Species [no plots available]:

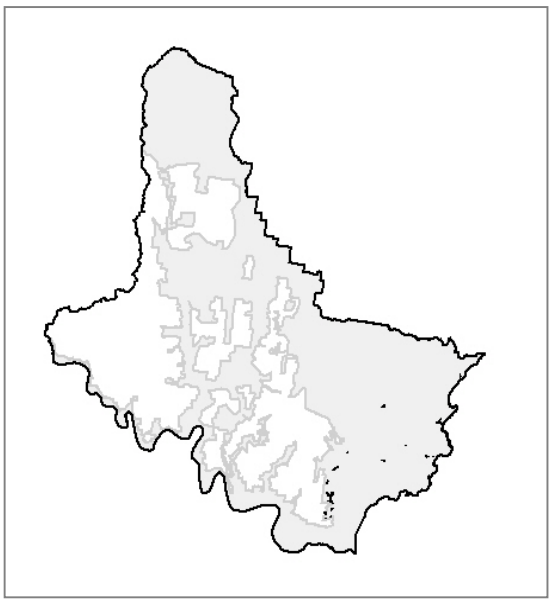
Diagnostic species have not been generated for this community due to a lack of suitable floristic data, and uncertainty between the composition of this and related communities. *Eucalyptus tereticornis, Eucalyptus amplifolia* and *Eucalyptus saligna* are characteristic in the canopy. The following species list is based on brief field observations at known sites.

| Life Form | Species | Community | | All others | | Fidelity |
|---|---|---|---|---|---|---|
| | | c/a | Freq. | c/a | Freq. | |
| Tree | *Eucalyptus amplifolia* | - | - | - | - | - |
| | *Eucalyptus tereticornis* | - | - | - | - | - |
| | *Eucalyptus saligna* | - | - | - | - | - |
| | *Casuarina glauca* | - | - | - | - | - |
| | *Eucalyptus robusta* | - | - | - | - | - |
| Small tree | *Melaleuca linariifolia* | - | - | - | - | - |
| | *Melaleuca styphelioides* | - | - | - | - | - |
| | *Melaleuca biconvexa* | - | - | - | - | - |
| | *Callistemon salignus* | - | - | - | - | - |
| Herb | *Commelina cyanea* | - | - | - | - | - |

| | | | | | | |
|---|---|---|---|---|---|---|
| | *Ranunculus inundatus* | - | - | - | - | - |
| | *Alternanthera denticulata* | - | - | - | - | - |
| | *Viola hederaceae* | - | - | - | - | - |
| Grass | *Oplismenus imbecillus* | - | - | - | - | - |
| Graminoid | *Lomandra longifolia* | - | - | - | - | - |
| Ground fern | *Hypolepis muelleri* | - | - | - | - | - |
| Climber | *Parsonsia straminea* | - | - | - | - | - |
| Sedge/ Rush | *Gahnia clarkei* | - | - | - | - | - |
| | *Carex appressa* | - | - | - | - | - |
| | *Juncus continuus* | - | - | - | - | - |

# Coastal Sand Swamp Forest
## Swamp Mahogany – Paperbark Forest

# Unit E37e
## REMS Unit 37



## General Description:
Coastal Sand Swamp Forest occurs in coastal areas on Quaternary Pleistocene Sand deposits, in poorly drained depressions. In most locations, Broad-leaved Paperbark (*Melaleuca quinquenervia*) dominates the tree layer, although Swamp Mahogany (*Eucalyptus robusta*) may be present in some fringing areas. Understorey components are generally wetland or mesic species such as *Gahnia clarkei, Phragmites australis*, *Baumea* spp, *Baloskion tetraphyllum* subsp. *meiostachyum* and *Omalanthus populifolius*, together with the ferns *Blechnum indicum, Blechnum camfieldii, Gleichenia spp.,* and *Cyclosorus interruptus*. NPWS (2000) identify this form in their profile for Swamp Mahogany – Paperbark Forest, although do not apply sub-community status.

## Known Floristic/ Structural Variations:
(a) Type variant (mapped as E37ei) – dense stands of *Melaleuca quinquenervia* comprise the type variant (generally greater than 90%), with an understorey dominated by *Gahnia clarkei* and other sedges and rushes.

(b) Cabbage Palm variant (mapped as E37eii) – it at least one location on the Umina Sandplain, Cabbage Palm (*Livistona australis*) is prominent in the canopy with *Melaleuca quinquenervia*.

## Distribution:
*Within Gosford LGA* – occurs on poorly drained sand sheets along the coast, in restricted locations.

*Within LHCC Region* – NPWS (2000) have included this vegetation type in their Swamp Mahogany-Paperbark Swamp Forest, of which they map 4763ha remaining in the region.

*Examples Within Gosford LGA*
- Umina Golf Course, Umina (variant a)
- Bareena Island, Avoca Lake (variant a)
- Ettalong Creek, Umina Beach (variant b)

## Extent:
*Extant* - 43.42 ha

## Relationship to Other Communities:

Coastal Sand Swamp Forest effectively lies along a drainage gradient at the moister end of the Coastal Sand Apple - Blackbutt Forest (Unit E33a). However, the characteristic presence of *Melaleuca quinquenervia* and (occasionally) *Eucalyptus robusta* in the canopy of this community, and the moister swamp and fern species in the understorey generally separates the two. Umina Sands Coastal Woodland (Unit E33b) may also be considered similar, but the presence of *Eucalyptus botryoides* and *Angophora floribunda* in the canopy of that type, and the absence of *Eucalyptus robusta*, separate the two.

## Equivalent Vegetation Types:

- Benson 1981 (Mangrove Creek): n/a
- Benson & Fallding 1981 (Brisbane Water) n/a
- Benson 1986 (Gosf-Lake Mac): (?) Open-Forest (Unit 27a)
- Clarke & Benson 1986 (Dharug): n/a
- Strom 1986 (Bouddi Peninsula): Woodland with Wetland (Unit 1.3.2)
- Clarke & Benson 1987 (Mt White/ Mt Olive): n/a
- McRae 1990 (Bouddi Peninsula): n/a
- Binns 1996 (SF MFD): n/a
- Payne 1997 (Cockle Bay/ Bouddi): n/a
- Bell 1998 (Popran NP): n/a
- Bell 2002 (Wyong LGA): Coastal Sand Mahogany-Paperbark Swamp Forest (Unit 10)

## Significant Species:

- Undescribed species – *none recorded*
- Threatened (TSC Act) – *Syzygium paniculatum*
- Rare (ROTAP) – *none recorded*

## Community Conservation Status:

*Reserve Representation* - within Gosford, no areas are known within conservation reserves.

*TSC Act (1995) Status* - May possibly be considered part of the *Sydney Coastal Estuary Swamp Forest Complex* EEC due to the very occasional presence of *Eucalyptus robusta*, although areas dominated by *Melaleuca quinquenervia* should be excluded. Insufficient data at present to confirm its inclusion in the EEC.

## Mapping Reliability & Included Units:

*High Resolution Area* – this vegetation type has been mapped from aerial photographic interpretation and ground truthing. Small areas of Coastal Sand Blackbutt-Apple Forest (Unit E33a) or Umina Sands Coastal Woodland (Unit E33b) may be included in the mapping.

*Low Resolution Area* – no occurrence within the low resolution area expected.

## Vegetation Structure:

| Stratum | Mean height (m) | Min height (m) | Max height (m) | Mean cover (%) | Sdev | n |
|---|---|---|---|---|---|---|
| Emergent | | | | | | |
| Tallest | 13.00 | 10.00 | 15.00 | 77 | 15.3 | 3 |
| Middle 1 | 4.25 | 2.00 | 8.00 | 58 | 46.5 | 3 |
| Middle 2 | 1.67 | 1.00 | 2.00 | 75 | 21.2 | 2 |
| Middle 3 | | | | | | |
| Lowest | 1.03 | 0.10 | 2.00 | 24 | 31.8 | 3 |

## Key Diagnostic Species [based on 3 plots]:

| Life Form | Species | Community | | All others | | Fidelity |
|---|---|---|---|---|---|---|
| | | c/a | Freq. | c/a | Freq. | |
| Tree | *Melaleuca quinquenervia* | 6 | 100% | 1 | 2% | positive |
| | *Acmena smithii* | 1 | 67% | 2 | 14% | uninformative |
| Small tree | *Glochidion ferdinandii* | 2 | 100% | 2 | 28% | positive |
| | *Synoum glandulosum subsp. glandulosum* | 6 | 67% | 1 | 12% | positive |
| | *Alphitonia excelsa* | 3 | 67% | 1 | 9% | positive |
| | *Myoporum acuminatum* | 2 | 33% | 0 | 0% | unique |
| | *Cupaniopsis anacardioides* | 1 | 67% | 2 | 2% | uninformative |
| | *Callistemon salignus* | 2 | 33% | 2 | 3% | uninformative |
| | *Endiandra sieberi* | 1 | 33% | 1 | 0% | uninformative |
| | ***Syzygium paniculatum* [TSC Vulnerable]** | **1** | **33%** | **3** | **1%** | **uninformative** |
| Shrub | *Acacia longifolia* | 6 | 67% | 1 | 11% | positive |
| | *Melaleuca nodosa* | 3 | 67% | 5 | 2% | positive |
| | *Pittosporum undulatum* | 3 | 67% | 1 | 14% | positive |
| | *Notelaea longifolia* | 3 | 67% | 1 | 16% | positive |
| | *Elaeocarpus reticulatus* | 2 | 67% | 1 | 9% | positive |
| | *Pittosporum revolutum* | 2 | 67% | 1 | 12% | positive |
| | *Rapanea variabilis* | 2 | 67% | 1 | 15% | positive |
| | *Cordyline stricta* | 1 | 33% | 0 | 0% | unique |
| | *Breynia oblongifolia* | 1 | 67% | 1 | 32% | uninformative |
| | *Dodonaea triquetra* | 2 | 33% | 1 | 17% | uninformative |
| | *Banksia integrifolia subsp. integrifolia* | 1 | 33% | 1 | 7% | uninformative |
| | *Crinum pedunculatum* | 1 | 33% | 1 | 0% | uninformative |
| | *Rapanea howittiana* | 1 | 33% | 1 | 1% | uninformative |
| Herb | *Viola hederacea* | 2 | 67% | 2 | 13% | positive |
| | *Pratia purpurascens* | 1 | 67% | 2 | 21% | uninformative |
| Grass | *Themeda australis* | 2 | 33% | 2 | 24% | uninformative |
| | *Entolasia stricta* | 1 | 33% | 2 | 53% | negative |
| | *Entolasia marginata* | 1 | 33% | 2 | 16% | uninformative |
| | *Oplismenus aemulus* | 1 | 33% | 2 | 5% | uninformative |
| Graminoid | *Lomandra longifolia* | 2 | 100% | 2 | 44% | constant |
| | *Dianella caerulea* | 1 | 100% | 1 | 50% | uninformative |
| Ground fern | *Adiantum aethiopicum* | 2 | 33% | 2 | 12% | uninformative |
| | *Pteridium esculentum* | 0 | 0% | 2 | 43% | negative |
| Climber | *Geitonoplesium cymosum* | 2 | 100% | 1 | 23% | positive |
| | *Smilax glyciphylla* | 5 | 67% | 1 | 19% | positive |
| | *Parsonsia straminea* | 3 | 67% | 1 | 19% | positive |
| | *Trophis scandens subsp. scandens* | 1 | 67% | 1 | 1% | uninformative |
| | *Cayratia clematidea* | 3 | 33% | 1 | 6% | uninformative |
| | *Kennedia rubicunda* | 2 | 33% | 1 | 11% | uninformative |
| | *Pandorea pandorana subsp. pandorana* | 2 | 33% | 1 | 24% | uninformative |
| | *Smilax australis* | 2 | 33% | 1 | 22% | uninformative |
| | *Cissus antarctica* | 1 | 33% | 1 | 10% | uninformative |
| | *Dioscorea transversa* | 1 | 33% | 1 | 11% | uninformative |
| | *Empodisma minus* | 1 | 33% | 2 | 5% | uninformative |
| | *Eustrephus latifolius* | 1 | 33% | 1 | 25% | uninformative |
| | *Glycine clandestina* | 1 | 33% | 2 | 22% | uninformative |
| | *Morinka jasminoides* | 1 | 33% | 1 | 15% | uninformative |
| Sedge/ Rush | *Gahnia clarkei* | 3 | 100% | 2 | 11% | positive |
| | *Gahnia melanocarpa* | 3 | 33% | 1 | 5% | uninformative |
| | *Lepidosperma longitudinale* | 1 | 33% | 1 | 1% | uninformative |
| | *Schoenus brevifolius* | 1 | 33% | 2 | 4% | uninformative |

# Estuarine Swamp Oak Forest
## Swamp Oak – Rushland Forest

# Unit E40
## REMS Unit 40

## General Description:
Estuarine Swamp Oak Forest occurs adjacent to tidal estuaries in slightly higher ground than the nearby mangrove-related vegetation types. Swamp Oak (*Casuarina glauca*) clearly dominates this community, with an understorey of sedges and rushes such as *Juncus kraussii* subsp. *australiensis* and *Baumea juncea*, and the herb *Apium prostratum*.

## Known Floristic/ Structural Variations:
(a) Type variant (mapped as E40i) – monospecific stands of Swamp Oak over *Baumea juncea* and *Juncus kraussii* subsp. *australiensis* forms the typical variant.

(b) Rainforest ecotone variant (mapped as E40ii) – at the interface between saline and freshwater influences, an ecotonal zone exists where an overstorey of *Casuarina glauca* occurs over an understorey of sedges and rainforest species, such as *Glochidion ferdinandi, Ficus coronata, Livistona australis* etc. These areas can be quite distinct.

## Distribution:
*Within Gosford LGA* – generally occurs locally around coastal estuaries, but is also present in back swamps associated with major tributaries of the Hawkesbury River system.

*Within LHCC Region* – NPWS (2000) have mapped 2449ha of their Swamp Oak-Rushland Forest (Unit 40) remaining in the region.

*Examples Within Gosford LGA*
- Upper reaches of Avoca Lake (variant b)
- Floodplain of Erina Creek, south of Wells Road (variant c)

## Extent:
*Extant* - 355.44 ha

## Relationship to Other Communities:
The clear dominance of *Casuarina glauca* separates this community from all others, although in some locations, understorey components are shared with Mangrove and Saltmarsh communities (Units E47 & E47a).

## Equivalent Vegetation Types:

- Benson 1981 (Mangrove Creek): n/a
- Benson & Fallding 1981 (Brisbane Water) Reedland/ Rushland with *Casuarina glauca* (Unit 11)
- Benson 1986 (Gosf-Lake Mac): Low Open-Forest (Unit 4a)
- Clarke & Benson 1986 (Dharug): Forest – She-oak Swamp (Unit A3)
- Strom 1986 (Bouddi Peninsula): Woodland with Reedland/ Rushland (Unit 1.3.1)
- Clarke & Benson 1987 (Mt White/ Mt Olive): She-oak Swamp Forest (Unit A3)
- McRae 1990 (Bouddi Peninsula): n/a
- Binns 1996 (SF MFD): n/a
- Payne 1997 (Cockle Bay/ Bouddi): n/a
- Bell 1998 (Popran NP): Estuarine Swamp Oak Forest (Unit SF1)
- Bell 2002 (Wyong LGA): Estuarine Swamp Oak Forest (Unit 3)

## Significant Species:

- Undescribed species – *none recorded*
- Threatened (TSC Act) – *none recorded*
- Rare (ROTAP) – *none recorded*

## Community Conservation Status:

*Reserve Representation* - within Gosford, small areas of this vegetation type are present in Cockle Bay NR, together with several of the island reserves in Brisbane Water.

*TSC Act (1995) Status* - not currently listed.

## Mapping Reliability & Included Units:

*High Resolution Area* – this vegetation type has been mapped through aerial photographic interpretation and ground truthing.

*Low Resolution Area* – as modelled by LHCCREMS, with some limited ground truthing.

## Vegetation Structure:

| Stratum | Mean height (m) | Min height (m) | Max height (m) | Mean cover (%) | Sdev | n |
|---|---|---|---|---|---|---|
| Emergent | | | | | | |
| Tallest | 12.13 | 4.00 | 18.00 | 41 | 21.4 | 4 |
| Middle 1 | 6.50 | 5.00 | 8.00 | 80 | | 1 |
| Middle 2 | 0.55 | 0.10 | 1.00 | 90 | | 1 |
| Middle 3 | | | | | | |
| Lowest | 0.85 | 0.10 | 2.00 | 69 | 22.9 | 4 |

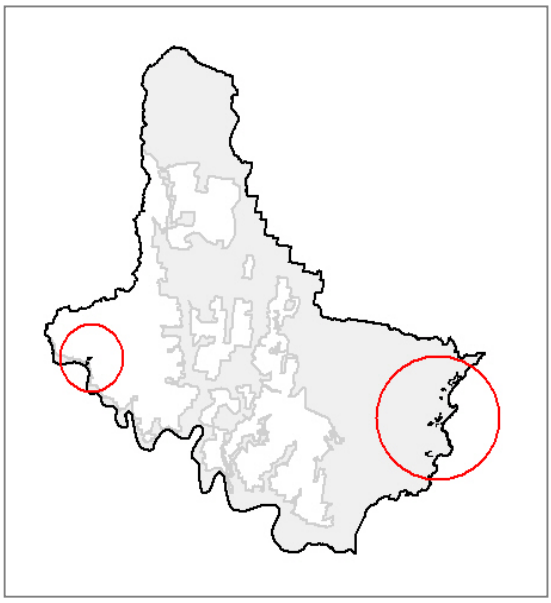
## Key Diagnostic Species [based on 7 plots]:

| Life Form | Species | Community | | All others | | Fidelity |
|---|---|---|---|---|---|---|
| | | c/a | Freq. | c/a | Freq. | |
| Tree | *Casuarina glauca* | 4 | 100% | 2 | 4% | positive |
| | *Melaleuca quinquenervia* | 5 | 14% | 2 | 3% | uninformative |
| Small tree | *Melaleuca styphelioides* | 1 | 43% | 2 | 3% | uninformative |
| | *Melaleuca linariifolia* | 2 | 29% | 2 | 6% | uninformative |
| Shrub | *Melaleuca ericifolia* | 2 | 43% | 2 | 3% | positive |
| | *Avicennia marina subsp. australasica* | 2 | 14% | 4 | 1% | uninformative |
| | *Acacia longifolia* | 1 | 14% | 2 | 12% | uninformative |
| | *Aegiceras corniculatum* | 1 | 14% | 3 | 0% | uninformative |
| | *Duboisia myoporoides* | 1 | 14% | 1 | 6% | uninformative |

| | | | | | | |
|---|---|---|---|---|---|---|
| | *Leptospermum polygalifolium* | 1 | 14% | 2 | 24% | uninformative |
| | *Goodenia ovata* | 1 | 43% | 1 | 3% | uninformative |
| Herb | *Apium prostratum var prostratum* | 2 | 43% | 2 | 0% | positive |
| | *Lobelia alata* | 2 | 57% | 1 | 1% | positive |
| | *Mimulus repens* | 3 | 29% | 0 | 0% | unique |
| | *Eclipta platyglossa* | 2 | 29% | 0 | 0% | unique |
| | *Leptinella longipes* | 2 | 29% | 0 | 0% | unique |
| | *Triglochin striatum* | 2 | 29% | 0 | 0% | unique |
| | *Epaltes australis* | 2 | 14% | 0 | 0% | unique |
| | *Gratiola pedunculata* | 2 | 14% | 0 | 0% | unique |
| | *Mitrasacme paludosa* | 2 | 14% | 0 | 0% | unique |
| | *Pratia pedunculata* | 2 | 14% | 0 | 0% | unique |
| | *Atriplex australasica* | 1 | 14% | 0 | 0% | unique |
| | *Bacopa monnieri* | 1 | 14% | 0 | 0% | unique |
| | *Samolus repens* | 1 | 57% | 3 | 1% | uninformative |
| | *Alternanthera denticulata* | 1 | 29% | 2 | 0% | uninformative |
| | *Sarcocornia quinqueflora subsp. quinqueflora* | 4 | 14% | 5 | 1% | uninformative |
| | *Viola hederacea* | 2 | 14% | 2 | 13% | uninformative |
| | *Commelina cyanea* | 1 | 14% | 1 | 7% | uninformative |
| | *Cotula australis* | 1 | 14% | 2 | 0% | uninformative |
| | *Senecio linearifolius* | 1 | 14% | 2 | 1% | uninformative |
| | *Suaeda australis* | 1 | 14% | 2 | 0% | uninformative |
| Grass | *Phragmites australis* | 4 | 86% | 2 | 1% | positive |
| | *Typha orientalis* | 1 | 29% | 0 | 0% | unique |
| | *Sporobolus virginicus* | 4 | 29% | 5 | 0% | uninformative |
| | *Sacciolepis indica* | 2 | 29% | 2 | 0% | uninformative |
| | *Tetrarrhena juncea* | 2 | 14% | 2 | 3% | uninformative |
| | *Zoysia macrantha* | 2 | 14% | 2 | 0% | uninformative |
| | *Hemarthria uncinata* | 2 | 14% | 2 | 1% | uninformative |
| | *Entolasia marginata* | 1 | 14% | 2 | 17% | uninformative |
| | *Oplismenus imbecillis* | 1 | 14% | 2 | 17% | uninformative |
| | *Entolasia stricta* | 0 | 0% | 2 | 54% | negative |
| Graminoid | *Lomandra longifolia* | 0 | 0% | 2 | 45% | negative |
| Ground fern | *Hypolepis muelleri* | 2 | 14% | 2 | 7% | uninformative |
| | *Blechnum nudum* | 1 | 14% | 2 | 3% | uninformative |
| | *Calochlaena dubia* | 1 | 14% | 3 | 18% | uninformative |
| | *Pteridium esculentum* | 0 | 0% | 2 | 43% | negative |
| Epiphtyic fern | *Platycerium bifurcatum* | 1 | 14% | 1 | 1% | uninformative |
| Epiphytic orchid | *Dendrobium teretifolium* | 1 | 14% | 0 | 0% | unique |
| Climber | *Parsonsia straminea* | 1 | 57% | 1 | 19% | uninformative |
| Sedge/ Rush | *Baumea juncea* | 5 | 71% | 2 | 3% | positive |
| | *Juncus kraussii subsp. australiensis* | 5 | 57% | 2 | 0% | positive |
| | *Eleocharis equisetina* | 2 | 14% | 0 | 0% | unique |
| | *Cladium procerum* | 1 | 14% | 0 | 0% | unique |
| | *Fimbristylis ferruginea* | 1 | 14% | 0 | 0% | unique |
| | *Carex appressa* | 3 | 29% | 2 | 4% | uninformative |
| | *Isolepis nodosa* | 2 | 29% | 2 | 1% | uninformative |
| | *Isolepis inundata* | 2 | 14% | 1 | 1% | uninformative |
| | *Juncus continuus* | 2 | 14% | 1 | 1% | uninformative |
| | *Juncus planifolius* | 2 | 14% | 1 | 0% | uninformative |
| | *Carex fascicularis* | 1 | 14% | 1 | 1% | uninformative |
| | *Gahnia clarkei* | 1 | 14% | 2 | 11% | uninformative |
| | *Juncus usitatus* | 1 | 14% | 1 | 0% | uninformative |

# *Phragmites* Rushland
## *Phragmites* Rushland

# Unit E40a
## REMS Unit 40a



## General Description:
*Phragmites* Rushland occurs in a few localities within Gosford, generally in man-made dams and drainage lines in swampy environments. *Phragmites australis* clearly dominates these areas, where it has generally invaded following human disturbance of swampy areas.

## Known Floristic/ Structural Variations:
No floristic or structural variations are known for this community.

## Distribution:
*Within Gosford LGA* – sporadic in the eastern parts of the City around coastal estuaries and floodplains, in fresh or brackish water. Also in the west associated with the Hawkesbury River floodplains.

*Within LHCC Region* – NPWS (2000) mapped 981ha of their *Phragmites* Rushland remaining in the region.

*Examples Within Gosford LGA*
- Lisarow wetland

## Extent:
*Extant* - 38.53 ha

## Relationship to Other Communities:
The monotypic stands of *Phragmites australis* clearly separate this community from other similar types. Floristically, Freshwater *Typha* Wetland (Unit E46a) is dominated by *Typha orientalis*; Estuarine *Baumea* Sedgeland (E40b) by *Baumea juncea*; and Umina *Lepironia* Sedgeland (Unit E45) by *Lepironia articulata*.

## Equivalent Vegetation Types:
- Benson 1981 (Mangrove Creek): n/a
- Benson & Fallding 1981 (Brisbane Water) Reedland/ Rushland with *Casuarina glauca* (Unit 11)
- Benson 1986 (Gosf-Lake Mac): Sedgeland (Unit 27a)
- Clarke & Benson 1986 (Dharug): n/a

- Strom 1986 (Bouddi Peninsula): Woodland with Reedland/ Rushland (Unit 1.3.1) & Grassland (Unit 4.9)
- Clarke & Benson 1987 (Mt White/ Mt Olive): n/a
- McRae 1990 (Bouddi Peninsula): n/a
- Binns 1996 (SF MFD): n/a
- Payne 1997 (Cockle Bay/ Bouddi): n/a
- Bell 1998 (Popran NP): n/a
- Bell 2002 (Wyong LGA) n/a

## Significant Species:

- Undescribed species – *none recorded*
- Threatened (TSC Act) – *none recorded*
- Rare (ROTAP) – *none recorded*

## Community Conservation Status:

*Reserve Representation* - within Gosford, this vegetation type is not mapped within reserve, but it could be expected to occur in small amounts in some of the coastal estuary and floodplain reserves.

*TSC Act (1995) Status* - not currently listed.

## Mapping Reliability & Included Units:

*High Resolution Area* – this vegetation type has been mapped from ground truthing where known.

*Low Resolution Area* – this vegetation type has been modelled by REMS for the low resolution area.

## Vegetation Structure:

No structural data is yet available for this community, but it typically consists of a dense shrub layer up to 1.8m high.

## Key Diagnostic Species [no plots available]:

Diagnostic species have not been generated for this community due to a lack of suitable floristic data, and uncertainty between the composition of this and related communities. *Phragmites australis* is characteristic. The following species list is based on field observations at known sites.

| Life Form | Species | Community | | All others | | Fidelity |
|---|---|---|---|---|---|---|
| | | c/a | Freq. | c/a | Freq. | |
| Grass | *Phragmites australis* | - | - | - | - | |

# Estuarine *Baumea* Sedgeland
## Swamp Oak – Rushland Forest

# Unit E40b
## REMS Unit 40

## General Description:
Estuarine *Baumea* Sedgeland occurs only in a few localities within Gosford, generally in alluvial mud soils in close proximity to coastal estuaries. *Baumea juncea* clearly dominates these areas.

## Known Floristic/ Structural Variations:
No floristic or structural variations are known for this community, although it is possible that variations in the height and density of sedges may occur.

## Distribution:
*Within Gosford LGA* – sporadic in the eastern parts of the City around coastal estuaries.

*Within LHCC Region* – NPWS (2000) did not map an equivalent vegetation type, although it is most likely included in their Swamp Oak – Rushland Forest (Unit 40), of which 2449ha remains in the region.

*Examples Within Gosford LGA*
- Coastal estuaries around Brisbane Water
- Avoca Lake, North Avoca
- Cockrone Lagoon

## Extent:
*Extant* - 13.18 ha, although additional areas are possible

## Relationship to Other Communities:
This vegetation type is structurally distinct from most other vegetation types within Gosford, although the floristic composition of the dominant species do overlap with other Estuarine communities. The almost monotypic stands of *Baumea juncea* clearly separate it from other types. Areas of the related Estuarine Swamp Oak Forest (Unit E40), which have been modified through felling of *Casuarina glauca* trees, are floristically very similar.

## Equivalent Vegetation Types:
- Benson 1981 (Mangrove Creek): n/a

- Benson & Fallding 1981 (Brisbane Water) — Reedland/ Rushland with *Casuarina glauca* (Unit 11)
- Benson 1986 (Gosf-Lake Mac): — (?) Rushland (Unit 4a)
- Clarke & Benson 1986 (Dharug): — n/a
- Strom 1986 (Bouddi Peninsula): — n/a
- Clarke & Benson 1987 (Mt White/ Mt Olive): — n/a
- McRae 1990 (Bouddi Peninsula): — n/a
- Binns 1996 (SF MFD): — n/a
- Payne 1997 (Cockle Bay/ Bouddi): — n/a
- Bell 1998 (Popran NP): — n/a
- Bell 2002 (Wyong LGA) — Estuarine *Baumea* Sedgeland (Unit 1)

## Significant Species:

- Undescribed species – *none recorded*
- Threatened (TSC Act) – *none recorded*
- Rare (ROTAP) – *none recorded*

## Community Conservation Status:

*Reserve Representation* - within Gosford, this vegetation type is likely to be represented in some of the coastal estuary reserves, such as Cockle Bay NR.

*TSC Act (1995) Status* - not currently listed.

## Mapping Reliability & Included Units:

*High Resolution Area* – this vegetation type has been mapped from aerial photographic interpretation and ground truthing. Additional small areas are likely within other estuarine units.

*Low Resolution Area* – this vegetation type has not been mapped or modelled by LHCCREMS.

## Vegetation Structure:

| Stratum | Mean height (m) | Min height (m) | Max height (m) | Mean cover (%) | Sdev | n |
|---|---|---|---|---|---|---|
| Emergent | | | | | | |
| Tallest | | | | | | |
| Middle 1 | | | | | | |
| Middle 2 | | | | | | |
| Middle 3 | | | | | | |
| Lowest | 1.00 | 1.00 | 1.00 | 70 | | 1 |

## Key Diagnostic Species [based on 1 plot]:

| Life Form | Species | Community | | All others | | Fidelity |
|---|---|---|---|---|---|---|
| | | c/a | Freq. | c/a | Freq. | |
| Tree | *Casuarina glauca* | 1 | 100% | 3 | 5% | uninformative |
| | *Melaleuca quinquenervia* | 1 | 100% | 3 | 3% | uninformative |
| Shrub | *Melaleuca ericifolia* | 1 | 100% | 2 | 3% | uninformative |
| Herb | *Apium prostratum var prostratum* | 2 | 100% | 2 | 1% | positive |
| | *Selliera radicans* | 2 | 100% | 1 | 0% | positive |
| | *Samolus repens* | 1 | 100% | 2 | 2% | uninformative |
| Grass | *Entolasia stricta* | 0 | 0% | 2 | 53% | negative |
| Graminoid | *Lomandra longifolia* | 0 | 0% | 2 | 45% | negative |
| Ground fern | *Pteridium esculentum* | 0 | 0% | 2 | 43% | negative |
| Sedge/ Rush | *Baumea juncea* | 6 | 100% | 3 | 4% | positive |
| | *Baumea articulata* | 2 | 100% | 1 | 1% | positive |

| | | | | | |
|---|---|---|---|---|---|
| *Juncus kraussii subsp. australiensis* | 1 | 100% | 2 | 1% | uninformative |
| *Schoenus brevifolius* | 1 | 100% | 2 | 4% | uninformative |

# Estuarine *Juncus* Rushland
## Swamp Oak – Rushland Forest

# Unit E40c
## REMS Unit 40

## General Description:
Estuarine *Juncus* Rushland occurs principally in estuarine environments along Hawkesbury River and Mangrove Creek, generally on peaty alluvial soils. *Juncus kraussii subsp. australiensis* clearly dominates these areas, and other species present may include *Casuarina glauca, Avicennia marina* or *Baumea juncea* from adjoining communities.

## Known Floristic/ Structural Variations:
No floristic or structural variations are known for this community, although it is possible that variations in the height and density of *Juncus* may occur.

## Distribution:
*Within Gosford LGA* – restricted to alluvial mud flats along the Mangrove Creek and Hawkesbury River estuaries.

*Within LHCC Region* – NPWS (2000) did not map an equivalent vegetation type, although it is most likely included in their Swamp Oak – Rushland Forest (Unit 40), of which 2449ha remains in the region.

*Examples Within Gosford LGA*
- Spencer
- Lower Mangrove

## Extent:
*Extant* - 204.35 ha, although additional areas are possible

## Relationship to Other Communities:
This vegetation type is floristically distinct from most other vegetation types within Gosford. The almost monotypic stands of *Juncus kraussii* subsp*. australiensis* clearly separate it from other types. Areas of the related Estuarine Swamp Oak Forest (Unit E40) which have been modified through felling of *Casuarina glauca* trees may be similar, although in these cases *Baumea juncea* tends to dominate.

## Equivalent Vegetation Types:
- Benson 1981 (Mangrove Creek): n/a

- Benson & Fallding 1981 (Brisbane Water) — Reedland/ Rushland with *Casuarina glauca* (Unit 11)
- Benson 1986 (Gosf-Lake Mac): — (?) Rushland (Unit 4a)
- Clarke & Benson 1986 (Dharug): — Herbland/ Sedgeland (Unit A2)
- Strom 1986 (Bouddi Peninsula): — n/a
- Clarke & Benson 1987 (Mt White/ Mt Olive): — n/a
- McRae 1990 (Bouddi Peninsula): — n/a
- Binns 1996 (SF MFD): — n/a
- Payne 1997 (Cockle Bay/ Bouddi): — n/a
- Bell 1998 (Popran NP): — n/a
- Bell 2002 (Wyong LGA) — n/a

## Significant Species:

- Undescribed species – *none recorded*
- Threatened (TSC Act) – *none recorded*
- Rare (ROTAP) – *none recorded*

## Community Conservation Status:

*Reserve Representation* - within Gosford, small amounts of this vegetation type are likely to be present in Dharug NP.

*TSC Act (1995) Status* - not currently listed.

## Mapping Reliability & Included Units:

*High Resolution Area* – this vegetation type has been mapped from aerial photographic interpretation and ground truthing. Additional small areas are likely within other estuarine units.

*Low Resolution Area* – this vegetation type has not been mapped or modelled by LHCCREMS.

## Vegetation Structure:

| Stratum | Mean height (m) | Min height (m) | Max height (m) | Mean cover (%) | Sdev | n |
|---|---|---|---|---|---|---|
| Emergent | | | | | | |
| Tallest | | | | | | |
| Middle 1 | | | | | | |
| Middle 2 | | | | | | |
| Middle 3 | | | | | | |
| Lowest | 1.00 | 1.00 | 1.00 | 100 | | 1 |

## Key Diagnostic Species [based on 1 plot]:

| Life Form | Species | Community | | All others | | Fidelity |
|---|---|---|---|---|---|---|
| | | c/a | Freq. | c/a | Freq. | |
| Tree | *Casuarina glauca* | - | - | - | - | - |
| Shrub | *Avicennia marina subsp. australasica* | - | - | - | - | - |
| Sedge/ Rush | *Juncus kraussii subsp. australiensis* | - | - | - | - | |
| | *Baumea juncea* | - | - | - | - | - |

# Swamp Oak Sedge Forest
## Swamp Oak Sedge Forest

# Unit E41
## REMS Unit 41

## General Description:
Swamp Oak Sedge Forest is a community delineated by NPWS (2000) for parts of the western sections of the Gosford LGA, and includes those freshwater swamp forests dominated by *Casuarina glauca* and *Melaleuca linariifolia* in the canopy, and where *Phragmites australis* and/ or *Carex inversa* is prominent in the understorey. *Eucalyptus robusta* and *Eucalyptus tereticornis* may occasionally be present, but never in abundance. It is probable that sites supporting dominant stands of *Carex appressa* are a response to past disturbance, and may also indicate that entire stands of Swamp Oak are regrowth vegetation types.

## Known Floristic/ Structural Variations:
No floristic or structural variations are known for this community.

## Distribution:
*Within Gosford LGA* – sporadic in the western parts of the LGA around the Hawkesbury River estuaries.

*Within LHCC Region* – NPWS (2000) have mapped 596ha of their Swamp Oak Sedge Forest (Unit 41) remaining in the region.

*Examples Within Gosford LGA*
- Backswamps along the Hawkesbury River

## Extent:
*Extant* - 27.53 ha

## Relationship to Other Communities:
This vegetation type is most similar to the Estuarine Swamp Oak Forest (Unit E40), through the shared dominance of *Casuarina glauca*. However, Unit E40 occurs close to estuaries and consequently supports salt-tolerant species such as *Baumea juncea* and *Juncus kraussii*. Unit E41 occurs in association with freshwater estuaries, where *Carex appressa* is important, and other salt-tolerant species are absent.

## Equivalent Vegetation Types:
- Benson 1981 (Mangrove Creek): n/a

- Benson & Fallding 1981 (Brisbane Water) — Reedland/ Rushland with *Casuarina glauca* (Unit 11)
- Benson 1986 (Gosf-Lake Mac): — (?) Low Open-Forest (Unit 4a)
- Clarke & Benson 1986 (Dharug): — n/a
- Strom 1986 (Bouddi Peninsula): — n/a
- Clarke & Benson 1987 (Mt White/ Mt Olive): — n/a
- McRae 1990 (Bouddi Peninsula): — n/a
- Binns 1996 (SF MFD): — n/a
- Payne 1997 (Cockle Bay/ Bouddi): — n/a
- Bell 1998 (Popran NP): — n/a
- Bell 2002 (Wyong LGA) — Estuarine Swamp Oak Forest (Unit 3)

## Significant Species:

- Undescribed species – *none recorded*
- Threatened (TSC Act) – *none recorded*
- Rare (ROTAP) – *none recorded*

## Community Conservation Status:

*Reserve Representation* - within Gosford, this vegetation type is not represented in reserve.

*TSC Act (1995) Status* - not currently listed.

## Mapping Reliability & Included Units:

*High Resolution Area* – this vegetation type has not been mapped in the high resolution area.

*Low Resolution Area* – this vegetation type has modelled by NPWS (2000) for parts of the Hawkesbury River estuaries.

## Vegetation Structure:

No structural data is yet available for this community.

## Key Diagnostic Species [no plots available]:

Diagnostic species have not been generated for this community due to a lack of suitable floristic data, and uncertainty between the composition of this and related communities. As a guide, the following species list has been extracted from the regional REMS profiles (NPWS 2000), but it has not been possible to rationalise this list with communities delineated during the present study.

| Life Form | Species | Community | | All others | | Fidelity |
|---|---|---|---|---|---|---|
| | | c/a | Freq. | c/a | Freq. | |
| Tree | *Casuarina glauca* | - | - | - | - | - |
| | *Eucalyptus robusta* | - | - | - | - | - |
| | *Eucalyptus tereticornis* | - | - | - | - | - |
| Small tree | *Melaleuca linariifolia* | - | - | - | - | - |
| | *Melaleuca ericifolia* | - | - | - | - | - |
| | *Melaleuca nodosa* | - | - | - | - | - |
| | *Melaleuca styphelioides* | - | - | - | - | - |
| | *Melaleuca quinquenervia* | - | - | - | - | - |
| Herb | *Commelina cyanea* | - | - | - | - | - |
| | *Alternanthera denticulata* | - | - | - | - | - |
| | *Ranunculus inundatus* | - | - | - | - | - |
| | *Enydra fluctuans* | - | - | - | - | - |
| | *Persicaria lapathifolia* | - | - | - | - | - |
| | *Persicaria decipiens* | - | - | - | - | - |

| | | | | | | |
|---|---|---|---|---|---|---|
| | *Persicaria hydropiper* | - | - | - | - | - |
| Grass | *Entolasia marginata* | - | - | - | - | - |
| Ground fern | *Hypolepis muelleri* | - | - | - | - | - |
| Climber | *Parsonsia straminea* | - | - | - | - | - |
| Sedge/ Rush | *Carex appressa* | - | - | - | - | - |
| | *Gahnia clarkei* | - | - | - | - | - |
| | *Juncus usitatus* | - | - | - | - | - |

# Narrabeen Alluvial Sedge Woodland — Unit E42

## Riparian Melaleuca Swamp Woodland — REMS Unit 42

## General Description:

Within shallow drainage lines of the Narrabeen Sandstone lowlands, an open woodland or forest on alluvial soils occurs. This vegetation supports a high density of sedges and grasses (*Gahnia clarkei, Lepyrodia scariosa, Schoenus brevifolius, Lepidosperma quadrangulata, Chorizandra cymbaria*, and *Empodisma minus*), together with scattered and stunted trees of *Eucalyptus robusta, Eucalyptus resinifera* subsp. *resinifera, Angophora costata* and *Melaleuca linariifolia*. Variation in this community is dependant on soil depth and drainage, with structure including open woodland with sedgeland and swamp forest with a dense shrubby understorey. This community has strong affinities with the vegetation occupying similar environments in Wyong Shire, but in Gosford it is particularly uncommon.

## Known Floristic/ Structural Variations:

(a) Type variant (mapped as E42i) – canopy species are generally widely spaced, over a dense understorey of sedges and scattered thickets of *Callistemon citrinus* and *Banksia robur*.

(b) *Melaleuca* variant (mapped as E42ii) – in places, thickets of *Melaleuca linariifolia* occur, particularly along major soaks, often to the exclusion of all other canopy species. Understorey vegetation is normally limited to sedges around ponds and creeklines.

In places,. In other locations, tree species are widely scattered and sedgelands develop with dense thickets of

## Distribution:

*Within Gosford LGA* – occurs in a few restricted drainage lines in the Kincumber-Cockle Bay area.

*Within LHCC Region* – NPWS (2000) have mapped 2886ha of their Riparian Melaleuca Swamp Woodland (Unit 42) as remaining in the region.

*Examples Within Gosford LGA*

- Sewerage treatment works, Kincumber
- Off Empire Bay Drive, Bensville

## Extent:

*Extant* - 36.59 ha

## Relationship to Other Communities:

Narrabeen Alluvial Sedge Woodland can generally be differentiated from other swamp communities by vegetation structure and local topography. The wide expanses of sedges are also diagnostic. Most other swamp types, such as the alluvial floodplain swamp forests (Unit 37 and sub-communities), occur only on the larger floodplains, or in pockets of the larger valleys. These situations support deeper alluvial soils deposited by major creek systems.

## Equivalent Vegetation Types:

- Benson 1981 (Mangrove Creek): n/a
- Benson & Fallding 1981 (Brisbane Water) n/a
- Benson 1986 (Gosf-Lake Mac): n/a
- Clarke & Benson 1986 (Dharug): n/a
- Strom 1986 (Bouddi Peninsula): n/a
- Clarke & Benson 1987 (Mt White/ Mt Olive): n/a
- McRae 1990 (Bouddi Peninsula): n/a
- Binns 1996 (SF MFD): n/a
- Payne 1997 (Cockle Bay/ Bouddi): n/a
- Bell 1998 (Popran NP): n/a
- Bell 2002 (Wyong LGA): Narrabeen Alluvial Drainage Line Complex (Unit 26)

## Significant Species:

- Undescribed species – *none recorded*
- Threatened (TSC Act) – *none recorded*
- Rare (ROTAP) – *none recorded*

## Community Conservation Status:

*Reserve Representation* - within Gosford, this vegetation type is not known in reservation, although small amounts may be present in Cockle Bay NR.

*TSC Act (1995) Status* - included within the *Sydney Coastal Estuary Swamp Forest Complex* EEC.

## Mapping Reliability & Included Units:

*High Resolution Area* – this vegetation type has been mapped by aerial photographic interpretation and ground truthing.

*Low Resolution Area* – no occurrence within the low resolution area expected.

## Vegetation Structure:

| Stratum | Mean height (m) | Min height (m) | Max height (m) | Mean cover (%) | Sdev | n |
|---|---|---|---|---|---|---|
| Emergent | | | | | | |
| Tallest | 14.80 | 6.00 | 25.00 | 24 | 5.5 | 5 |
| Middle 1 | 6.90 | 4.00 | 12.00 | 16 | 11.1 | 5 |
| Middle 2 | 2.38 | 1.00 | 4.00 | 40 | 7.1 | 2 |
| Middle 3 | | | | | | |
| Lowest | 1.47 | 0.10 | 3.00 | 76 | 29.9 | 5 |

## Key Diagnostic Species [based on 5 plots]:

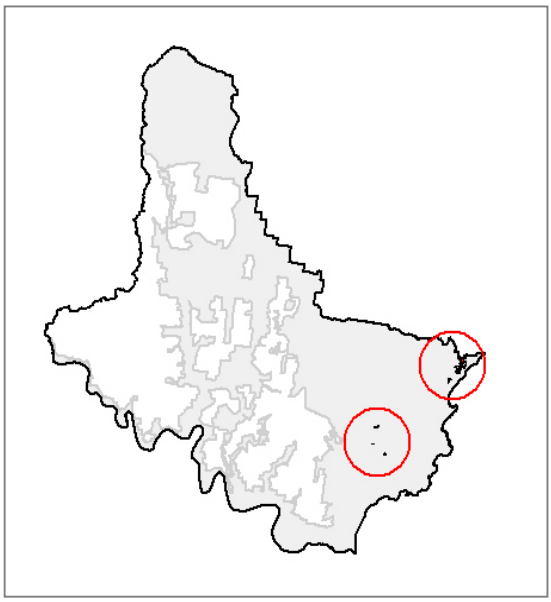
| Life Form | Species | Community | | All others | | Fidelity |
|---|---|---|---|---|---|---|
| | | c/a | Freq. | c/a | Freq. | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Tree | *Eucalyptus robusta* | 3 | 80% | 3 | 7% | positive |
| | *Angophora floribunda* | 2 | 40% | 2 | 18% | positive |
| | *Eucalyptus resinifera subsp. resinifera* | 3 | 20% | 2 | 2% | uninformative |
| | *Eucalyptus tereticornis* | 3 | 20% | 3 | 2% | uninformative |
| | *Angophora costata* | 1 | 20% | 2 | 31% | uninformative |
| Palm | *Livistona australis* | 1 | 20% | 1 | 15% | uninformative |
| Small tree | *Glochidion ferdinandii* | 2 | 100% | 2 | 28% | positive |
| | *Melaleuca linariifolia* | 3 | 80% | 2 | 6% | positive |
| | *Callistemon salignus* | 2 | 40% | 2 | 3% | positive |
| | *Allocasuarina littoralis* | 2 | 20% | 1 | 14% | uninformative |
| | *Acacia irrorata subsp. irrorata* | 1 | 20% | 1 | 2% | uninformative |
| Shrub | *Acacia longifolia* | 3 | 100% | 1 | 11% | positive |
| | *Leptospermum juniperinum* | 4 | 40% | 2 | 2% | positive |
| | *Callistemon citrinus* | 2 | 40% | 1 | 4% | positive |
| | *Melaleuca ericifolia* | 2 | 40% | 2 | 3% | positive |
| | *Pultenaea flexilis* | 2 | 40% | 1 | 11% | positive |
| | *Melaleuca thymifolia* | 2 | 20% | 0 | 0% | unique |
| | *Pultenaea daphnoides* | 1 | 60% | 1 | 7% | uninformative |
| | *Banksia spinulosa* | 1 | 40% | 2 | 16% | uninformative |
| | *Breynia oblongifolia* | 1 | 40% | 1 | 33% | uninformative |
| | *Elaeocarpus reticulatus* | 1 | 40% | 1 | 9% | uninformative |
| | *Epacris pulchella* | 1 | 40% | 2 | 14% | uninformative |
| | *Banksia robur* | 1 | 20% | 3 | 1% | uninformative |
| | *Exocarpos cupressiformis* | 1 | 20% | 1 | 5% | uninformative |
| | *Leptospermum arachnoides* | 1 | 20% | 2 | 3% | uninformative |
| | *Leptospermum polygalifolium* | 1 | 20% | 2 | 24% | uninformative |
| | *Maytenus silvestris* | 1 | 20% | 1 | 9% | uninformative |
| | *Persoonia levis* | 1 | 20% | 1 | 34% | uninformative |
| | *Pittosporum revolutum* | 1 | 20% | 1 | 12% | uninformative |
| | *Platysace linearifolia* | 1 | 20% | 2 | 33% | uninformative |
| | *Polyscias sambucifolia* | 1 | 20% | 1 | 18% | uninformative |
| | *Pultenaea blakelyi* | 1 | 20% | 2 | 0% | uninformative |
| | *Pultenaea paleacea* | 2 | 20% | 1 | 2% | uninformative |
| | *Pultenaea retusa* | 1 | 20% | 1 | 1% | uninformative |
| | *Pultenaea villosa* | 1 | 20% | 1 | 3% | uninformative |
| | *Viminaria juncea* | 2 | 20% | 1 | 1% | uninformative |
| | *Xanthorrhoea resinifera* | 1 | 20% | 1 | 8% | uninformative |
| Herb | *Commelina cyanea* | 3 | 40% | 1 | 7% | positive |
| | *Caesia parviflora* | 2 | 40% | 1 | 2% | positive |
| | *Gonocarpus micranthus* | 2 | 40% | 1 | 1% | positive |
| | *Gonocarpus tetragynus* | 2 | 40% | 2 | 5% | positive |
| | *Hydrocotyle peduncularis* | 2 | 40% | 2 | 3% | positive |
| | *Villarsia exaltata* | 3 | 40% | 0 | 0% | unique |
| | *Pratia purpurascens* | 2 | 20% | 2 | 21% | uninformative |
| | *Viola hederacea* | 2 | 20% | 2 | 13% | uninformative |
| | *Dampiera stricta* | 2 | 20% | 1 | 12% | uninformative |
| | *Goodenia heterophylla* | 2 | 20% | 1 | 6% | uninformative |
| | *Lobelia alata* | 2 | 20% | 1 | 2% | uninformative |
| | *Centella asiatica* | 1 | 20% | 2 | 1% | uninformative |
| | *Dampiera purpurea* | 1 | 20% | 1 | 2% | uninformative |
| | *Opercularia hispida* | 1 | 20% | 1 | 4% | uninformative |
| Grass | *Imperata cylindrica var major* | 2 | 60% | 2 | 29% | positive |
| | *Hemarthria uncinata* | 4 | 40% | 2 | 1% | positive |
| | *Themeda australis* | 3 | 40% | 2 | 24% | positive |
| | *Deyeuxia quadriseta* | 3 | 20% | 0 | 0% | unique |
| | *Paspalum distichum* | 4 | 20% | 0 | 0% | unique |
| | *Pseudoraphis paradoxa* | 2 | 20% | 0 | 0% | unique |
| | *Entolasia stricta* | 2 | 60% | 2 | 53% | constant |

| | | | | | | |
|---|---|---|---|---|---|---|
| | *Oplismenus imbecillis* | 2 | 20% | 2 | 17% | uninformative |
| | *Echinopogon ovatus* | 2 | 20% | 2 | 5% | uninformative |
| | *Entolasia marginata* | 1 | 20% | 2 | 17% | uninformative |
| | *Panicum simile* | 1 | 20% | 1 | 5% | uninformative |
| Graminoid | *Dianella caerulea* | 2 | 80% | 1 | 50% | positive |
| | *Lomandra longifolia* | 2 | 40% | 2 | 45% | constant |
| Ground fern | *Pteridium esculentum* | 3 | 60% | 2 | 42% | constant |
| | *Blechnum cartilagineum* | 1 | 20% | 2 | 16% | uninformative |
| | *Calochlaena dubia* | 1 | 20% | 3 | 18% | uninformative |
| | *Gleichenia dicarpa* | 1 | 20% | 3 | 7% | uninformative |
| | *Hypolepis muelleri* | 1 | 20% | 2 | 6% | uninformative |
| Ground orchid | *Cryptostylis subulata* | 1 | 20% | 1 | 2% | uninformative |
| Epiphytic orchid | *Cymbidium suave* | 1 | 40% | 1 | 5% | uninformative |
| Clubmoss | *Selaginella uliginosa* | 1 | 60% | 2 | 5% | uninformative |
| Climber | *Empodisma minus* | 2 | 60% | 2 | 5% | positive |
| | *Kennedia rubicunda* | 5 | 40% | 1 | 11% | positive |
| | *Cassytha glabella forma glabella* | 2 | 40% | 1 | 14% | positive |
| | *Pandorea pandorana subsp. pandorana* | 1 | 60% | 1 | 23% | uninformative |
| | *Cassytha pubescens* | 2 | 20% | 1 | 8% | uninformative |
| | *Glycine clandestina* | 2 | 20% | 2 | 23% | uninformative |
| | *Hibbertia dentata* | 2 | 20% | 1 | 10% | uninformative |
| | *Parsonsia straminea* | 2 | 20% | 1 | 20% | uninformative |
| | *Billardiera scandens* | 1 | 20% | 1 | 29% | uninformative |
| | *Eustrephus latifolius* | 1 | 20% | 1 | 25% | uninformative |
| | *Smilax glyciphylla* | 1 | 20% | 1 | 19% | uninformative |
| Sedge/ Rush | *Gahnia clarkei* | 4 | 80% | 2 | 10% | positive |
| | *Baloskion tetraphyllum subsp. meiostachyum* | 3 | 60% | 2 | 2% | positive |
| | *Lepidosperma quadrangulatum* | 5 | 40% | 2 | 0% | positive |
| | *Leptocarpus tenax* | 2 | 40% | 2 | 4% | positive |
| | *Schoenus villosus* | 1 | 20% | 0 | 0% | unique |
| | *Chorizandra sphaerocephala* | 4 | 20% | 3 | 0% | uninformative |
| | *Lepidosperma filiforme* | 2 | 20% | 2 | 2% | uninformative |
| | *Baumea juncea* | 2 | 20% | 3 | 4% | uninformative |
| | *Cyathochaeta diandra* | 1 | 20% | 2 | 21% | uninformative |
| | *Eurychorda complanata* | 1 | 20% | 3 | 0% | uninformative |
| | *Juncus continuus* | 1 | 20% | 2 | 1% | uninformative |
| | *Lepidosperma elatius* | 1 | 20% | 2 | 2% | uninformative |

# Estuarine Paperbark Scrub-Forest Unit E43a

## Wyong Paperbark Swamp Forest (*Melaleuca* Scrub) REMS Unit 43a



## General Description:

Estuarine Paperbark Scrub-Forest occurs at the upper reaches of estuarine swamp systems on alluvial claypans. It is characterised by dense thickets of paperbarks (*Melaleuca nodosa, Melaleuca stypheloides*) with stunted emergent eucalypts including *Eucalyptus paniculata* subsp. *paniculata* and *Eucalyptus resinifera*. Understorey vegetation is often limited, although clumps of *Gahnia clarkei* are typical. In places where freshwater tends to pool, *Eucalyptus robusta* may occur, although never in dominant amounts.

## Known Floristic/ Structural Variations:

(a) Type variant (mapped as E43ai) – dense thickets of paperbark with stunted emergent *Eucalyptus paniculata* subsp. *paniculata* and *Eucalyptus resinifera*, occasionally *Eucalyptus robusta*.

(b) *Casuarina* variant (mapped as E43aii) – in a few drainage lines at Forresters Beach, *Eucalyptus robusta* and *Casuarina glauca* become more prominent in the emergent overstorey layer, although still within the wider paperbark complex. *Casuarina glauca* is particularly abundant close to the creek feeding Wamberal Lagoon, and may be a response to past disturbance.

## Distribution:

*Within Gosford LGA* – this sub-community occurs in backswamp situations associated with estuaries such as Wamberal Lagoon, and parts of Brisbane Water.

*Within LHCC Region* – NPWS (2000) have mapped 1921ha of their Wyong Paperbark Swamp Forest (Unit 43) remaining in the region, which includes this community.

*Examples Within Gosford LGA*

- The entrance Road, Wamberal North (variant a)
- Lindens Flat, Green Point (variant a)
- Malinya road, Davistown (variant a)
- Malkana Avenue, Forresters Beach (variant b)

## Extent:

*Extant* - 70.47 ha

## Relationship to Other Communities:

Floristically, this vegetation type is most similar to the Coastal Headland Paperbark Scrub (Unit E51d), but the environments in which they both occur (coastal headland vs backswamp) sufficiently distinguishes the two. Both sub-communities support dense stands of *Melaleuca nodosa* and occasional emergent *Eucalyptus paniculata* subsp. *paniculata*, however Unit E51d is structurally stunted and includes a range of other more typical coastal headland species, such as *Themeda australis, Lasiopetalum parvifolium,* and *Lomandra longifolia*. The presence of sedge species, such as *Gahnia clarkei* and *Schoenus brevifolius*, in the Estuarine Paperbark Scrub-Forest also differentiate the two.

## Equivalent Vegetation Types:

- Benson 1981 (Mangrove Creek): n/a
- Benson & Fallding 1981 (Brisbane Water) n/a
- Benson 1986 (Gosf-Lake Mac): Closed-Forest & Scrub (Unit 8b)
- Clarke & Benson 1986 (Dharug): n/a
- Strom 1986 (Bouddi Peninsula): n/a
- Clarke & Benson 1987 (Mt White/ Mt Olive): n/a
- McRae 1990 (Bouddi Peninsula): n/a
- Binns 1996 (SF MFD): n/a
- Payne 1997 (Cockle Bay/ Bouddi): n/a
- Bell 1998 (Popran NP): n/a
- Bell 2002 (Wyong LGA): (?) Alluvial Woollybutt-Melaleuca Sedge Forest (Unit 19)

## Significant Species:

- Undescribed species – *none recorded*
- Threatened (TSC Act) – *none recorded*
- Rare (ROTAP) – *none recorded*

## Community Conservation Status:

*Reserve Representation* - within Gosford, this vegetation type is known from Wamberal Lagoon NR, where the majority of stands are found.

*TSC Act (1995) Status* - not currently listed (possibly included in *Sydney Coastal Estuary Swamp Forest Complex* EEC).

## Mapping Reliability & Included Units:

*High Resolution Area* – this vegetation type has been mapped from aerial photographic interpretation and ground truthing.

*Low Resolution Area* – no occurrence within the low resolution area expected.

## Vegetation Structure:

| Stratum | Mean height (m) | Min height (m) | Max height (m) | Mean cover (%) | Sdev | n |
|---|---|---|---|---|---|---|
| Emergent | | | | | | |
| Tallest | 10.20 | 5.00 | 22.00 | 65 | 31.8 | 6 |
| Middle 1 | 3.81 | 0.10 | 10.00 | 47 | 37.7 | 6 |
| Middle 2 | 1.50 | 0.50 | 4.00 | 31 | 31.6 | 5 |
| Middle 3 | | | | | | |
| Lowest | 0.59 | 0.10 | 1.00 | 51 | 35.0 | 6 |

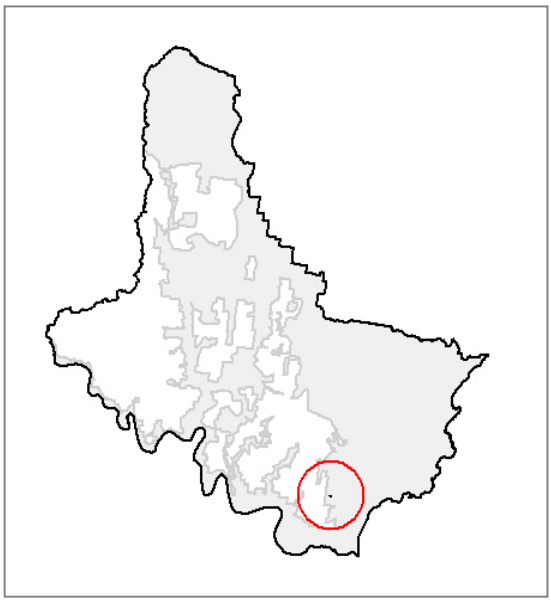
## Key Diagnostic Species [based on 6 plots]:

| Life Form | Species | Community | | All others | | Fidelity |
|---|---|---|---|---|---|---|
| | | c/a | Freq. | c/a | Freq. | |
| Tree | *Acmena smithii* | 2 | 17% | 2 | 14% | uninformative |
| | *Casuarina glauca* | 1 | 50% | 3 | 5% | uninformative |
| | *Eucalyptus paniculata subsp. paniculata* | 3 | 33% | 3 | 9% | uninformative |
| | *Eucalyptus resinifera subsp. resinifera* | 3 | 33% | 3 | 1% | uninformative |
| | *Eucalyptus robusta* | 2 | 33% | 3 | 8% | uninformative |
| Small tree | *Glochidion ferdinandii* | 2 | 83% | 2 | 28% | positive |
| | *Callistemon salignus* | 2 | 50% | 2 | 3% | positive |
| | *Alphitonia excelsa* | 2 | 33% | 1 | 9% | uninformative |
| | *Melaleuca styphelioides* | 3 | 17% | 1 | 3% | uninformative |
| | *Melaleuca linariifolia* | 1 | 17% | 2 | 6% | uninformative |
| Shrub | *Melaleuca nodosa* | 6 | 100% | 1 | 1% | positive |
| | *Dodonaea triquetra* | 2 | 50% | 1 | 16% | positive |
| | *Notelaea longifolia* | 2 | 50% | 1 | 15% | positive |
| | *Pittosporum undulatum* | 2 | 50% | 1 | 13% | positive |
| | *Callistemon rigidus* | 1 | 17% | 0 | 0% | unique |
| | *Kunzea ericoides* | 1 | 17% | 0 | 0% | unique |
| | *Notelaea ovata* | 1 | 17% | 0 | 0% | unique |
| | *Breynia oblongifolia* | 1 | 100% | 1 | 32% | uninformative |
| | *Acacia longifolia* | 1 | 83% | 2 | 11% | uninformative |
| | *Pittosporum revolutum* | 1 | 50% | 1 | 12% | uninformative |
| | *Melaleuca ericifolia* | 4 | 33% | 2 | 3% | uninformative |
| | *Rapanea variabilis* | 2 | 33% | 1 | 15% | uninformative |
| | *Banksia integrifolia subsp. integrifolia* | 1 | 33% | 1 | 7% | uninformative |
| | *Polyscias sambucifolia* | 1 | 33% | 1 | 17% | uninformative |
| | *Acrotriche divaricata* | 1 | 17% | 1 | 1% | uninformative |
| | *Callistemon citrinus* | 1 | 17% | 1 | 4% | uninformative |
| | *Canthium coprosmoides* | 1 | 17% | 1 | 1% | uninformative |
| | *Elaeocarpus reticulatus* | 1 | 17% | 1 | 10% | uninformative |
| | *Exocarpos cupressiformis* | 1 | 17% | 1 | 5% | uninformative |
| | *Goodenia ovata* | 1 | 17% | 1 | 3% | uninformative |
| | *Leptospermum polygalifolium* | 1 | 17% | 2 | 24% | uninformative |
| | *Omalanthus populifolius* | 1 | 17% | 1 | 5% | uninformative |
| | *Ozothamnus diosmifolius* | 1 | 17% | 1 | 4% | uninformative |
| | *Pimelea linifolia* | 1 | 17% | 1 | 20% | uninformative |
| | *Pultenaea villosa* | 1 | 17% | 1 | 3% | uninformative |
| | *Senna coronilloides* | 1 | 17% | 1 | 0% | uninformative |
| | *Viminaria juncea* | 1 | 17% | 1 | 1% | uninformative |
| Herb | *Viola hederacea* | 2 | 83% | 2 | 12% | positive |
| | *Centella asiatica* | 2 | 33% | 2 | 1% | uninformative |
| | *Pratia purpurascens* | 1 | 33% | 2 | 21% | uninformative |
| | *Gonocarpus teucrioides* | 4 | 17% | 1 | 15% | uninformative |
| | *Dichondra repens* | 2 | 17% | 2 | 6% | uninformative |
| | *Hydrocotyle laxiflora* | 2 | 17% | 2 | 8% | uninformative |
| | *Lobelia alata* | 1 | 17% | 1 | 2% | uninformative |
| | *Veronica plebeia* | 1 | 17% | 1 | 3% | uninformative |
| Grass | *Imperata cylindrica var major* | 3 | 67% | 2 | 29% | positive |
| | *Poa poiformis var poiformis* | 1 | 33% | 0 | 0% | unique |
| | *Entolasia stricta* | 5 | 50% | 2 | 53% | constant |
| | *Oplismenus imbecillis* | 3 | 33% | 2 | 17% | uninformative |
| | *Entolasia marginata* | 2 | 33% | 2 | 16% | uninformative |
| | *Microlaena stipoides var stipoides* | 2 | 33% | 2 | 10% | uninformative |
| | *Phragmites australis* | 6 | 17% | 2 | 2% | uninformative |
| | *Echinopogon ovatus* | 2 | 17% | 2 | 5% | uninformative |
| Graminoid | *Dianella caerulea* | 2 | 83% | 1 | 50% | positive |
| | *Lomandra longifolia* | 1 | 50% | 2 | 44% | negative |

| | | | | | | |
|---|---|---|---|---|---|---|
| Ground fern | *Pteridium esculentum* | 1 | 17% | 2 | 43% | negative |
| | *Adiantum aethiopicum* | 3 | 17% | 2 | 12% | uninformative |
| | *Blechnum indicum* | 1 | 17% | 2 | 3% | uninformative |
| | *Doodia aspera* | 1 | 17% | 2 | 13% | uninformative |
| | *Hypolepis muelleri* | 1 | 17% | 2 | 6% | uninformative |
| Clubmoss | *Selaginella uliginosa* | 1 | 17% | 2 | 5% | uninformative |
| Climber | *Parsonsia straminea* | 2 | 100% | 1 | 19% | positive |
| | *Billardiera scandens* | 1 | 50% | 1 | 29% | uninformative |
| | *Marsdenia rostrata* | 1 | 50% | 1 | 5% | uninformative |
| | *Pandorea pandorana subsp. pandorana* | 1 | 50% | 1 | 23% | uninformative |
| | *Geitonoplesium cymosum* | 2 | 33% | 1 | 24% | uninformative |
| | *Glycine clandestina* | 1 | 33% | 2 | 22% | uninformative |
| | *Kennedia rubicunda* | 1 | 33% | 1 | 11% | uninformative |
| | *Cassytha glabella forma glabella* | 2 | 17% | 1 | 14% | uninformative |
| | *Cassytha pubescens* | 1 | 17% | 1 | 8% | uninformative |
| | *Eustrephus latifolius* | 1 | 17% | 1 | 25% | uninformative |
| | *Morinka jasminoides* | 1 | 17% | 1 | 15% | uninformative |
| | *Rubus moorei* | 1 | 17% | 1 | 1% | uninformative |
| | *Sarcopetalum harveyanum* | 1 | 17% | 1 | 11% | uninformative |
| | *Smilax australis* | 1 | 17% | 1 | 22% | uninformative |
| | *Smilax glyciphylla* | 1 | 17% | 1 | 19% | uninformative |
| Sedge/ Rush | *Baumea juncea* | 2 | 50% | 3 | 4% | positive |
| | *Gahnia clarkei* | 3 | 67% | 2 | 10% | positive |
| | *Lepidosperma elatius* | 1 | 50% | 2 | 2% | uninformative |
| | *Gahnia melanocarpa* | 1 | 17% | 1 | 5% | uninformative |

# Umina *Lepironia* Sedgeland
*Lepironia* Swamp

# Unit E45
REMS Unit 45



## General Description:
Umina *Lepironia* Sedgeland is known with certainty only from Iluka Lagoon at Umina. It occurs on coastal sand deposits where drainage is impounded. Floristically, this vegetation type is very simple (dominated by *Lepironia articulata*), and occurs in select locations along the NSW North Coast. The stand in Iluka Lagoon may represent the southern limit of distribution of this vegetation type, and the naming of Iluka Lagoon may in fact reflect the association with North Coast sand swamps. Payne (1997) has stated that Iluka Lagoon is the only wetland supporting *Lepironia articulata* on the Gosford coastal plain.

## Known Floristic/ Structural Variations:
No variations have been identified for this vegetation type.

## Distribution:
*Within Gosford LGA* – known only from Iluka Lagoon, Umina.

*Within LHCC Region* – NPWS (2000) have mapped 37ha of their Lepironia Swamp (Unit 45) in the region.

*Examples Within Gosford LGA*
- Iluka Lagoon, Umina

## Extent:
*Extant* - 0.83 ha

## Relationship to Other Communities:
Umina *Lepironia* Sedgeland is dominated by *Lepironia articulata*, and no other community in the study area supports monospecific stands of this species.

## Equivalent Vegetation Types:
- Benson 1981 (Mangrove Creek): n/a
- Benson & Fallding 1981 (Brisbane Water) n/a

- Benson 1986 (Gosf-Lake Mac): (?) Sedgeland (Unit 27a)
- Clarke & Benson 1986 (Dharug): n/a
- Strom 1986 (Bouddi Peninsula): n/a
- Clarke & Benson 1987 (Mt White/ Mt Olive): n/a
- McRae 1990 (Bouddi Peninsula): n/a
- Binns 1996 (SF MFD): n/a
- Payne 1997 (Cockle Bay/ Bouddi): n/a
- Bell 1998 (Popran NP): n/a
- Bell 2002 (Wyong LGA): (?) Freshwater Wetland (Unit 14)

## Significant Species:

- Undescribed species – *none recorded*
- Threatened (TSC Act) – *none recorded*
- Rare (ROTAP) – *none recorded*

## Community Conservation Status:

*Reserve Representation* - within Gosford, this vegetation type is not known in reservation. Iluka Lagoon is a Council reserve.

*TSC Act (1995) Status* - Included in the *Sydney Freshwater Wetlands* EEC.

## Mapping Reliability & Included Units:

*High Resolution Area* – this vegetation type has been mapped only where known from ground truthing.

*Low Resolution Area* – no occurrence within the low resolution area expected.

## Vegetation Structure:

No structural data is yet available for this community, however it typically consists of a dense shrub layer up to 2.0m in height.

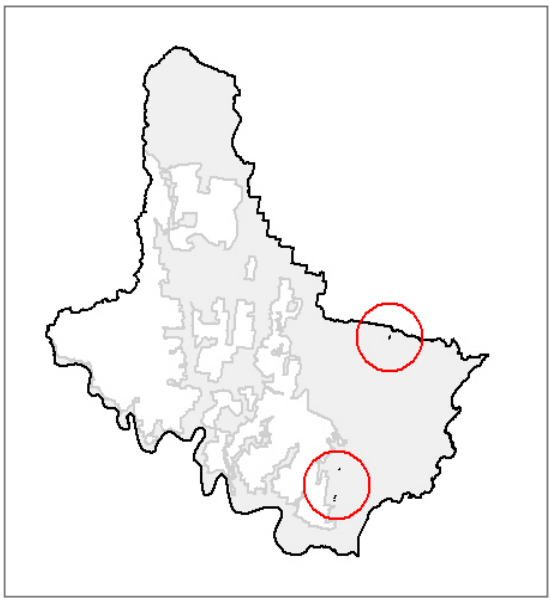
## Key Diagnostic Species [no plots available]:

Diagnostic species have not been generated for this community due to a lack of suitable floristic data. *Lepironia articulata* is clearly dominant and characteristic. As a guide, the following species list has been extracted from the regional REMS profiles (NPWS 2000), but it has not been possible to rationalise this list with communities delineated during the present study.

| Life Form | Species | Community | | All others | | Fidelity |
|---|---|---|---|---|---|---|
| | | c/a | Freq. | c/a | Freq. | |
| Tree | *Melaleuca quinquenervia* | - | - | - | - | - |
| Herbs | *Pseudanthus orientalis* | - | - | - | - | - |
| | *Villarsia exaltata* | - | - | | - | - |
| | *Hydrocotyle peduncularis* | - | - | - | - | - |
| Grass | *Pseudoraphis paradoxa* | - | - | - | - | - |
| | *Entolasia marginata* | - | - | - | - | - |
| | *Digitaria ramularis* | - | - | - | - | - |
| Graminoid | *Dianella caerulea* | - | - | - | - | - |
| Sedge/ Rush | *Lepironia articulata* | - | - | - | - | - |
| | *Lepidosperma concavum* | - | - | - | - | - |

# Freshwater *Typha* Wetland
## Freshwater Wetland Complex

# Unit E46a
## REMS Unit 46



## General Description:
True freshwater wetland areas within the Gosford area are few, and most have been impacted upon by man. Freshwater *Typha* Wetland is clearly dominated by *Typha orientalis*, and this species often invades disturbed water bodies forming mono-specific stands (see Payne 2001). Little other vegetation is evident in these areas. Freshwater Wetlands within the Gosford area have not been adequately sampled during this study, and hence relationships discussed between them are of necessity broad.

## Known Floristic/ Structural Variations:
No variations have been delineated in this study.

## Distribution:
*Within Gosford LGA* – occurs sporadically on major floodplains in the east.

*Within LHCC Region* – NPWS (2000) have not delineated or mapped this vegetation type.

*Examples Within Gosford LGA*
- Near Lisarow railway station
- Ettalong Creek, Umina

## Extent:
*Extant* - 2.55 ha

## Relationship to Other Communities:
Freshwater *Typha* Wetland is dominated by *Typha orientalis*, and no other community in the study area supports monospecific stands of the species.

## Equivalent Vegetation Types:
- Benson 1981 (Mangrove Creek): n/a
- Benson & Fallding 1981 (Brisbane Water) n/a

- Benson 1986 (Gosf-Lake Mac): (?) Sedgeland (Unit 27a)
- Clarke & Benson 1986 (Dharug): n/a
- Strom 1986 (Bouddi Peninsula): n/a
- Clarke & Benson 1987 (Mt White/ Mt Olive): n/a
- McRae 1990 (Bouddi Peninsula): n/a
- Binns 1996 (SF MFD): n/a
- Payne 1997 (Cockle Bay/ Bouddi): n/a
- Bell 1998 (Popran NP): n/a
- Bell 2002 (Wyong LGA): (?) Freshwater Wetland (Unit 14)

## Significant Species:

- Undescribed species – *none recorded*
- Threatened (TSC Act) – *none recorded*
- Rare (ROTAP) – *none recorded*

## Community Conservation Status:

*Reserve Representation* - within Gosford, this vegetation type is not known in reservation.

*TSC Act (1995) Status* - May be included in the *Sydney Freshwater Wetlands* EEC.

## Mapping Reliability & Included Units:

*High Resolution Area* – this vegetation type has been mapped only where known from ground truthing.

*Low Resolution Area* – no occurrence within the low resolution area expected.

## Vegetation Structure:

No structural data is yet available for this community, however it typically consists of a sparse-to-dense shrub layer up to 1.5m in height.

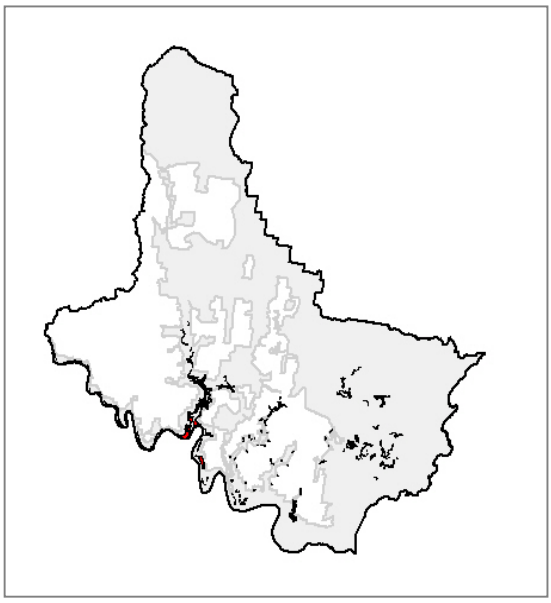
## Key Diagnostic Species [no plots available]:

Diagnostic species have not been generated for this community due to a lack of suitable floristic data. *Typha orientalis* is normally dominant. The following species list is based on field observations at known sites.

| Life Form | Species | Community | | All others | | Fidelity |
|---|---|---|---|---|---|---|
| | | c/a | Freq. | c/a | Freq. | |
| Graminoid | *Typha orientalis* | - | - | - | - | |

# Estuarine Mangrove Scrub
## Mangrove Estuarine Complex

# Unit E47
## REMS Unit 47



## General Description:
Estuarine Mangrove Scrub occurs immediately within and adjacent to tidal estuaries. This community can be quite variable structurally, but is always dominated by the mangrove *Avicennia marina* subsp. *australasica*, together with *Aegiceras corniculatum* along major river systems (eg: Hawkesbury River). Tidal gradients within this community also introduce local variations where saltmarsh can be undergoing mangrove colonisation.

## Known Floristic/ Structural Variations:
(a) Estuarine Mangrove Scrub (mapped as E47) – closed and open scrubs dominated solely by *Avicennia marina* subsp. *australasica*.

(b) Riverine Mangrove Scrub (included in E47) – closed and open scrubs dominated by *Aegiceras corniculatum* with *Avicennia marina* subsp. *australasica*.

## Distribution:
*Within Gosford LGA* – occurs generally as narrow bands around the coastal estuaries, but on larger estuarine flats stands can be quite sizeable.

*Within LHCC Region* – NPWS (2000) have mapped 6111ha of their Mangrove-Estuarine Complex remaining in the region.

*Examples Within Gosford LGA*
- Cockle Bay Nature Reserve
- Davistown-Saratoga

## Extent:
*Extant* - 758.87 ha

## Relationship to Other Communities:
This vegetation type is distinct from all other vegetation types both floristically and, in most cases, structurally. The most closely related unit is Unit 47a: Estuarine Saltmarsh/ Grassland, but in general that community rarely contains mangrove species, or if they are present they are of low abundance. Estuarine Swamp Oak Forest (Unit E40) also occurs in close proximity to the coastal estuaries, and consequently some understorey species do occur in both types. However, the

presence of Swamp Oak (*Casuarina glauca*) in monospecific stands clearly separate the two. Swamp Paperbark Thicket (Unit E100) may also occur near coastal estuaries, but that unit is clearly distinguished by the often monospecific stands of *Melaleuca ericifolia*.

## Equivalent Vegetation Types:

- Benson 1981 (Mangrove Creek): n/a
- Benson & Fallding 1981 (Brisbane Water) Tall open-scrub (Unit 7)
- Benson 1986 (Gosf-Lake Mac): Open-Scrub (Unit 4a)
- Clarke & Benson 1986 (Dharug): Forest and Scrub – Mangrove (Unit A1)
- Strom 1986 (Bouddi Peninsula): Low open scrub – Mangroves (Unit 1.4)
- Clarke & Benson 1987 (Mt White/ Mt Olive): Mangrove (Unit A1)
- McRae 1990 (Bouddi Peninsula): n/a
- Binns 1996 (SF MFD): n/a
- Payne 1997 (Cockle Bay/ Bouddi): Shrubland, herbland on estuarine alluvium (Unit 4.3)
- Bell 1998 (Popran NP): Estuarine Mangrove Open Scrub (Unit S2)
- Bell 2002 (Wyong LGA): Estuarine Mangrove-Saltmarsh Complex (Unit 2)

## Significant Species:

- Undescribed species – *none recorded*
- Threatened (TSC Act) – *none recorded*
- Rare (ROTAP) – *none recorded*

## Community Conservation Status:

*Reserve Representation* - within Gosford City, this vegetation type is currently represented in Cockle Bay NR, Rileys Island NR, Pelican Island NR.

*TSC Act (1995) Status* - not currently listed.

## Mapping Reliability & Included Units:

*High Resolution Area* – this vegetation type has been mapped directly from aerial photographs with ground truthing in some parts. There is likely to be some integration with Unit 47a.

*Low Resolution Area* – as modelled by LHCCREMS, with some limited ground truthing.

## Vegetation Structure:

| Stratum | Mean height (m) | Min height (m) | Max height (m) | Mean cover (%) | Sdev | n |
|---|---|---|---|---|---|---|
| Emergent | | | | | | |
| Tallest | 2.25 | 0.50 | 4.00 | 46 | 16.0 | 4 |
| Middle 1 | 4.00 | 4.00 | 4.00 | 80 | | 1 |
| Middle 2 | | | | | | |
| Middle 3 | | | | | | |
| Lowest | 0.41 | 0.10 | 1.00 | 73 | 37.0 | 5 |

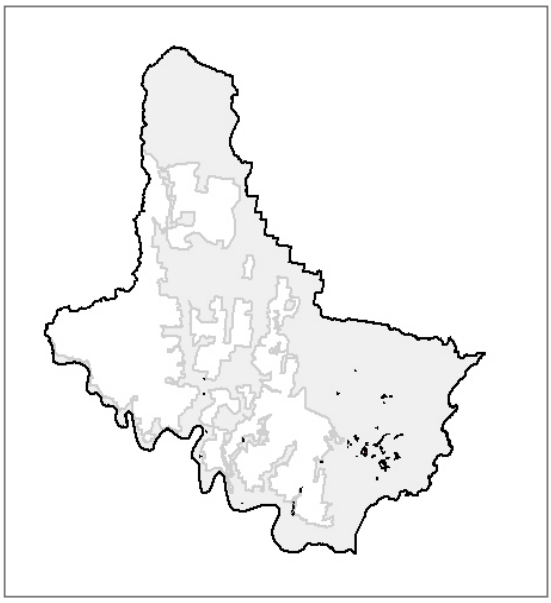
## Key Diagnostic Species [based on 5 plots]:

| Life Form | Species | Community | | All others | | Fidelity |
|---|---|---|---|---|---|---|
| | | c/a | Freq. | c/a | Freq. | |
| Tree | *Casuarina glauca* | 2 | 20% | 3 | 6% | uninformative |
| Shrub | *Avicennia marina subsp. australasica* | 4 | 100% | 2 | 0% | positive |
| | *Aegiceras corniculatum* | 3 | 20% | 1 | 0% | uninformative |
| Herb | *Sarcocornia quinqueflora subsp. quinqueflora* | 6 | 80% | 4 | 0% | positive |

| | | | | | | |
|---|---|---|---|---|---|---|
| | *Suaeda australis* | 2 | 40% | 1 | 0% | positive |
| | *Samolus repens* | 3 | 20% | 1 | 2% | uninformative |
| | *Tetragonia tetragonioides* | 1 | 20% | 1 | 0% | uninformative |
| Grass | *Sporobolus virginicus* | 5 | 20% | 4 | 1% | uninformative |
| | *Zoysia macrantha* | 2 | 20% | 2 | 0% | uninformative |
| | *Entolasia stricta* | 0 | 0% | 2 | 54% | negative |
| Graminoid | *Lomandra longifolia* | 0 | 0% | 2 | 45% | negative |
| Ground fern | *Pteridium esculentum* | 0 | 0% | 2 | 43% | negative |

# Estuarine Saltmarsh/ Grassland — Unit E47a

## Mangrove Estuarine Complex — REMS Unit 47



## General Description:

Estuarine Saltmarsh/ Grassland occurs immediately within and adjacent to tidal estuaries. This community occurs in close association with Estuarine Mangrove Scrub, but differs structurally and floristically by the clear dominance of species such as *Sarcocornia quinqueflora* subsp. *quinqueflora*, *Samolus repens* and *Suaeda australis* in saltmarsh; and *Zoysia macrantha* and *Sporobolus virginicus* in grasslands.

## Known Floristic/ Structural Variations:

(a) Saltmarsh (included in E47a) – saltmarsh flats dominated by *Sarcocornia quinqueflora* subsp. *quinqueflora*, *Samolus repens* and *Suaeda australis*. Occasional emergent *Avicennia marina* subsp. *australasica* may also be present.

(b) Grassland (included in E47a) – grasslands may be interspersed within saltmarsh and mangrove, and are dominated by *Zoysia macrantha* and *Sporobolus virginicus*.

(c) Wet meadows (included in E47a) – Payne (1997) briefly outlines saline wet meadows near Kincumber Crescent at Davistown dominated by *Schoenoplectus littoralis*, which he states is the only known location of this type in the region.

## Distribution:

*Within Gosford LGA* – occurs mainly on the larger mudflats of the coastal estuaries.

*Within LHCC Region* – NPWS (2000) have mapped 6111ha of their Mangrove-Estuarine Complex remaining in the region.

*Examples Within Gosford LGA*

- Cockle Bay Nature Reserve
- Davistown-Saratoga

## Extent:

*Extant* - 118.29 ha

## Relationship to Other Communities:

Estuarine Saltmarsh/ Grassland is floristically distinct from all other vegetation types. Estuarine Mangrove Scrub (Unit 47) may support a similar suite of species, however the dominance of a scrub or small tree layer of mangroves clearly separates the two. Estuarine Swamp Oak Forest (Unit E40) also occurs in close proximity to the coastal estuaries, and consequently some understorey species do occur in both types. However, the presence of Swamp Oak (*Casuarina glauca*) in monospecific stands clearly separate the two. Swamp Paperbark Thicket (Unit E100) may also occur near coastal estuaries, but that unit is clearly distinguished by the often monospecific stands of *Melaleuca ericifolia*.

## Equivalent Vegetation Types:

- Benson 1981 (Mangrove Creek): n/a
- Benson & Fallding 1981 (Brisbane Water) n/a
- Benson 1986 (Gosf-Lake Mac): Open-Scrub (Unit 4a)
- Clarke & Benson 1986 (Dharug): Herbland/ Sedgeland – Saltmarsh (Unit A2)
- Strom 1986 (Bouddi Peninsula): n/a
- Clarke & Benson 1987 (Mt White/ Mt Olive): Saltmarsh (Unit A2)
- McRae 1990 (Bouddi Peninsula): n/a
- Binns 1996 (SF MFD): n/a
- Payne 1997 (Cockle Bay/ Bouddi): Shrubland, herbland on estuarine alluvium (Unit 4.3)
- Bell 1998 (Popran NP): Estuarine Saltmarsh (Unit SM1)
- Bell 2002 (Wyong LGA): Estuarine Mangrove-Saltmarsh Complex (Unit 2)

## Significant Species:

- Undescribed species – *none recorded*
- Threatened (TSC Act) – *none recorded*
- Rare (ROTAP) – *none recorded*

## Community Conservation Status:

*Reserve Representation* - within Gosford City, this vegetation type is currently represented in Cockle Bay NR, Rileys Island NR, Pelican Island NR.

*TSC Act (1995) Status* - not currently listed.

## Mapping Reliability & Included Units:

*High Resolution Area* – this vegetation type has been mapped directly from aerial photographs with ground truthing in some parts. There is likely to be some integration with Unit 47.

*Low Resolution Area* – not mapped for the low resolution area, but was included in the modelling of Unit 47 by NPWS (2000).

## Vegetation Structure:

No structural data is yet available for this community, however it typically comprises a sparse-to-dense ground cover up to 0.3m in height.

## Key Diagnostic Species [no plots available]:

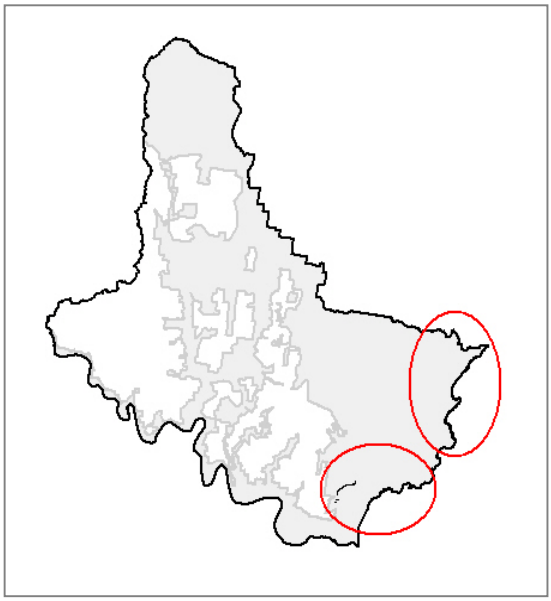
Diagnostic species have not been generated for this community due to a lack of suitable floristic data. *Sarcocornia quinqueflora, Sporobolus virginicus* and *Zoysia macrantha* are normally dominant in this community. The following species list is based on field observations at known sites.

| Life Form | Species | Community | | All others | | Fidelity |
|---|---|---|---|---|---|---|
| | | c/a | Freq. | c/a | Freq. | |
| Herb | *Sarcocornia quinquefaria* | - | - | - | - | - |
| | *Suaeda australis* | - | - | - | - | - |
| | *Selliera radicans* | - | - | - | - | - |

| | | | | | | |
|---|---|---|---|---|---|---|
| | *Samolus repens* | - | - | - | - | - |
| Grass | *Sporobolus virginicus* | - | - | - | - | |
| | *Zoysia macrantha* | - | - | - | - | - |

# Coastal Sand Foredune Scrub
## Coastal Sand Scrub

# Unit E50a
## REMS Unit 50



## General Description:
Coastal Sand Foredune Scrub occurs immediately landward of Coastal Sand Beach Spinifex, also as narrow bands on the frontal beach dunes. This vegetation type is dominated by low prostrate shrubs of *Acacia sophorae* and *Acacia longifolia*, with few other species present. Heavy invasion by Bitou Bush (*Chrysanthemoides monilifera*) has occurred along much of the coastline in the region, impacting on this community.

## Known Floristic/ Structural Variations:
No variations are recognised.

## Distribution:
*Within Gosford LGA* - occurs only along the immediate coastline on beach foredunes.

*Within LHCC Region* – NPWS (2000) have not delineated this vegetation type as separate from their Coastal Sand Scrub.

*Examples Within Gosford LGA*
- Forresters Beach
- Wamberal Beach

## Extent:
*Extant* - 44.49 ha

## Relationship to Other Communities:
The dominance of *Acacia* spp. in this vegetation type, and the general absence of emergent *Leptospermum laevigatum*, clearly distinguish this type from other similar frontal dune communities. There may be some intergradation between it and the Coastal Sand *Banksia* Scrub (Unit E50b), although that community is structurally different and includes a number of additional species in the emergent layer (eg: *Monotoca elliptica*).

## Equivalent Vegetation Types:
- Benson 1981 (Mangrove Creek): n/a

- Benson & Fallding 1981 (Brisbane Water) n/a
- Benson 1986 (Gosf-Lake Mac): n/a
- Clarke & Benson 1986 (Dharug): n/a
- Strom 1986 (Bouddi Peninsula): n/a
- Clarke & Benson 1987 (Mt White/ Mt Olive): n/a
- McRae 1990 (Bouddi Peninsula): n/a
- Binns 1996 (SF MFD): n/a
- Payne 1997 (Cockle Bay/ Bouddi): n/a
- Bell 1998 (Popran NP): n/a
- Bell 2002 (Wyong LGA): Coastal Sand Foredune acacia Scrub (Unit 5)

## Significant Species:

- Undescribed species – *none recorded*
- Threatened (TSC Act) – *none recorded*
- Rare (ROTAP) – *none recorded*

## Community Conservation Status:

*Reserve Representation* - within Gosford, good areas of this vegetation type are present in parts of Wyrrabalong and Bouddi NP's.

*TSC Act (1995) Status* - not currently listed.

## Mapping Reliability & Included Units:

*High Resolution Area* – this vegetation type has been mapped where visible from aerial photographic interpretation. It is possible that some monotypic stands of Bitou Bush (*Chrysanthemoides monilifera*) will be included in the mapping, and that some regenerating stands have not been detected.

*Low Resolution Area* – no occurrence within the low resolution area expected.

## Vegetation Structure:

No structural data is yet available for this community, however it typically comprises a dense shrub layer up to 1.5m in height.

## Key Diagnostic Species [no plots available]:

Diagnostic species have not been generated for this community due to a lack of suitable floristic data. *Acacia sophorae* is characteristic in this community. The following species list is based on field observations at known sites.

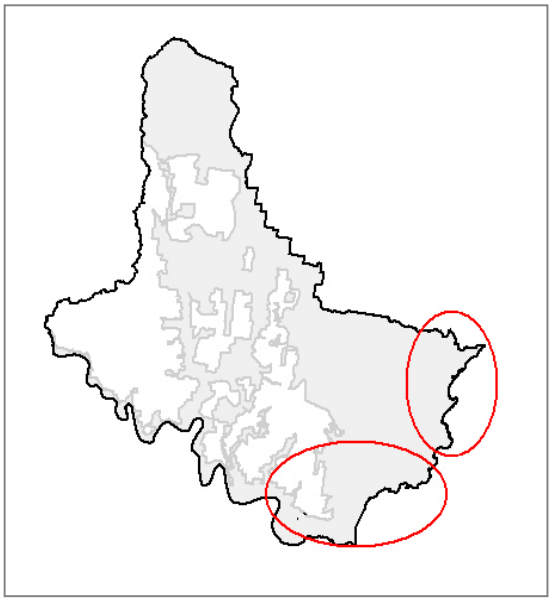
| Life Form | Species | Community | | All others | | Fidelity |
|---|---|---|---|---|---|---|
| | | c/a | Freq. | c/a | Freq. | |
| Shrub | *Acacia sophorae* | - | - | - | - | - |
| | *Acacia longifolia* | - | - | - | - | - |
| | *Chrysanthemoides monilifera* * | - | - | - | - | - |
| | *Leptospermum laevigatum* | - | - | - | - | - |
| | *Banksia integrifolia subsp. integrifolia* | - | - | - | - | - |
| Herb | *Carpobrotus glaucescens* | - | - | - | - | - |
| | *Scaevola calendulacea* | - | - | - | - | - |
| | *Correa alba var alba* | - | - | - | - | - |
| Grass | *Spinifex sericeus* | - | - | - | - | - |
| Graminoid | *Lomandra longifolia* | - | - | - | - | - |

# Coastal Sand *Banksia* Scrub

## Coastal Sand Scrub

# Unit E50b

## REMS Unit 50



## General Description:

Coastal Sand *Banksia* Scrub occurs in slightly more sheltered locations than Coastal Sand Foredune Scrub, generally higher up the frontal dune system where the effects of salt and desiccating winds are reduced. Characteristic species in this vegetation type include the tall shrubs *Leptospermum laevigatum* and *Monotoca elliptica*, with occasional emergents of *Banksia integrifolia* subsp. *integrifolia* or *Banksia serrata*. Typically, this vegetation type is very dense with little understorey shrubs or herbs present.

## Known Floristic/ Structural Variations:

No variations are recognised, although in some areas heavy invasion by the exotic Bitou Bush (*Chrysanthemoides monilifera*) has dramatically changed vegetation structure and floristic composition.

## Distribution:

*Within Gosford LGA* – occurs only along the immediate coastline on beach foredunes.

*Within LHCC Region* – NPWS (2000) have mapped 809ha of their Coastal Sand Scrub remaining within the region.

*Examples Within Gosford LGA*

- Wamberal Beach
- Putty Beach

## Extent:

*Extant* - 22.36 ha

## Relationship to Other Communities:

This vegetation type can be distinguished from other similar types by the dominance of *Leptospermum laevigatum* and *Monotoca elliptica* in dense stands, with the occasional emergent *Banksia* spp. There may be some intergradation with the Coastal Sand Foredune Scrub (Unit 50a) where the two sub-communities merge. The dominance of the exotic Bitou Bush (*Chyrsanthemoides monilifera* subsp. *rotundata*) in many locations may hinder the distinction between the two.

## Equivalent Vegetation Types:

- Benson 1981 (Mangrove Creek): n/a
- Benson & Fallding 1981 (Brisbane Water) (?) Heath (Unit 10)
- Benson 1986 (Gosf-Lake Mac): Closed-Scrub (Unit 21b)
- Clarke & Benson 1986 (Dharug): n/a
- Strom 1986 (Bouddi Peninsula): Open scrub (Units 3.2 & 4.6)
- Clarke & Benson 1987 (Mt White/ Mt Olive): n/a
- McRae 1990 (Bouddi Peninsula): Tall shrubland (Unit 4.1)
- Binns 1996 (SF MFD): n/a
- Payne 1997 (Cockle Bay/ Bouddi): n/a
- Bell 1998 (Popran NP): n/a
- Bell 2002 (Wyong LGA): Coastal Sand Holocene *Banksia* Scrub (Unit 6)

## Significant Species:

- Undescribed species – *none recorded*
- Threatened (TSC Act) – *none recorded*
- Rare (ROTAP) – *none recorded*

## Community Conservation Status:

*Reserve Representation* - within Gosford, areas of this vegetation type are present in Bouddi NP.

*TSC Act (1995) Status* - not currently listed.

## Mapping Reliability & Included Units:

*High Resolution Area* – this vegetation type has been mapped from aerial photographic interpretation. It is possible that some monotypic stands of Bitou Bush (*Chrysanthemoides monilifera*), and parts of Coastal Sand Foredune Scrub (Unit 50a) will be included in the mapping, and that unmapped stands exist.

*Low Resolution Area* – no occurrence within the low resolution area expected.

## Vegetation Structure:

| Stratum | Mean height (m) | Min height (m) | Max height (m) | Mean cover (%) | Sdev | n |
|---|---|---|---|---|---|---|
| Emergent | | | | | | |
| Tallest | 2.67 | 1.00 | 5.00 | 66 | 38.2 | 4 |
| Middle 1 | 1.00 | 1.00 | 1.00 | 20 | | 1 |
| Middle 2 | | | | | | |
| Middle 3 | | | | | | |
| Lowest | 1.25 | 1.00 | 2.00 | 27 | 20.8 | 3 |

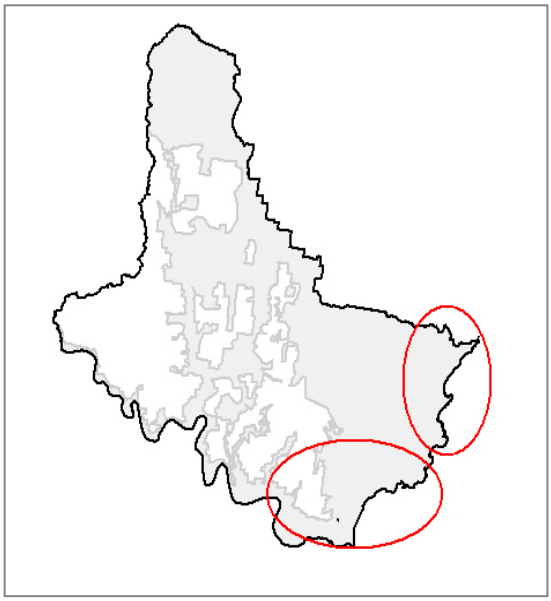
## Key Diagnostic Species [based on 4 plots]:

| Life Form | Species | Community | | All others | | Fidelity |
|---|---|---|---|---|---|---|
| | | c/a | Freq. | c/a | Freq. | |
| Small tree | *Cupaniopsis anacardioides* | 1 | 75% | 2 | 1% | uninformative |
| Shrub | *Banksia integrifolia subsp. integrifolia* | 2 | 100% | 1 | 6% | positive |
| | *Leptospermum laevigatum* | 5 | 75% | 2 | 1% | positive |
| | *Acacia longifolia subsp. sophorae* | 2 | 25% | 0 | 0% | unique |
| | *Leucopogon parviflorus* | 4 | 25% | 0 | 0% | unique |
| | *Myoporum boninense subsp. australe* | 1 | 25% | 0 | 0% | unique |
| | *Banksia oblongifolia* | 4 | 25% | 2 | 18% | uninformative |
| | *Monotoca elliptica* | 3 | 25% | 1 | 3% | uninformative |
| | *Persoonia lanceolata* | 3 | 25% | 1 | 6% | uninformative |

| | | | | | | |
|---|---|---|---|---|---|---|
| | *Eriostemon australasius* | 2 | 25% | 2 | 6% | uninformative |
| | *Acacia suaveolens* | 2 | 25% | 1 | 28% | uninformative |
| | *Allocasuarina distyla* | 2 | 25% | 2 | 3% | uninformative |
| | *Acacia longifolia* | 1 | 25% | 2 | 11% | uninformative |
| | *Bossiaea ensata* | 1 | 25% | 1 | 3% | uninformative |
| | *Bossiaea scolopendria* | 1 | 25% | 1 | 10% | uninformative |
| | *Breynia oblongifolia* | 1 | 25% | 1 | 33% | uninformative |
| | *Leucopogon ericoides* | 1 | 25% | 1 | 3% | uninformative |
| | *Phyllota phylicoides* | 1 | 25% | 2 | 18% | uninformative |
| | *Pittosporum undulatum* | 1 | 25% | 1 | 14% | uninformative |
| | *Ricinocarpos pinifolius* | 1 | 25% | 1 | 6% | uninformative |
| Herb | *Carpobrotus glaucescens* | 1 | 75% | 0 | 0% | unique |
| | *Scaevola calendulacea* | 4 | 50% | 0 | 0% | unique |
| | *Senecio spp.* | 3 | 25% | 0 | 0% | unique |
| | *Rhagodia candolleana subsp. candolleana* | 2 | 25% | 0 | 0% | unique |
| | *Correa alba var alba* | 2 | 25% | 0 | 0% | unique |
| | *Arrhenechthites mixta* | 1 | 25% | 0 | 0% | unique |
| | *Pelargonium australe* | 1 | 25% | 0 | 0% | unique |
| | *Actinotus helianthi* | 1 | 25% | 1 | 7% | uninformative |
| Grass | *Imperata cylindrica var major* | 3 | 50% | 2 | 29% | positive |
| | *Spinifex sericeus* | 2 | 50% | 0 | 0% | unique |
| | *Cynodon dactylon* | 1 | 25% | 1 | 3% | uninformative |
| | *Entolasia stricta* | 0 | 0% | 2 | 54% | negative |
| Graminoid | *Lomandra longifolia* | 3 | 50% | 2 | 45% | constant |
| | *Dianella caerulea* | 1 | 50% | 1 | 51% | uninformative |
| Ground fern | *Pteridium esculentum* | 0 | 0% | 2 | 43% | negative |
| Climber | *Hardenbergia violacea* | 3 | 25% | 1 | 10% | uninformative |
| | *Cassytha pubescens* | 2 | 25% | 1 | 8% | uninformative |
| | *Marsdenia rostrata* | 2 | 25% | 1 | 5% | uninformative |
| | *Tylophora barbata* | 1 | 25% | 1 | 5% | uninformative |

# Coastal Headland Grassland
## Coastal Headland Complex

# Unit E51a
## REMS Unit 51



### General Description:
On coastal clay headlands and slopes exposed to onshore winds, Coastal Headland Grassland occurs. This community forms a complex of merging vegetation types dependant on local soil conditions and disturbance history, including Shrubland (Units E51b & E51d), Low Closed Forest (Unit E51c), and Gully Scrub (E51e). In the most exposed areas, grasslands are dominated by *Themeda australis* and *Ptilothrix deusta*, with stunted *Pimelea linifolia, Acacia myrtifolia,* and *Lasiopetalum parviflorum*.

### Known Floristic/ Structural Variations:
No variations have been recognised in this sub-community although ecotones with surrounding Headland types is to be expected.

### Distribution:
*Within Gosford LGA* – occurs on exposed coastal headlands on clay substrates on the Bouddi Peninsula and some other headlands.

*Within LHCC Region* – NPWS (2000) have mapped 126ha of their Coastal Headland Complex (Unit 51) remaining in the region.

*Examples Within Gosford LGA*
- Wyrrabalong NP
- Bouddi NP

### Extent:
*Extant* - 17.56 ha

### Relationship to Other Communities:
Coastal Headland Grassland is generally distinct from all other communities in the study area due to the clear dominance of *Themeda australis* occurring on coastal headlands.

### Equivalent Vegetation Types:

- Benson 1981 (Mangrove Creek): n/a
- Benson & Fallding 1981 (Brisbane Water) n/a
- Benson 1986 (Gosf-Lake Mac): Grassland (Unit 21a)
- Clarke & Benson 1986 (Dharug): n/a
- Strom 1986 (Bouddi Peninsula): n/a
- Clarke & Benson 1987 (Mt White/ Mt Olive): n/a
- McRae 1990 (Bouddi Peninsula): Grassland (Unit 1.1)
- Binns 1996 (SF MFD): n/a
- Payne 1997 (Cockle Bay/ Bouddi): n/a
- Bell 1998 (Popran NP): n/a
- Bell 2002 (Wyong LGA): Coastal Headland Complex (Grassland & Shrubland) (Unit 13)

## Significant Species:

- Undescribed species – *none recorded*
- Threatened (TSC Act) – *none recorded, but* Thesium australe *may be present*
- Rare (ROTAP) – *none recorded*

## Community Conservation Status:

*Reserve Representation* - within Gosford, most areas of this vegetation type are protected within appropriate zonings. It is also present within Bouddi NP, and Wyrrabalong NP.

*TSC Act (1995) Status* - not currently listed.

## Mapping Reliability & Included Units:

*High Resolution Area* – this vegetation type has been mapped from aerial photographic interpretation. It is possible that some disturbed stands of other pasture grass species will be included in the mapping.

*Low Resolution Area* – no occurrence within the low resolution area expected.

## Vegetation Structure:

| Stratum | Mean height (m) | Min height (m) | Max height (m) | Mean cover (%) | Sdev | n |
|---|---|---|---|---|---|---|
| Emergent | | | | | | |
| Tallest | 3.00 | 3.00 | 3.00 | 20 | | 1 |
| Middle 1 | | | | | | |
| Middle 2 | | | | | | |
| Middle 3 | | | | | | |
| Lowest | 3.00 | 3.00 | 3.00 | 100 | | 1 |

## Key Diagnostic Species [based on 1 plot]:

| Life Form | Species | Community | | All others | | Fidelity |
|---|---|---|---|---|---|---|
| | | c/a | Freq. | c/a | Freq. | |
| Emergent | *Syncarpia glomulifera subsp. glomulifera* | 1 | 100% | 2 | 28% | uninformative |
| Small tree | *Allocasuarina littoralis* | 1 | 100% | 2 | 14% | uninformative |
| Shrub | *Acacia longifolia* | 3 | 100% | 1 | 11% | positive |
| | *Dillwynia ramosissima* | 1 | 100% | 0 | 0% | unique |
| | *Acacia myrtifolia* | 1 | 100% | 1 | 11% | uninformative |
| | *Acacia suaveolens* | 1 | 100% | 1 | 28% | uninformative |
| | *Acacia ulicifolia* | 1 | 100% | 1 | 24% | uninformative |
| | *Cryptandra amara* | 1 | 100% | 2 | 1% | uninformative |
| | *Dodonaea triquetra* | 1 | 100% | 1 | 17% | uninformative |
| | *Epacris longiflora* | 1 | 100% | 2 | 1% | uninformative |

| | | | | | | |
|---|---|---|---|---|---|---|
| | *Hakea teretifolia* | 1 | 100% | 1 | 17% | uninformative |
| | *Kunzea ambigua* | 1 | 100% | 1 | 3% | uninformative |
| | *Leucopogon ericoides* | 1 | 100% | 1 | 3% | uninformative |
| | *Platylobium formosum* | 1 | 100% | 2 | 10% | uninformative |
| | *Pomaderris ferruginea* | 1 | 100% | 1 | 3% | uninformative |
| | *Pultenaea daphnoides* | 1 | 100% | 1 | 7% | uninformative |
| | *Pultenaea flexilis* | 1 | 100% | 1 | 11% | uninformative |
| | *Woollsia pungens* | 1 | 100% | 1 | 10% | uninformative |
| Herb | *Gonocarpus teucrioides* | 2 | 100% | 1 | 14% | positive |
| | *Opercularia aspera* | 1 | 100% | 1 | 5% | uninformative |
| Grass | *Cynodon dactylon* | 6 | 100% | 1 | 3% | positive |
| | *Themeda australis* | 3 | 100% | 2 | 24% | positive |
| | *Imperata cylindrica var major* | 1 | 100% | 2 | 29% | uninformative |
| | *Entolasia stricta* | 0 | 0% | 2 | 53% | negative |
| Graminoid | *Lomandra longifolia* | 0 | 0% | 2 | 45% | negative |
| Ground fern | *Pteridium esculentum* | 0 | 0% | 2 | 43% | negative |
| Climber | *Hardenbergia violacea* | 3 | 100% | 1 | 10% | positive |
| | *Billardiera scandens* | 1 | 100% | 1 | 29% | uninformative |

# Coastal Headland Shrubland
## Coastal Headland Complex

# Unit E51b
## REMS Unit 51

## General Description:
On Narrabeen series coastal clay headlands and slopes exposed to onshore winds, Coastal Headland Shrubland occurs. This community forms a complex of merging vegetation types dependant on local soil conditions and disturbance history, including Grassland (Units E51a), Low Closed Forest (Unit E51c), and Gully Scrub (E51e). In areas subjected to high levels of coastal exposure yet are still protected to some degree, shrublands of species such as *Allocasuarina distyla, Westringia fruticosa, Melaleuca nodosa, Dodonaea triquetra*, and *Hakea dactyloides* occur. In some places, Bitou Bush (*Chrysanthemoides monilifera* subsp. *rotundata*) has become highly invasive.

## Known Floristic/ Structural Variations:
Variation within this sub-community relates to fire history and extent of exposure. In most situations, *Allocasuarina distyla* clearly dominates the shrub layer, but with regular fire other species may predominate. Invasion by Bitou Bush may also be localised, and stunted trees of *Eucalyptus capitellata, Angophora costata* or *Casuarina glauca* may occur.

## Distribution:
*Within Gosford LGA* – occurs on exposed coastal headlands on clay substrates on the Bouddi Peninsula and other coastal headlands.

*Within LHCC Region* – NPWS (2000) have mapped 126ha of their Coastal Headland Complex (Unit 51) remaining in the region.

*Examples Within Gosford LGA*
- The Skillion, Terrigal
- Captains Cook Memorial Lookout, Copacabana

## Extent:
*Extant* - 234.15 ha

## Relationship to Other Communities:
Coastal Headland Shrubland is distinct from most other communities in the study area due to the dominance of *Allocasuarina distyla* and position in the landscape. Bouddi Sandstone Coastal Heath (Unit E26e) also supports dominant stands of *Allocasuarina distyla*, however that community occurs on Hawkesbury Sandstone geology and

consequently supports a range of species not present on the clay-rich Narrabeen Sandstone headlands (eg: *Banksia ericifolia, Baeckea brevifolia*, and *Epacris longifolia*).

## Equivalent Vegetation Types:

- Benson 1981 (Mangrove Creek): n/a
- Benson & Fallding 1981 (Brisbane Water) n/a
- Benson 1986 (Gosf-Lake Mac): Open-Heath (Unit 21a)
- Clarke & Benson 1986 (Dharug): n/a
- Strom 1986 (Bouddi Peninsula): (?) Low open forest (Unit 3.1), Closed heath (Unit 4.7.2) & Open heath (Unit 4.8.1)
- Clarke & Benson 1987 (Mt White/ Mt Olive): n/a
- McRae 1990 (Bouddi Peninsula): Low-woodland (Unit 1.2) & Closed-heath/ Open-heath (Unit 1.3)
- Binns 1996 (SF MFD): n/a
- Payne 1997 (Cockle Bay/ Bouddi): n/a
- Bell 1998 (Popran NP): n/a
- Bell 2002 (Wyong LGA): Coastal Headland Complex (Grassland & Shrubland) (Unit 13)

## Significant Species:

- Undescribed species – *none recorded*
- Threatened (TSC Act) – *none recorded*
- Rare (ROTAP) – *none recorded*

## Community Conservation Status:

*Reserve Representation* - within Gosford, this vegetation type is present within Bouddi NP and Wyrrabalong NP.

*TSC Act (1995) Status* - not currently listed.

## Mapping Reliability & Included Units:

*High Resolution Area* – this vegetation type has been mapped from aerial photographic interpretation. Areas of heavy infestation by Bitou Bush (*Chrysanthemoides monilifera*) may be included in this mapping.

*Low Resolution Area* – no occurrence within the low resolution area expected.

## Vegetation Structure:

| Stratum | Mean height (m) | Min height (m) | Max height (m) | Mean cover (%) | Sdev | n |
|---|---|---|---|---|---|---|
| Emergent | | | | | | |
| Tallest | 3.67 | 2.00 | 5.00 | 46 | 29.8 | 4 |
| Middle 1 | 1.50 | 1.00 | 2.00 | 85 | 8.7 | 3 |
| Middle 2 | | | | | | |
| Middle 3 | | | | | | |
| Lowest | 0.60 | 0.01 | 1.00 | 46 | 25.0 | 4 |

## Key Diagnostic Species [based on 4 plots]:

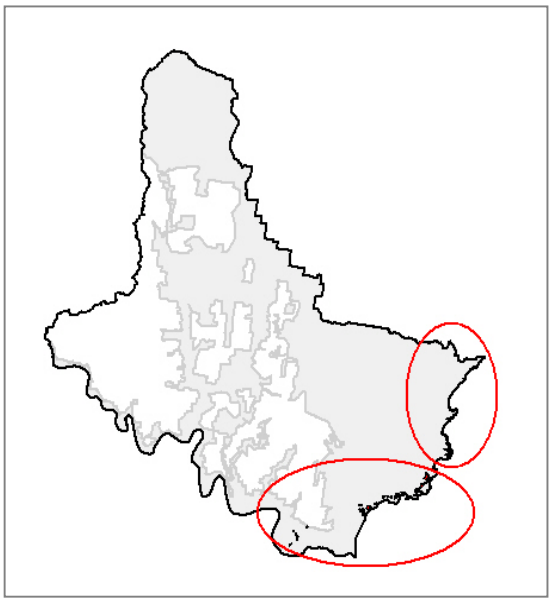
| Life Form | Species | Community | | All others | | Fidelity |
|---|---|---|---|---|---|---|
| | | c/a | Freq. | c/a | Freq. | |
| Tree | *Angophora costata* | 1 | 25% | 2 | 31% | uninformative |
| | *Eucalyptus umbra* | 1 | 25% | 2 | 10% | uninformative |
| Small tree | *Banksia serrata* | 1 | 25% | 2 | 25% | uninformative |
| | *Glochidion ferdinandii* | 1 | 25% | 2 | 28% | uninformative |
| Shrub | *Banksia integrifolia subsp. integrifolia* | 2 | 100% | 1 | 6% | positive |

| | | | | | | |
|---|---|---|---|---|---|---|
| | *Allocasuarina distyla* | 3 | 75% | 2 | 3% | positive |
| | *Westringia fruticosa* | 2 | 75% | 1 | 0% | positive |
| | *Ozothamnus diosmifolius* | 3 | 50% | 1 | 4% | positive |
| | *Lasiopetalum ferrugineum* | 1 | 75% | 1 | 5% | uninformative |
| | *Acacia suaveolens* | 1 | 50% | 1 | 28% | uninformative |
| | *Pittosporum undulatum* | 1 | 50% | 1 | 14% | uninformative |
| | *Leptospermum laevigatum* | 3 | 25% | 2 | 2% | uninformative |
| | *Pimelea linifolia* | 2 | 25% | 1 | 20% | uninformative |
| | *Pomaderris ferruginea* | 2 | 25% | 1 | 3% | uninformative |
| | *Acacia myrtifolia* | 2 | 25% | 1 | 11% | uninformative |
| | *Acacia longifolia* | 1 | 25% | 2 | 11% | uninformative |
| | *Breynia oblongifolia* | 1 | 25% | 1 | 33% | uninformative |
| | *Eriostemon australasius* | 1 | 25% | 2 | 6% | uninformative |
| | *Exocarpos cupressiformis* | 1 | 25% | 1 | 5% | uninformative |
| | *Hakea gibbosa* | 1 | 25% | 1 | 1% | uninformative |
| | *Hakea teretifolia* | 1 | 25% | 1 | 17% | uninformative |
| | *Isopogon anemonifolius* | 1 | 25% | 1 | 18% | uninformative |
| | *Melaleuca hypericifolia* | 1 | 25% | 1 | 0% | uninformative |
| | *Omalanthus populifolius* | 1 | 25% | 1 | 5% | uninformative |
| | *Persoonia lanceolata* | 1 | 25% | 1 | 6% | uninformative |
| | *Woollsia pungens* | 1 | 25% | 1 | 10% | uninformative |
| Sub-shrub | *Astroloma pinifolium* | 1 | 25% | 1 | 1% | uninformative |
| | *Scaevola ramosissima* | 1 | 25% | 1 | 8% | uninformative |
| Herb | *Calandrinia pickeringii* | 1 | 25% | 0 | 0% | unique |
| | *Chloanthes stoechadis* | 2 | 25% | 0 | 0% | unique |
| | *Senecio lautus* | 1 | 50% | 1 | 0% | uninformative |
| | *Tricoryne elatior* | 2 | 25% | 1 | 1% | uninformative |
| | *Pratia purpurascens* | 2 | 25% | 2 | 21% | uninformative |
| | *Actinotus helianthi* | 2 | 25% | 1 | 7% | uninformative |
| | *Commelina cyanea* | 1 | 25% | 1 | 7% | uninformative |
| | *Correa reflexa* | 1 | 25% | 1 | 5% | uninformative |
| | *Tetragonia tetragonioides* | 1 | 25% | 1 | 0% | uninformative |
| | *Viola hederacea* | 1 | 25% | 2 | 13% | uninformative |
| | *Xanthosia tridentata* | 1 | 25% | 1 | 10% | uninformative |
| Grass | *Themeda australis* | 4 | 100% | 2 | 23% | positive |
| | *Entolasia stricta* | 1 | 50% | 2 | 53% | negative |
| | *Imperata cylindrica var major* | 1 | 25% | 2 | 29% | uninformative |
| Graminoid | *Lomandra longifolia* | 2 | 75% | 2 | 44% | constant |
| | *Dianella caerulea* | 1 | 50% | 1 | 51% | uninformative |
| | *Lomandra glauca* | 1 | 25% | 2 | 18% | uninformative |
| | *Lomandra obliqua* | 1 | 25% | 2 | 19% | uninformative |
| Ground fern | *Adiantum aethiopicum* | 2 | 50% | 2 | 12% | positive |
| | *Blechnum ambiguum* | 1 | 25% | 2 | 0% | uninformative |
| | *Pteridium esculentum* | 0 | 0% | 2 | 43% | negative |
| Climber | *Hardenbergia violacea* | 2 | 50% | 1 | 10% | positive |
| | *Billardiera scandens* | 1 | 50% | 1 | 29% | uninformative |
| | *Parsonsia straminea* | 3 | 25% | 1 | 20% | uninformative |
| | *Kennedia rubicunda* | 3 | 25% | 1 | 11% | uninformative |
| | *Cassytha pubescens* | 1 | 25% | 1 | 8% | uninformative |
| | *Cayratia clematidea* | 1 | 25% | 1 | 6% | uninformative |
| | *Glycine clandestina* | 1 | 25% | 2 | 22% | uninformative |
| | *Glycine tabacina* | 1 | 25% | 2 | 2% | uninformative |
| | *Hibbertia dentata* | 1 | 25% | 1 | 10% | uninformative |
| | *Hibbertia scandens* | 1 | 25% | 1 | 14% | uninformative |
| | *Marsdenia rostrata* | 1 | 25% | 1 | 5% | uninformative |
| | *Pandorea pandorana subsp. pandorana* | 1 | 25% | 1 | 24% | uninformative |
| | *Sarcopetalum harveyanum* | 1 | 25% | 1 | 11% | uninformative |
| | *Smilax glyciphylla* | 1 | 25% | 1 | 19% | uninformative |

| | | | | | | |
|---|---|---|---|---|---|---|
| | *Stephania japonica var discolor* | 1 | 25% | 1 | 17% | uninformative |
| Sedge/ Rush | *Gahnia melanocarpa* | 5 | 25% | 1 | 5% | uninformative |
| | *Gahnia sieberiana* | 2 | 25% | 1 | 6% | uninformative |

# Coastal Headland Low Forest
## Coastal Headland Complex

# Unit E51c
## REMS Unit 51



## General Description:
On coastal clay headlands and slopes exposed to onshore winds, Coastal Headland Low Forest occurs. This community forms a complex of merging vegetation types dependant on local soil conditions and disturbance history, including Grassland (Units E51a), Shrubland (Unit E51b & E51d), and Gully Scrub (E51e). In areas with protection from on-shore winds away from the immediate coastline a low closed forest develops. Stunted canopy species such as *Eucalyptus capitellata, Eucalyptus paniculata* subsp*. paniculata, Eucalyptus umbra* and *Angophora costata* occur over a sparse shrub layer, and a normally well developed herb layer including *Lomandra longifolia* and *Macrozamia reducta*. The ground surface is also often rocky supporting a thin soil.

## Known Floristic/ Structural Variations:
No variations have been delineated for this sub-community.

## Distribution:
*Within Gosford LGA* – occurs on exposed coastal headlands on clay substrates on the Bouddi Peninsula and other headland locations.

*Within LHCC Region* – NPWS (2000) have mapped 126ha of their Coastal Headland Complex (Unit 51) remaining in the region.

*Examples Within Gosford LGA*
- Captain Cooks Memorial Lookout, Copacabana
- Coast Road, North Avoca

## Extent:
*Extant* - 184.85 ha

## Relationship to Other Communities:
Coastal Headland Shrubland is distinct from all other communities in the study area due to the low closed forest structure supporting *Eucalyptus capitellata, Eucalyptus paniculata* and *Eucalyptus umbra*, and the position in the landscape.

## Equivalent Vegetation Types:

- Benson 1981 (Mangrove Creek): n/a
- Benson & Fallding 1981 (Brisbane Water) n/a
- Benson 1986 (Gosf-Lake Mac): Open-Heath (Unit 21a)
- Clarke & Benson 1986 (Dharug): n/a
- Strom 1986 (Bouddi Peninsula): (?) Low open forest (Unit 3.1)
- Clarke & Benson 1987 (Mt White/ Mt Olive): n/a
- McRae 1990 (Bouddi Peninsula): Woodland/ low woodland (Unit 1.5)
- Binns 1996 (SF MFD): n/a
- Payne 1997 (Cockle Bay/ Bouddi): Woodland/ low woodland (Unit 1.5)
- Bell 1998 (Popran NP): n/a
- Bell 2002 (Wyong LGA): Coastal Headland Complex (Grassland & Shrubland) (Unit 13)

## Significant Species:

- Undescribed species – *none recorded*
- Threatened (TSC Act) – *none recorded*
- Rare (ROTAP) – *none recorded*

## Community Conservation Status:

*Reserve Representation* - within Gosford, areas of this vegetation type are present in Bouddi NP and Wyrrabalong NP.

*TSC Act (1995) Status* - not currently listed.

## Mapping Reliability & Included Units:

*High Resolution Area* – this vegetation type has been mapped from aerial photographic interpretation. Areas of heavy infestation by Bitou Bush (*Chrysanthemoides monilifera*) may be included in this mapping.

*Low Resolution Area* – no occurrence within the low resolution area expected.

## Vegetation Structure:

| Stratum | Mean height (m) | Min height (m) | Max height (m) | Mean cover (%) | Sdev | n |
|---|---|---|---|---|---|---|
| Emergent | | | | | | |
| Tallest | 11.25 | 6.00 | 25.00 | 62 | 15.2 | 5 |
| Middle 1 | 2.06 | 1.00 | 3.00 | 22 | 9.1 | 5 |
| Middle 2 | | | | | | |
| Middle 3 | | | | | | |
| Lowest | 0.67 | 0.10 | 2.00 | 60 | 32.2 | 5 |

## Key Diagnostic Species [based on 5 plots]:

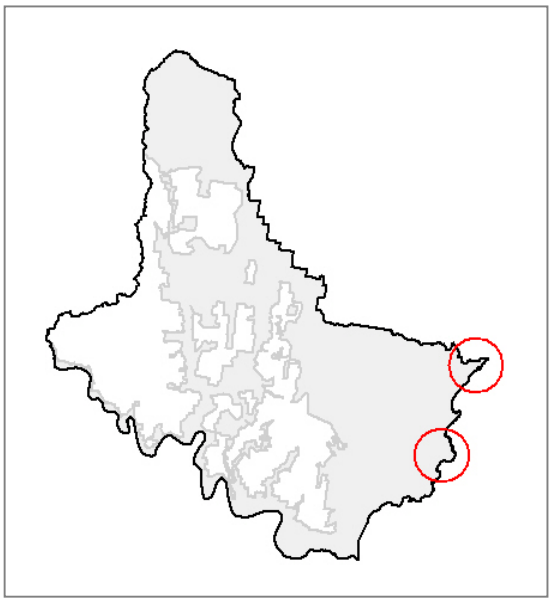
| Life Form | Species | Community | | All others | | Fidelity |
|---|---|---|---|---|---|---|
| | | c/a | Freq. | c/a | Freq. | |
| Tree | *Eucalyptus paniculata subsp. paniculata* | 3 | 100% | 2 | 8% | positive |
| | *Eucalyptus umbra* | 5 | 80% | 2 | 9% | positive |
| | *Syncarpia glomulifera subsp. glomulifera* | 2 | 20% | 2 | 29% | uninformative |
| | *Eucalyptus botryoides* | 2 | 20% | 2 | 2% | uninformative |
| | *Acmena smithii* | 1 | 20% | 2 | 14% | uninformative |
| | *Eucalyptus pilularis* | 1 | 20% | 3 | 14% | uninformative |
| Small tree | *Glochidion ferdinandii* | 2 | 40% | 2 | 28% | positive |
| | *Synoum glandulosum subsp. glandulosum* | 1 | 40% | 1 | 12% | uninformative |

| | | | | | | |
|---|---|---|---|---|---|---|
| | *Acacia maidenii* | 1 | 20% | 1 | 5% | uninformative |
| | *Allocasuarina littoralis* | 1 | 20% | 2 | 14% | uninformative |
| | *Tristaniopsis collina* | 1 | 20% | 3 | 0% | uninformative |
| Shrub | *Pittosporum undulatum* | 3 | 80% | 1 | 13% | positive |
| | *Banksia spinulosa* | 4 | 40% | 2 | 16% | positive |
| | *Dodonaea triquetra* | 3 | 40% | 1 | 17% | positive |
| | *Acacia longifolia* | 2 | 40% | 1 | 11% | positive |
| | *Leptospermum polygalifolium* | 2 | 40% | 2 | 24% | positive |
| | *Maytenus silvestris* | 2 | 40% | 1 | 9% | positive |
| | *Persoonia linearis* | 2 | 40% | 1 | 26% | positive |
| | *Podolobium ilicifolium* | 2 | 40% | 2 | 12% | positive |
| | *Rapanea variabilis* | 2 | 40% | 1 | 15% | positive |
| | *Pomaderris lanigera* | 1 | 20% | 0 | 0% | unique |
| | *Macrozamia communis* | 1 | 100% | 2 | 10% | uninformative |
| | *Breynia oblongifolia* | 1 | 80% | 1 | 32% | uninformative |
| | *Polyscias sambucifolia* | 1 | 80% | 1 | 17% | uninformative |
| | *Leucopogon lanceolatus var lanceolatus* | 1 | 60% | 1 | 4% | uninformative |
| | *Pittosporum revolutum* | 1 | 60% | 1 | 12% | uninformative |
| | *Elaeocarpus reticulatus* | 1 | 40% | 1 | 9% | uninformative |
| | *Notelaea longifolia* | 1 | 40% | 1 | 16% | uninformative |
| | *Acacia myrtifolia* | 4 | 20% | 1 | 11% | uninformative |
| | *Lasiopetalum ferrugineum* | 3 | 20% | 1 | 5% | uninformative |
| | *Xanthorrhoea macronema* | 3 | 20% | 2 | 3% | uninformative |
| | *Leptospermum laevigatum* | 2 | 20% | 3 | 2% | uninformative |
| | *Hibbertia empetrifolia subsp. empetrifolia* | 2 | 20% | 1 | 11% | uninformative |
| | *Pomaderris ferruginea* | 2 | 20% | 1 | 3% | uninformative |
| | *Allocasuarina distyla* | 2 | 20% | 2 | 3% | uninformative |
| | *Acacia suaveolens* | 1 | 20% | 1 | 28% | uninformative |
| | *Acacia ulicifolia* | 1 | 20% | 1 | 24% | uninformative |
| | *Banksia integrifolia subsp. integrifolia* | 1 | 20% | 1 | 7% | uninformative |
| | *Clerodendrum tomentosum* | 1 | 20% | 1 | 11% | uninformative |
| | *Eupomatia laurina* | 1 | 20% | 1 | 7% | uninformative |
| | *Hakea sericea* | 1 | 20% | 1 | 11% | uninformative |
| | *Indigofera australis* | 1 | 20% | 1 | 4% | uninformative |
| | *Leptospermum polyanthum* | 1 | 20% | 4 | 0% | uninformative |
| | *Leucopogon juniperinus* | 1 | 20% | 1 | 1% | uninformative |
| | *Petrophile pulchella* | 1 | 20% | 2 | 18% | uninformative |
| | *Phyllanthus gunnii* | 1 | 20% | 1 | 2% | uninformative |
| | *Platylobium formosum* | 1 | 20% | 2 | 10% | uninformative |
| | *Pultenaea daphnoides* | 1 | 20% | 1 | 7% | uninformative |
| | *Woollsia pungens* | 1 | 20% | 1 | 10% | uninformative |
| | *Xanthorrhoea media* | 1 | 20% | 2 | 15% | uninformative |
| | *Xanthorrhoea resinifera* | 1 | 20% | 1 | 8% | uninformative |
| | *Zieria smithii* | 1 | 20% | 1 | 4% | uninformative |
| Tree fern | *Cyathea australis* | 1 | 20% | 1 | 1% | uninformative |
| Herb | *Actinotus helianthi* | 1 | 40% | 1 | 6% | uninformative |
| | *Commelina cyanea* | 1 | 20% | 1 | 7% | uninformative |
| | *Correa reflexa* | 1 | 20% | 1 | 5% | uninformative |
| | *Pseuderanthemum variabile* | 1 | 20% | 2 | 17% | uninformative |
| | *Viola hederacea* | 2 | 20% | 2 | 13% | uninformative |
| Grass | *Imperata cylindrica var major* | 1 | 60% | 2 | 29% | uninformative |
| | *Entolasia stricta* | 2 | 60% | 2 | 53% | constant |
| | *Oplismenus aemulus* | 2 | 20% | 1 | 5% | uninformative |
| | *Themeda australis* | 1 | 20% | 2 | 24% | uninformative |
| Graminoid | *Dianella caerulea* | 2 | 100% | 1 | 50% | positive |
| | *Lomandra obliqua* | 4 | 20% | 2 | 19% | uninformative |
| | *Patersonia sericea* | 1 | 20% | 2 | 18% | uninformative |
| | *Lomandra longifolia* | 1 | 100% | 2 | 44% | negative |

| | | | | | | |
|---|---|---|---|---|---|---|
| Ground fern | *Adiantum aethiopicum* | 3 | 20% | 2 | 12% | uninformative |
| | *Blechnum cartilagineum* | 1 | 20% | 2 | 16% | uninformative |
| | *Doodia aspera* | 1 | 20% | 2 | 13% | uninformative |
| | *Schizaea bifida* | 1 | 20% | 1 | 4% | uninformative |
| | *Pteridium esculentum* | 1 | 40% | 2 | 42% | negative |
| Epiphtyic fern | *Davallia solida var pyxidata* | 1 | 20% | 1 | 1% | uninformative |
| Climber | *Cissus hypoglauca* | 2 | 60% | 1 | 17% | positive |
| | *Smilax australis* | 4 | 40% | 1 | 22% | positive |
| | *Eustrephus latifolius* | 1 | 100% | 1 | 24% | uninformative |
| | *Geitonoplesium cymosum* | 1 | 100% | 1 | 23% | uninformative |
| | *Pandorea pandorana subsp. pandorana* | 1 | 100% | 1 | 23% | uninformative |
| | *Glycine clandestina* | 1 | 80% | 2 | 22% | uninformative |
| | *Billardiera scandens* | 1 | 60% | 1 | 29% | uninformative |
| | *Kennedia rubicunda* | 1 | 40% | 1 | 11% | uninformative |
| | *Sarcopetalum harveyanum* | 1 | 40% | 1 | 11% | uninformative |
| | *Hibbertia dentata* | 2 | 20% | 1 | 10% | uninformative |
| | *Parsonsia straminea* | 2 | 20% | 1 | 20% | uninformative |
| | *Cayratia clematidea* | 1 | 20% | 1 | 6% | uninformative |
| | *Clematis aristata* | 1 | 20% | 1 | 10% | uninformative |
| | *Desmodium varians* | 1 | 20% | 2 | 11% | uninformative |
| | *Dioscorea transversa* | 1 | 20% | 1 | 11% | uninformative |
| | *Hibbertia scandens* | 1 | 20% | 1 | 14% | uninformative |
| | *Mirbelia rubiifolia* | 1 | 20% | 2 | 6% | uninformative |
| | *Rubus moluccanus var trilobus* | 1 | 20% | 1 | 7% | uninformative |
| | *Smilax glyciphylla* | 1 | 20% | 1 | 19% | uninformative |
| Sedge/ Rush | *Lepidosperma laterale* | 2 | 60% | 2 | 27% | positive |
| | *Gahnia melanocarpa* | 2 | 40% | 1 | 4% | positive |
| | *Lepidosperma longitudinale* | 6 | 20% | 1 | 1% | uninformative |
| | *Cyathochaeta diandra* | 1 | 20% | 2 | 21% | uninformative |
| | *Gahnia clarkei* | 1 | 20% | 2 | 11% | uninformative |

# Coastal Headland Paperbark Scrub — Unit E51d

## Coastal Headland Complex — REMS Unit 51



## General Description:

On some coastal clay headlands exposed to onshore winds, Coastal Headland Paperbark Scrub occurs. This sub-community forms a complex of merging vegetation types dependant on local soil conditions and disturbance history, including Grassland (Units E51a), Shrubland (Unit E51b), Low Forest (Unit E51c), and Gully Scrub (E51e). In areas with particularly clayey soils and exposed to on-shore winds, a dense scrub of *Melaleuca nodosa* develops. Stunted canopy species such as *Eucalyptus paniculata* subsp. *paniculata* or *Eucalyptus capitellata* are also present over a sparse ground layer. In places, *Angophora floribunda* is common as an emergent. This sub-community has yet to be sampled in detail.

## Known Floristic/ Structural Variations:

No variations have been delineated for this sub-community.

## Distribution:

*Within Gosford LGA* – occurs on exposed coastal headlands on clay substrates. Known with confidence in the Forresters Beach area, but may also occur on the Bouddi Peninsula and other headland locations.

*Within LHCC Region* – NPWS (2000) have mapped 126ha of their Coastal Headland Complex (Unit 51) remaining in the region.

*Examples Within Gosford LGA*

- North Scenic Road, Forresters Beach

## Extent:

*Extant* - 4.06 ha

## Relationship to Other Communities:

Coastal Headland Paperbark Scrub is floristically similar to Estuarine Paperbark Backswamp Forest (Unit E43a) through the sharing of dense stands of *Melaleuca nodosa* and emergent *Eucalyptus paniculata* subsp. *paniculata*. However, Unit E51d occurs on elevated clifftop locations while Unit E43a occurs in backswamp locations in estuarine environments, and is also better developed structurally. Coastal Headland Shrubland (Unit E51b) occurs in similar clifftop environments, but is dominated by *Allocasuarina distyla*. Fire history may explain the floristic difference between the two.

## Equivalent Vegetation Types:

- Benson 1981 (Mangrove Creek): n/a
- Benson & Fallding 1981 (Brisbane Water) n/a
- Benson 1986 (Gosf-Lake Mac): (?) Open-Heath (Unit 21a)
- Clarke & Benson 1986 (Dharug): n/a
- Strom 1986 (Bouddi Peninsula): n/a
- Clarke & Benson 1987 (Mt White/ Mt Olive): n/a
- McRae 1990 (Bouddi Peninsula): n/a
- Binns 1996 (SF MFD): n/a
- Payne 1997 (Cockle Bay/ Bouddi): n/a
- Bell 1998 (Popran NP): n/a
- Bell 2002 (Wyong LGA): (?) Coastal Headland Complex (Grassland & Shrubland) (Unit 13)

## Significant Species:

- Undescribed species – *none recorded*
- Threatened (TSC Act) – *Diuris praecox* (confirmation required)
- Rare (ROTAP) – *none recorded*

## Community Conservation Status:

*Reserve Representation* - within Gosford, small areas of this vegetation type are known from Wyrrabalong NP, and it may also be present in Bouddi NP.

*TSC Act (1995) Status* - not currently listed.

## Mapping Reliability & Included Units:

*High Resolution Area* – this vegetation type has been mapped from aerial photographic interpretation and ground truthing. The extent of representation may be under-represented in parts of the Bouddi Peninsula.

*Low Resolution Area* – no occurrence within the low resolution area expected.

## Vegetation Structure:

| Stratum | Mean height (m) | Min height (m) | Max height (m) | Mean cover (%) | Sdev | n |
|---|---|---|---|---|---|---|
| Emergent | | | | | | |
| Tallest | 3.00 | 3.00 | 3.00 | 80 | | 1 |
| Middle 1 | 1.00 | 1.00 | 1.00 | 30 | | 1 |
| Middle 2 | | | | | | |
| Middle 3 | | | | | | |
| Lowest | 1.00 | 1.00 | 1.00 | 100 | | 1 |

## Key Diagnostic Species [based on 1 plot]:

| Life Form | Species | Community | | All others | | Fidelity |
|---|---|---|---|---|---|---|
| | | c/a | Freq. | c/a | Freq. | |
| Tree | *Brachychiton populneus subsp. populneus* | 1 | 100% | 0 | 0% | unique |
| | *Angophora floribunda* | 1 | 100% | 2 | 19% | uninformative |
| | *Eucalyptus paniculata subsp. paniculata* | 1 | 100% | 3 | 9% | uninformative |
| Small tree | *Glochidion ferdinandii* | 1 | 100% | 2 | 28% | uninformative |
| Shrub | *Melaleuca nodosa* | 4 | 100% | 4 | 3% | positive |

| | | | | | | |
|---|---|---|---|---|---|---|
| | *Pomaderris ferruginea* | 3 | 100% | 1 | 3% | positive |
| | *Banksia spinulosa* | 2 | 100% | 2 | 16% | positive |
| | *Leptospermum polygalifolium* | 2 | 100% | 2 | 24% | positive |
| | *Acacia myrtifolia* | 1 | 100% | 1 | 11% | uninformative |
| | *Allocasuarina distyla* | 1 | 100% | 2 | 3% | uninformative |
| | *Epacris microphylla var microphylla* | 1 | 100% | 2 | 3% | uninformative |
| | *Hakea dactyloides* | 1 | 100% | 1 | 20% | uninformative |
| | *Isopogon anemonifolius* | 1 | 100% | 1 | 18% | uninformative |
| | *Lasiopetalum ferrugineum* | 1 | 100% | 1 | 5% | uninformative |
| | *Macrozamia communis* | 1 | 100% | 2 | 11% | uninformative |
| | *Pittosporum revolutum* | 1 | 100% | 1 | 12% | uninformative |
| | *Pittosporum undulatum* | 1 | 100% | 1 | 14% | uninformative |
| | *Xanthorrhoea macronema* | 1 | 100% | 2 | 3% | uninformative |
| Herb | *Gonocarpus teucrioides* | 1 | 100% | 1 | 14% | uninformative |
| | *Xanthosia tridentata* | 1 | 100% | 1 | 10% | uninformative |
| Grass | *Imperata cylindrica var major* | 1 | 100% | 2 | 29% | uninformative |
| | *Entolasia stricta* | 0 | 0% | 2 | 53% | negative |
| Graminoid | *Lomandra longifolia* | 1 | 100% | 2 | 44% | negative |
| Ground fern | *Pteridium esculentum* | 0 | 0% | 2 | 43% | negative |
| Climber | *Billardiera scandens* | 1 | 100% | 1 | 29% | uninformative |
| | *Geitonoplesium cymosum* | 1 | 100% | 1 | 24% | uninformative |
| | *Marsdenia rostrata* | 1 | 100% | 1 | 5% | uninformative |
| | *Pandorea pandorana subsp. pandorana* | 1 | 100% | 1 | 24% | uninformative |
| | *Parsonsia straminea* | 1 | 100% | 1 | 19% | uninformative |
| | *Smilax glyciphylla* | 1 | 100% | 1 | 19% | uninformative |
| Sedge/ Rush | *Schoenus brevifolius* | 6 | 100% | 1 | 4% | positive |

# Coastal Headland Gully Scrub
## Coastal Headland Complex

# Unit E51e
## REMS Unit 51

## General Description:
Coastal Headland Gully Scrub is a poorly defined vegetation type occurring in gully lines on coastal headlands, where exposure to on-shore winds is high. It represents a scrubby vegetation where elements of the coastal complex of Shrubland (Unit E51b) and Low Forest (Unit E51c) merge in gully situations. Typically, low emergent eucalypts such as *Eucalyptus umbra* and *Eucalyptus paniculata* occur over a scrubby understorey of various species, which may include littoral rainforest elements such as *Cupaniopsis anacaroides, Acmena smithii* and *Cassine australe*. Further survey and research is required within the Coastal Headland complex of vegetation, as this sub-community has yet to be sampled in detail. In some areas (such as Wiley's Bay), *Eucalyptus botryoides* also occurs in the emergent layer.

## Known Floristic/ Structural Variations:
No variations have been delineated for this sub-community.

## Distribution:
*Within Gosford LGA* – occurs in gully situations on exposed coastal headlands on clay substrates.

*Within LHCC Region* – NPWS (2000) have mapped 126ha of their Coastal Headland Complex (Unit 51) remaining in the region, which would include this sub-community.

*Examples Within Gosford LGA*
- Captain Cook Memorial Lookout, Copacabana
- Avoca Beach
- Wileys Bay

## Extent:
*Extant* - 0.85 ha

## Relationship to Other Communities:
The littoral rainforest elements within the Coastal Headland Gully Scrub distinguish this sub-community from other components of the Coastal Headland complex. However, further work is required to better understand floristic relationships.

## Equivalent Vegetation Types:

- Benson 1981 (Mangrove Creek): n/a
- Benson & Fallding 1981 (Brisbane Water) n/a
- Benson 1986 (Gosf-Lake Mac): n/a
- Clarke & Benson 1986 (Dharug): n/a
- Strom 1986 (Bouddi Peninsula): n/a
- Clarke & Benson 1987 (Mt White/ Mt Olive): n/a
- McRae 1990 (Bouddi Peninsula): n/a
- Binns 1996 (SF MFD): n/a
- Payne 1997 (Cockle Bay/ Bouddi): n/a
- Bell 1998 (Popran NP): n/a
- Bell 2002 (Wyong LGA): (?) Coastal Headland Complex (Grassland & Shrubland) (Unit 13)

## Significant Species:

- Undescribed species – *none recorded*
- Threatened (TSC Act) – *none recorded*
- Rare (ROTAP) – *none recorded*

## Community Conservation Status:

*Reserve Representation* - not known from reservation areas, although coastal planning policies apply.

*TSC Act (1995) Status* - not currently listed.

## Mapping Reliability & Included Units:

*High Resolution Area* – this vegetation type has been mapped from aerial photographic interpretation and ground truthing. The extent of representation may be under-represented in parts, as small gully lines have not been delineated from the surrounding sub-communities.

*Low Resolution Area* – no occurrence within the low resolution area expected.

## Vegetation Structure:

| Stratum | Mean height (m) | Min height (m) | Max height (m) | Mean cover (%) | Sdev | n |
|---|---|---|---|---|---|---|
| Emergent | | | | | | |
| Tallest | 1.00 | 1.00 | 1.00 | 80 | | 1 |
| Middle 1 | 1.00 | 1.00 | 1.00 | 40 | | 1 |
| Middle 2 | | | | | | |
| Middle 3 | | | | | | |
| Lowest | 1.00 | 1.00 | 1.00 | 20 | | 1 |

## Key Diagnostic Species [based on 1 plot]:

| Life Form | Species | Community | | All others | | Fidelity |
|---|---|---|---|---|---|---|
| | | c/a | Freq. | c/a | Freq. | |
| Tree | *Acmena smithii* | 2 | 100% | 2 | 14% | positive |
| Shrub | *Banksia integrifolia subsp. integrifolia* | 2 | 100% | 1 | 7% | positive |
| | *Westringia fruticosa* | 1 | 100% | 2 | 1% | uninformative |
| Herb | *Hydrocotyle spp.* | 5 | 100% | 0 | 0% | unique |
| | *Samolus repens* | 3 | 100% | 1 | 2% | positive |
| | *Viola hederacea* | 3 | 100% | 2 | 13% | positive |
| Grass | *Themeda australis* | 3 | 100% | 2 | 24% | positive |
| | *Cynodon dactylon* | 2 | 100% | 1 | 3% | positive |

| | | | | | | |
|---|---|---|---|---|---|---|
| | *Imperata cylindrica var major* | 1 | 100% | 2 | 29% | uninformative |
| | *Oplismenus aemulus* | 1 | 100% | 2 | 5% | uninformative |
| | *Entolasia stricta* | 0 | 0% | 2 | 53% | negative |
| Graminoid | *Lomandra longifolia* | 5 | 100% | 2 | 44% | constant |
| | *Dianella caerulea* | 1 | 100% | 1 | 51% | uninformative |
| Ground fern | *Adiantum aethiopicum* | 2 | 100% | 2 | 12% | positive |
| | *Pteridium esculentum* | 0 | 0% | 2 | 43% | negative |
| Climber | *Kennedia rubicunda* | 1 | 100% | 1 | 11% | uninformative |
| | *Stephania japonica var discolor* | 1 | 100% | 1 | 17% | uninformative |
| Sedge/ Rush | *Isolepis nodosa* | 1 | 100% | 2 | 1% | uninformative |

# Coastal Sand Beach Spinifex
## Beach Spinifex

# Unit E53
## REMS Unit 53

## General Description:
Coastal Sand Beach Spinifex represents a floristically simple and highly sensitive vegetation type occurring on the frontal beach dunes along the coastline. Spinifex (*Spinifex sericeus*) characterises the community, although other species may occasionally occur, most notably *Carpobrotus glaucescens* and *Scaevola calendulacea*. Heavy invasion by Bitou Bush (*Chrysanthemoides monilifera*) has occurred along much of the coastline in the region, impacting on this community.

## Known Floristic/ Structural Variations:
No variations are recognised, although in some instances a scattered small tree or shrub layer of *Leptospermum laevigatum* may be present, particularly along the upper extent of this type where it merges with other sand-based communities.

## Distribution:
*Within Gosford LGA* - occurs only along the immediate coastline.

*Within LHCC Region* – NPWS (2000) have not mapped or calculated extant areas of their Beach Spinifex due to the small areas of occurrence.

*Examples Within Gosford LGA*
- Wyrrabalong NP
-

## Extent:
*Extant* - 2.18 ha mapped, but additional areas possible.

## Relationship to Other Communities:
No other vegetation community within the study area is characterised by Spinifex, although it may occasionally occur in Coastal Sand Foredune Scrub (Unit E50a). However, the dominance of *Acacia* spp. in that community clearly separates the two.

## Equivalent Vegetation Types:

- Benson 1981 (Mangrove Creek): n/a
- Benson & Fallding 1981 (Brisbane Water) n/a
- Benson 1986 (Gosf-Lake Mac): n/a
- Clarke & Benson 1986 (Dharug): n/a
- Strom 1986 (Bouddi Peninsula): n/a
- Clarke & Benson 1987 (Mt White/ Mt Olive): n/a
- McRae 1990 (Bouddi Peninsula): n/a
- Binns 1996 (SF MFD): n/a
- Payne 1997 (Cockle Bay/ Bouddi): n/a
- Bell 1998 (Popran NP): n/a
- Bell 2002 (Wyong LGA): Coastal Sand Beach Spinifex (Unit 4)

## Significant Species:

- Undescribed species – *none recorded*
- Threatened (TSC Act) – *Chamaesyce psammatogeton*
- Rare (ROTAP) – *none recorded*

## Community Conservation Status:

*Reserve Representation* - within Gosford, minor areas of this vegetation type are present within Wyrrabalong NP.

*TSC Act (1995) Status* - not currently listed.

## Mapping Reliability & Included Units:

*High Resolution Area* – this vegetation type has been mapped only sparingly, but other areas of coastal beach sand have been mapped and may be used as a surrogate.

*Low Resolution Area* – no occurrence within the low resolution area expected.

## Vegetation Structure:

No structural data is yet available for this community, however it typically comprises a sparse grass layer up to 0.5m in height.

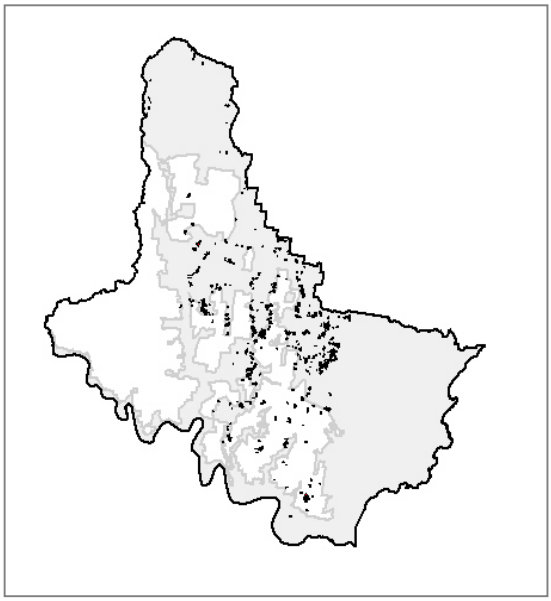
## Key Diagnostic Species [no plots available]:

Diagnostic species have not been generated for this community due to a lack of suitable floristic data, however *Spinifex sericeus* is characteristic. As a guide, the following species list has been extracted from the regional REMS profiles (NPWS 2000), but it has not been possible to rationalise this list with communities delineated during the present study.

| Life Form | Species | Community | | All others | | Fidelity |
|---|---|---|---|---|---|---|
| | | c/a | Freq. | c/a | Freq. | |
| Grass | *Spinifex sericeus* | - | - | - | - | - |
| | *Sporobolus virginicus* | - | - | - | - | - |
| Sedge/ Rush | *Carex pumila* | - | - | - | - | |

# Sandstone Hanging Swamps
## Sandstone Hanging Swamps

# Unit E54
## REMS Unit 54



## General Description:

Sandstone Hanging Swamps within Gosford are restricted in distribution, but also display a diverse range of structural and floristic forms. Floristic composition is likely to be related to water table depth and the type of soil accumulated. Some forms of hanging swamp show strong similarities to those occurring on sandstone at higher elevations, such as in the Blue Mountains/ Wollemi region. Others appear to be more closely related to the surrounding Exposed Hawkesbury Woodlands. Four forms of hanging swamp have been recognised in the current classification, although a considerable amount of additional sampling in hanging swamps elsewhere in Gosford is required to enable a better understanding of their relationships. In particular, sampling is required in many of the swamps within the low resolution mapping area.

## Known Floristic/ Structural Variations:

There is considerable floristic and structural variation within the hanging swamps in the region, and relatively few of these have been adequately sampled. As a consequence, the vast majority of swamps have not been attributed a variant status, but remain tagged as E54. So that available data is not lost to future research, those swamps known to support particular floristic assemblages have been tentatively attributed to one of four recognisable variations. Note that these variants have not been consistently applied across the LGA, but only in cases where they are known to occur.

(a) *Leptospermum-Glechenia* hanging swamp (mapped as E54a) – on restricted parts of the Somersby Plateau around Somersby, a characteristic form of hanging swamp or fernland occurs where Coral Fern (*Glechenia dicarpa*) dominates the ground layer, together with *Todea barbara* and *Gahnia sieberiana*. A tall shrub layer of *Leptospermum polygalifolium* and *Leptospermum juniperinum* can occur either in dense thickets or as a sparse overstorey.

(b) *Gymnoschoenus-Banksia-Sprengelia* hanging swamp (mapped as E54b) – further north around Mangrove, the hanging swamps there comprise a dense ground layer of the sedge Gymnoschoenus sphaerocephalus, together with a diverse range of shrub species including *Banksia robur, Sprengelia incarnata, Symphionema paludosa, Epacris obtusifolia, Banksia oblongifolia, Leptospermum juniperinum, Almaleea paludosa* and the rare *Gonocarpus salsoloides*.

(c) *Banksia-Hakea-Glechenia-Callistemon* hanging swamp (mapped as E54c) – at one location north of Somersby near the LGA boundary, a form of hanging swamp occurs on a steep slope above a major gully system which supports a very dense shrub layer of *Banksia ericifolia* with *Hakea teretifolia, Callistemon citrinus, Glechenia dicarpa* and *Acacia oxycedrus*.

(d) *Lepyrodia-Schoenus-Lepidosperma* hanging swamp (not yet mapped) – further south around Calga, hanging swamps tend to posses a higher sedge content, with high abundances of species such as *Lepyrodia scariosa,*

*Empodisma minus, Schoenus paludosus, Schoenus brevifolius,* and *Lepidosperma forsythii*. Other species dominant include *Xanthorrhoea resinifera, Banksia oblongifolia, Symphionema paludosa*, and *Gonocarpus salsoloides*.

## Distribution:

*Within Gosford LGA* – occurs in disjunct locations on the Hawkesbury Sandstone plateaus.

*Within LHCC Region* – NPWS (2000) have mapped 356ha in their Sandstone Hanging Swamps and Heaths (Unit 54) as remaining in the region. Note that this figure dramatically under-estimates the true extant value – over 630ha have been mapped for Gosford LGA alone in the current work.

*Examples Within Gosford LGA*

- Sylvesters Road, Somersby (variant a)
- Wisemans Ferry Road, Mangrove (variant b)
- North of "Woburn Farm", Somersby (variant c)
- Popran National Park, Calga (variant d)

## Extent:

*Extant* - 661.68ha

## Relationship to Other Communities:

Sandstone Hanging Swamps are generally floristically and structurally distinct. The combination of species, such as those noted above within each variation, do not generally occur in other heaths or sedgelands. Variant a occupies broad ecotonal bands at the northern end of Peats Ridge with the surrounding Exposed Hawkesbury Woodland, with *Glechenia dicarpa* in particular comprising dominant components of the understorey.

## Equivalent Vegetation Types:

- Benson 1981 (Mangrove Creek): n/a
- Benson & Fallding 1981 (Brisbane Water) Sedgeland (Unit 12)
- Benson 1986 (Gosf-Lake Mac): Sedgeland (Unit 10a)
- Clarke & Benson 1986 (Dharug): n/a
- Strom 1986 (Bouddi Peninsula): n/a
- Clarke & Benson 1987 (Mt White/ Mt Olive): Sedgeland (Unit C5)
- McRae 1990 (Bouddi Peninsula): n/a
- Binns 1996 (SF MFD): n/a
- Payne 1997 (Cockle Bay/ Bouddi): n/a
- Bell 1998 (Popran NP): Hawkesbury Coastal Impeded Sedgeland (Unit SL1) & Hawkesbury Coastal Restioid Heath (Unit H2)
- Bell 2002 (Wyong LGA): Hawkesbury Hanging Swamp (Unit 36)

## Significant Species:

- Undescribed species – *none recorded*
- Threatened (TSC Act) – *Hibbertia procumbens* on upslope edges
- Rare (ROTAP) – *Gonocarpus salsoloides, Grevillea diffusa* subsp*. filipendula*

## Community Conservation Status:

*Reserve Representation* - within Gosford, this vegetation type is known from Popran and Brisbane Water NP's, although it is currently unclear whether or not all variations are present within reserve.

*TSC Act (1995) Status* - not currently listed.

## Mapping Reliability & Included Units:

*High Resolution Area* – this vegetation type has been mapped from aerial photographic interpretation and ground truthing.

*Low Resolution Area* – this community has been modelled within the REMS Sandstone Hanging Swamps (Unit 54), although this modelling is not considered accurate.

## Vegetation Structure:

| Stratum | Mean height (m) | Min height (m) | Max height (m) | Mean cover (%) | Sdev | n |
|---|---|---|---|---|---|---|
| Emergent | | | | | | |
| Tallest | 2.60 | 0.70 | 5.00 | 7 | 2.1 | 2 |
| Middle 1 | | | | | | |
| Middle 2 | | | | | | |
| Middle 3 | | | | | | |
| Lowest | 0.55 | 0.01 | 1.50 | 100 | 0.0 | 2 |

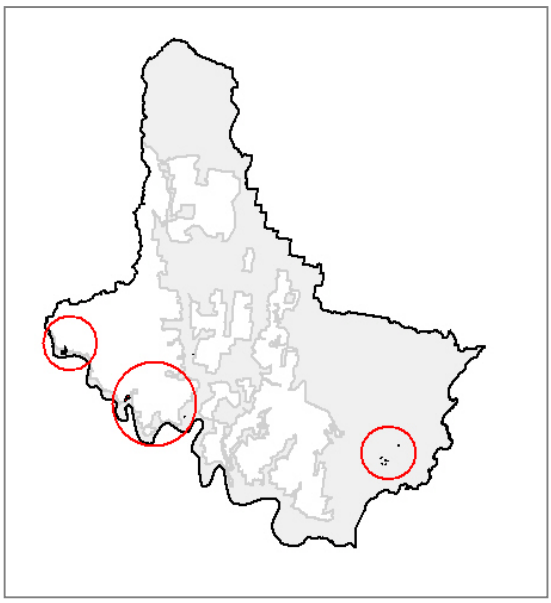
## Key Diagnostic Species [based on 7 plots]:

| Life Form | Species | Community | | All others | | Fidelity |
|---|---|---|---|---|---|---|
| | | c/a | Freq. | c/a | Freq. | |
| Tree | *Angophora costata* | 1 | 14% | 2 | 31% | uninformative |
| | *Eucalyptus pilularis* | 1 | 14% | 3 | 14% | uninformative |
| Shrub | *Epacris obtusifolia* | 2 | 100% | 2 | 0% | positive |
| | *Banksia oblongifolia* | 3 | 86% | 1 | 17% | positive |
| | *Sprengelia incarnata* | 3 | 71% | 1 | 1% | positive |
| | *Banksia robur* | 3 | 57% | 2 | 1% | positive |
| | *Dillwynia floribunda* | 2 | 57% | 2 | 11% | positive |
| | *Hakea teretifolia* | 2 | 57% | 1 | 17% | positive |
| | *Bauera rubioides* | 2 | 43% | 1 | 4% | positive |
| | *Callistemon citrinus* | 2 | 43% | 1 | 3% | positive |
| | *Leptospermum juniperinum* | 2 | 43% | 4 | 2% | positive |
| | *Xanthorrhoea resinifera* | 2 | 43% | 1 | 8% | positive |
| | *Almaleea paludosa* | 2 | 29% | 0 | 0% | unique |
| | *Babingtonia densifolia* | 5 | 14% | 0 | 0% | unique |
| | *Leptospermum continentale* | 2 | 14% | 0 | 0% | unique |
| | *Banksia ericifolia subsp. ericifolia* | 1 | 43% | 3 | 16% | uninformative |
| | *Leptospermum arachnoides* | 5 | 29% | 1 | 3% | uninformative |
| | *Leptospermum polygalifolium* | 4 | 29% | 2 | 24% | uninformative |
| | *Baeckea linifolia* | 4 | 29% | 1 | 0% | uninformative |
| | *Grevillea diffusa subsp. filipendula* | 3 | 29% | 2 | 12% | uninformative |
| | *Baeckea imbricata* | 2 | 29% | 4 | 0% | uninformative |
| | *Bauera microphylla* | 2 | 29% | 2 | 0% | uninformative |
| | *Epacris microphylla var microphylla* | 2 | 29% | 1 | 3% | uninformative |
| | *Viminaria juncea* | 1 | 29% | 1 | 1% | uninformative |
| | *Acacia oxycedrus* | 1 | 29% | 2 | 11% | uninformative |
| | *Acacia suaveolens* | 1 | 29% | 1 | 28% | uninformative |
| Sub-shrub | *Symphionema paludosum* | 3 | 29% | 1 | 0% | uninformative |
| Herb | *Boronia parviflora* | 2 | 57% | 0 | 0% | unique |
| | *Sowerbaea juncea* | 3 | 14% | 0 | 0% | unique |
| | *Blandfordia nobilis* | 2 | 14% | 0 | 0% | unique |
| | *Goodenia dimorpha* | 2 | 14% | 0 | 0% | unique |
| | *Viola caleyana* | 1 | 14% | 0 | 0% | unique |
| | *Burchardia umbellata* | 1 | 43% | 1 | 2% | uninformative |
| | *Dampiera stricta* | 1 | 43% | 1 | 12% | uninformative |
| | *Drosera peltata* | 2 | 29% | 1 | 0% | uninformative |
| | *Blandfordia grandiflora* | 2 | 29% | 1 | 0% | uninformative |
| | *Drosera spatulata* | 2 | 29% | 1 | 1% | uninformative |
| | *Gonocarpus micranthus* | 2 | 29% | 1 | 1% | uninformative |

| | | | | | | |
|---|---|---|---|---|---|---|
| | *Goodenia paniculata* | 2 | 29% | 1 | 0% | uninformative |
| | *Xanthosia tridentata* | 1 | 29% | 1 | 10% | uninformative |
| Grass | *Entolasia stricta* | 2 | 71% | 2 | 53% | constant |
| | *Aristida warburgii* | 2 | 29% | 2 | 2% | uninformative |
| Graminoid | *Xyris gracilis* | 2 | 43% | 2 | 1% | positive |
| | *Xyris operculata* | 2 | 29% | 0 | 0% | unique |
| | *Xyris complanata* | 4 | 14% | 2 | 0% | uninformative |
| | *Lomandra longifolia* | 0 | 0% | 2 | 45% | negative |
| Ground fern | *Gleichenia dicarpa* | 2 | 71% | 3 | 6% | positive |
| | *Hypolepis muelleri* | 5 | 14% | 2 | 7% | uninformative |
| | *Pteridium esculentum* | 3 | 14% | 2 | 43% | negative |
| | *Lindsaea linearis* | 2 | 14% | 2 | 15% | uninformative |
| Ground orchid | *Corybas fordhamii* | 1 | 14% | 0 | 0% | unique |
| Clubmoss | *Lycopodiella lateralis* | 2 | 43% | 0 | 0% | unique |
| | *Lycopodiella cernua* | 3 | 14% | 2 | 0% | uninformative |
| | *Selaginella uliginosa* | 3 | 14% | 1 | 5% | uninformative |
| Climber | *Empodisma minus* | 4 | 57% | 2 | 5% | positive |
| | *Cassytha glabella forma glabella* | 2 | 43% | 1 | 14% | positive |
| | ***Gonocarpus salsoloides* [ROTAP]** | **3** | **29%** | **0** | **0%** | **unique** |
| | *Mirbelia rubiifolia* | 2 | 14% | 1 | 6% | uninformative |
| Sedge/ Rush | *Lepyrodia scariosa* | 3 | 86% | 2 | 18% | positive |
| | *Schoenus brevifolius* | 3 | 57% | 1 | 4% | positive |
| | *Leptocarpus tenax* | 2 | 57% | 2 | 3% | positive |
| | *Baumea rubiginosa* | 3 | 43% | 1 | 2% | positive |
| | *Lepidosperma forsythii* | 3 | 29% | 0 | 0% | unique |
| | *Guringalia dimorpha* | 5 | 29% | 1 | 1% | uninformative |
| | *Gymnoschoenus sphaerocephalus* | 5 | 29% | 1 | 0% | uninformative |
| | *Ptilothrix deusta* | 3 | 29% | 3 | 8% | uninformative |
| | *Gahnia sieberiana* | 3 | 29% | 1 | 6% | uninformative |
| | *Lepidosperma limicola* | 1 | 29% | 3 | 0% | uninformative |
| | *Schoenus paludosus* | 4 | 14% | 1 | 0% | uninformative |
| | *Gahnia clarkei* | 3 | 14% | 2 | 11% | uninformative |
| | *Cyathochaeta diandra* | 2 | 14% | 2 | 21% | uninformative |
| | *Eurychorda complanata* | 2 | 14% | 3 | 0% | uninformative |
| | *Hypolaena fastigiata* | 2 | 14% | 1 | 2% | uninformative |

# Swamp Paperbark Thicket
## Closed Heath/ Scrub (ti-tree)

# Unit E100
## REMS Unit Qa13



## General Description:
Swamp Paperbark Thicket is characterised by dense, often monospecific stands of Swamp Paperbark (*Melaleuca ericifolia*). Structurally, this type can vary from a very low heath (0.5m) to a scrub or thicket up to 3m in height. Other species present in the canopy include the shrubs *Viminaria juncea* and *Leptospermum juniperinum*, but both are normally well scattered. The ground layer generally supports sparse-to-dense growth of the grass *Pseudoraphis paradoxa* and the sedge *Baumea juncea*, the latter particularly in situations closer to coastal estuaries. Emergent tree species may also occur, and include *Eucalyptus robusta, Casuarina glauca, Melaleuca quinquenervia* and *Melaleuca linariifolia*. Further sampling is required in this vegetation type to better understand floristic relationships. This type is very restricted in the Gosford area when compared to occurrences in Wyong Shire.

## Known Floristic/ Structural Variations:
No variations are currently recognised in this vegetation type, although structural differences are apparent in different areas.

## Distribution:
*Within Gosford LGA* – the main area of occurrence is in the Cockle Bay NR and nearby areas, where this community occurs in small discrete patches. Additional patches have been mapped on the Erina Creek floodplain at Erina, and along the Hawkesbury River.

*Within LHCC Region* – based on Payne and Duncan (1999), NPWS (2000) have mapped 381ha of their Closed Heath/ Scrub [Ti-tree] (Unit Qa13) remaining in the region.

*Examples Within Gosford LGA*
- Cockle Bay NR
- Near The Entrance Road/ Erina Creek crossing, Erina

## Extent:
*Extant* - 33.40 ha

## Relationship to Other Communities:

This vegetation type is quite distinct through the dominance of *Melaleuca ericifolia* either as a heath or scrub. This species may occasionally occur within the understorey of other swamp communities, but the more complex structure and higher species diversity in those communities easily distinguishes them from Unit E100.

## Equivalent Vegetation Types:

- Benson 1981 (Mangrove Creek): n/a
- Benson & Fallding 1981 (Brisbane Water) n/a
- Benson 1986 (Gosf-Lake Mac): Scrub (Unit 8b) & Closed-Scrub (Unit 27a)
- Clarke & Benson 1986 (Dharug): n/a
- Strom 1986 (Bouddi Peninsula): n/a
- Clarke & Benson 1987 (Mt White/ Mt Olive): n/a
- McRae 1990 (Bouddi Peninsula): n/a
- Binns 1996 (SF MFD): n/a
- Payne 1997 (Cockle Bay/ Bouddi): n/a
- Bell 1998 (Popran NP): n/a
- Bell 2002 (Wyong LGA): Alluvial Floodplain Swamp Paperbark Thicket (Unit 18)

## Significant Species:

- Undescribed species – *none recorded*
- Threatened (TSC Act) – *none recorded*
- Rare (ROTAP) – *none recorded*

## Community Conservation Status:

*Reserve Representation* - within Gosford, this vegetation type is known from Cockle Bay NR.

*TSC Act (1995) Status* - not currently listed.

## Mapping Reliability & Included Units:

*High Resolution Area* – this vegetation type has been mapped from aerial photographic interpretation and ground truthing.

*Low Resolution Area* – not expected to occur in the low resolution area.

## Vegetation Structure:

| Stratum | Mean height (m) | Min height (m) | Max height (m) | Mean cover (%) | Sdev | n |
|---|---|---|---|---|---|---|
| Emergent | | | | | | |
| Tallest | 1.33 | 1.00 | 2.00 | 85 | 7.1 | 2 |
| Middle 1 | | | | | | |
| Middle 2 | | | | | | |
| Middle 3 | | | | | | |
| Lowest | 0.70 | 0.10 | 1.00 | 85 | 7.1 | 2 |

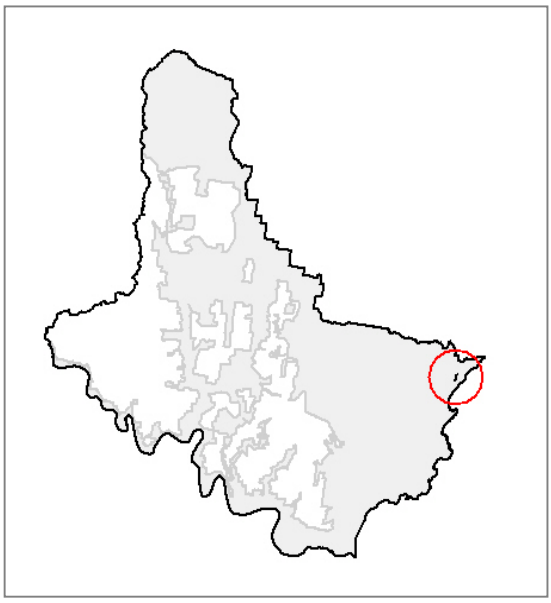
## Key Diagnostic Species [based on 2 plots]:

| Life Form | Species | Community | | All others | | Fidelity |
|---|---|---|---|---|---|---|
| | | c/a | Freq. | c/a | Freq. | |
| Small tree | *Melaleuca linariifolia* | 1 | 50% | 2 | 6% | uninformative |
| Shrub | *Melaleuca ericifolia* | 5 | 100% | 2 | 3% | positive |
| Herb | *Samolus repens* | 3 | 50% | 1 | 2% | positive |
| | *Lobelia alata* | 2 | 50% | 1 | 2% | positive |

| | | | | | | |
|---|---|---|---|---|---|---|
| | *Sarcocornia quinqueflora subsp. quinqueflora* | 2 | 50% | 5 | 1% | positive |
| | *Selliera radicans* | 1 | 50% | 2 | 0% | uninformative |
| Grass | *Sporobolus virginicus* | 5 | 50% | 4 | 1% | positive |
| | *Entolasia stricta* | 0 | 0% | 2 | 54% | negative |
| Graminoid | *Lomandra longifolia* | 0 | 0% | 2 | 45% | negative |
| Ground fern | *Pteridium esculentum* | 0 | 0% | 2 | 43% | negative |
| Sedge/ Rush | *Baumea juncea* | 6 | 100% | 3 | 4% | positive |
| | *Baumea teretifolia* | 6 | 50% | 0 | 0% | unique |
| | *Juncus kraussii subsp. australiensis* | 2 | 50% | 1 | 1% | positive |
| | *Isolepis cernua* | 1 | 50% | 0 | 0% | unique |
| | *Schoenus maschalinus* | 1 | 50% | 0 | 0% | unique |

# Wamberal Low Open Heath Forest — Unit E101

No equivalent — REMS Unit n/a



## General Description:

In a small, restricted area to the immediate north of Wamberal Cemetery, Wamberal Low Open Heath Forest occurs. This vegetation type is very distinct within the immediate local area, and is most likely linked to an outcrop of particularly sandy sandstone. Being exposed to on-shore winds across Wamberal Lagoon, the vegetation is very stunted (8 -10m high) but with a well developed understorey. Dominant canopy species include *Corymbia gummifera, Eucalyptus piperita* and *Syncarpia glomulifera*, while the understorey includes species such as *Banksia spinulosa* var. *collina, Leptospermum polygalifolium* subsp. *cistmontanum, Platylobium formosum, Acacia longifolia, Pimelia linifolia* subsp. *linifolia, Xanthorrhoea latifolia* subsp. *latifolia, Entolasia stricta, Tetrarrhena juncea, Schoenus melanostachyus*, and *Patersonia glabrata*. The current cemetery at this location has displaced some of this vegetation type, which appears otherwise to be highly restricted.

## Known Floristic/ Structural Variations:

No variations have been recognised in this community. Downslope towards Wamberal Lagoon this vegetation type appears to loose its low open forest structure and develop into a scrub, while to the north *Melaleuca nodosa* becomes increasingly prominent where it merges with the Estuarine Paperbark Backswamp Scrub (Unit E43a).

## Distribution:

*Within Gosford LGA* – restricted to the area immediately north of Wamberal Cemetry.

*Within LHCC Region* – NPWS (2000) have not recognised a similar community.

*Examples Within Gosford LGA*

- Wamberal Cemetry, Wamberal

## Extent:

*Extant* - 6.65 ha

## Relationship to Other Communities:

Wamberal Low Open Heath Forest is unique in the low elevation coastal area on Narrabeen Sandstones. No other community or sub-community supports a low open forest dominated by *Corymbia gummifera, Eucalyptus piperita* and *Syncarpia glomulifera*, over a heath-like understorey. Some similarities occur between this community and the

Narrabeen Coastal Peppermint Forest (Unit E22c) through a sharing of *Eucalyptus piperita* and several understorey species, but structurally that sub-community is noticeable taller. Other sandstone based communities present far to the west on the Somersby and Kulnura Plateaus support similar vegetation, but that occurring at Wamberal is significant in its elevation and stunted nature.

## Equivalent Vegetation Types:

- Benson 1981 (Mangrove Creek): n/a
- Benson & Fallding 1981 (Brisbane Water) n/a
- Benson 1986 (Gosf-Lake Mac): (?) Open-Forest (Unit 9g)
- Clarke & Benson 1986 (Dharug): n/a
- Strom 1986 (Bouddi Peninsula): n/a
- Clarke & Benson 1987 (Mt White/ Mt Olive): n/a
- McRae 1990 (Bouddi Peninsula): n/a
- Binns 1996 (SF MFD): n/a
- Payne 1997 (Cockle Bay/ Bouddi): n/a
- Bell 1998 (Popran NP): n/a
- Bell 2002 (Wyong LGA): n/a

## Significant Species:

- Undescribed species – *none recorded*
- Threatened (TSC Act) – none recorded, but suitable habitat for *Tetratheca juncea, Cryptostylis hunteriana, Diuris praecox*
- Rare (ROTAP) – *none recorded*

## Community Conservation Status:

*Reserve Representation* - the majority of this vegetation type is included within Wamberal Lagoon NR.

*TSC Act (1995) Status* - not currently listed.

## Mapping Reliability & Included Units:

*High Resolution Area* – this vegetation type has been mapped from aerial photographic interpretation and ground truthing.

*Low Resolution Area* – not expected to occur in the low resolution area.

## Vegetation Structure:

| Stratum | Mean height (m) | Min height (m) | Max height (m) | Mean cover (%) | Sdev | n |
|---|---|---|---|---|---|---|
| Emergent | | | | | | |
| Tallest | 9.00 | 8.00 | 10.00 | 40 | | 1 |
| Middle 1 | 5.00 | 4.00 | 6.00 | 15 | | 1 |
| Middle 2 | 1.25 | 0.50 | 2.00 | 45 | | 1 |
| Middle 3 | | | | | | |
| Lowest | 0.30 | 0.10 | 0.50 | 55 | | 1 |

## Key Diagnostic Species [based on 1 plot]:

| Life Form | Species | Community | | All others | | Fidelity |
|---|---|---|---|---|---|---|
| | | c/a | Freq. | c/a | Freq. | |
| Tree | *Corymbia gummifera* | 3 | 100% | 2 | 30% | positive |
| | *Eucalyptus piperita* | 3 | 100% | 2 | 13% | positive |

| | | | | | | |
|---|---|---|---|---|---|---|
| | *Syncarpia glomulifera subsp. glomulifera* | 3 | 100% | 2 | 28% | positive |
| Shrub | *Leptospermum polygalifolium* | 3 | 100% | 2 | 24% | positive |
| | *Platylobium formosum* | 3 | 100% | 2 | 10% | positive |
| | *Xanthorrhoea latifolia subsp. latifolia* | 3 | 100% | 2 | 2% | positive |
| | *Banksia spinulosa* | 3 | 100% | 2 | 16% | positive |
| | *Bossiaea stephensonii* | 2 | 100% | 3 | 5% | positive |
| | *Epacris pulchella* | 2 | 100% | 2 | 14% | positive |
| | *Gompholobium latifolium* | 2 | 100% | 1 | 15% | positive |
| | *Acacia longifolia* | 2 | 100% | 1 | 11% | positive |
| | *Hibbertia empetrifolia subsp. empetrifolia* | 2 | 100% | 1 | 10% | positive |
| | *Persoonia lanceolata* | 2 | 100% | 1 | 6% | positive |
| | *Persoonia levis* | 2 | 100% | 1 | 34% | positive |
| | *Pimelea linifolia* | 2 | 100% | 1 | 20% | positive |
| | *Styphelia viridis subsp. viridis* | 1 | 100% | 0 | 0% | unique |
| | *Acacia ulicifolia* | 1 | 100% | 1 | 24% | uninformative |
| | *Banksia oblongifolia* | 1 | 100% | 2 | 18% | uninformative |
| | *Isopogon anemonifolius* | 1 | 100% | 1 | 18% | uninformative |
| | *Macrozamia communis* | 1 | 100% | 2 | 11% | uninformative |
| | *Melaleuca nodosa* | 1 | 100% | 4 | 3% | uninformative |
| | *Polyscias sambucifolia* | 1 | 100% | 1 | 17% | uninformative |
| | *Pultenaea villosa* | 1 | 100% | 1 | 3% | uninformative |
| Herb | *Gonocarpus teucrioides* | 1 | 100% | 1 | 14% | uninformative |
| | *Stylidium graminifolium* | 1 | 100% | 3 | 1% | uninformative |
| | *Thysanotus tuberosus subsp. tuberosus* | 1 | 100% | 1 | 2% | uninformative |
| Grass | *Tetrarrhena juncea* | 3 | 100% | 2 | 3% | positive |
| | *Panicum simile* | 2 | 100% | 1 | 5% | positive |
| | *Entolasia stricta* | 3 | 100% | 2 | 53% | constant |
| Graminoid | *Dianella caerulea* | 2 | 100% | 1 | 51% | positive |
| | *Lomandra obliqua* | 2 | 100% | 2 | 19% | positive |
| | *Patersonia glabrata* | 2 | 100% | 2 | 7% | positive |
| | *Lomandra multiflora subsp. multiflora* | 1 | 100% | 1 | 6% | uninformative |
| | *Patersonia sericea* | 1 | 100% | 2 | 18% | uninformative |
| | *Lomandra longifolia* | 0 | 0% | 2 | 45% | negative |
| Ground fern | *Lindsaea linearis* | 2 | 100% | 2 | 15% | positive |
| | *Pteridium esculentum* | 0 | 0% | 2 | 43% | negative |
| Climber | *Billardiera scandens* | 2 | 100% | 1 | 29% | positive |
| | *Cassytha glabella forma glabella* | 2 | 100% | 1 | 14% | positive |
| | *Mirbelia rubiifolia* | 1 | 100% | 2 | 6% | uninformative |
| | *Parsonsia straminea* | 1 | 100% | 1 | 19% | uninformative |
| Sedge/ Rush | *Lepidosperma laterale* | 2 | 100% | 2 | 27% | positive |
| | *Ptilothrix deusta* | 1 | 100% | 3 | 8% | uninformative |
| | *Schoenus melanostachys* | 1 | 100% | 2 | 3% | uninformative |

# Kincumber Scribbly Gum Forest — Unit E102

No equivalent — REMS Unit n/a

## General Description:

Kincumber Scribbly Gum Forest is a highly restricted vegetation type centred on the Kincumber sewerage treatment works, between Empire Bay Drive and The Scenic Road. The presence of Scribbly Gum (*Eucalyptus racemosa*) in the canopy is the most easily distinguishing feature of this type, with other canopy species including *Angophora costata, Eucalyptus piperita*, and *Corymbia gummifera*. Understorey vegetation is diverse, and in particular terrestrial orchids are abundant, comprising suitable habitat for several threatened or rare species. Together with the shallow drainage lines supporting Narrabeen Alluvial Sedge Woodland (Unit E42), this area is distinct in Gosford and has strong similarities to vegetation in the Wyong local government area.

## Known Floristic/ Structural Variations:

No variations have been recognised, although towards the extremities of its range (such as near the Kincumber garbage depot), *Eucalyptus racemosa* drops out of this community, but other components remain the same. Where this vegetation meets the Narrabeen Coastal Blackbutt Forest (Unit E22a), an ecotonal area exists with *Syncarpia glomulifera* and *Eucalyptus pilularis* becoming more prominent.

## Distribution:

*Within Gosford LGA* – restricted to the area between Empire Bay Drive and The Scenic Road/ Cullens Road, Kincumber.

*Within LHCC Region* – NPWS (2000) have not recognised a similar community.

*Examples Within Gosford LGA*

- Empire Bay Drive, Kincumber
- Doyle Road, Kincumber

## Extent:

*Extant* - 78.50 ha

## Relationship to Other Communities:

Kincumber Scribbly Gum Forest is perhaps most similar to the Narrabeen Coastal Peppermint Forest (Unit E22c) through a sharing of *Eucalyptus piperita, Angophora costata* and several understorey species. However, the presence of

*Eucalyptus racemosa* and the more open structure of the understorey in Unit E102 distinguish the two. Wamberal Low Open Heath Forest (Unit E101) is also similar, but that community is a much lower forest and does not contain *Eucalyptus racemosa* or *Angophora costata*.

## Equivalent Vegetation Types:

- Benson 1981 (Mangrove Creek): n/a
- Benson & Fallding 1981 (Brisbane Water) n/a
- Benson 1986 (Gosf-Lake Mac): (?) Open-Forest (Unit 9g)
- Clarke & Benson 1986 (Dharug): n/a
- Strom 1986 (Bouddi Peninsula): n/a
- Clarke & Benson 1987 (Mt White/ Mt Olive): n/a
- McRae 1990 (Bouddi Peninsula): n/a
- Binns 1996 (SF MFD): n/a
- Payne 1997 (Cockle Bay/ Bouddi): n/a
- Bell 1998 (Popran NP): n/a
- Bell 2002 (Wyong LGA): (?) Narrabeen Doyalson Coastal Woodland (Unit 31) & (?) Narrabeen Snappy Gum Forest (Unit 32)

## Significant Species:

- Undescribed species – *none recorded*
- Threatened (TSC Act) – *none recorded,* but suitable habitat for *Tetratheca juncea, Cryptostylis hunteriana, Diuris praecox, Angophora inopina*
- Rare (ROTAP) – *none recorded*

## Community Conservation Status:

*Reserve Representation* - this vegetation type is not known from any conservation reserve.

*TSC Act (1995) Status* - not currently listed.

## Mapping Reliability & Included Units:

*High Resolution Area* – this vegetation type has been mapped from aerial photographic interpretation and ground truthing.

*Low Resolution Area* – not expected to occur in the low resolution area.

## Vegetation Structure:

| Stratum | Mean height (m) | Min height (m) | Max height (m) | Mean cover (%) | Sdev | n |
|---|---|---|---|---|---|---|
| Emergent | | | | | | |
| Tallest | 20.00 | 18.00 | 22.00 | 35 | 0.0 | 2 |
| Middle 1 | 6.50 | 3.00 | 10.00 | 12 | 4.9 | 2 |
| Middle 2 | 2.25 | 1.00 | 4.00 | 55 | 28.3 | 2 |
| Middle 3 | | | | | | |
| Lowest | 0.98 | 0.10 | 2.00 | 65 | 28.3 | 2 |

## Key Diagnostic Species [based on 2 plots]:

| Life Form | Species | Community | | All others | | Fidelity |
|---|---|---|---|---|---|---|
| | | c/a | Freq. | c/a | Freq. | |
| Tree | *Angophora costata* | 3 | 100% | 2 | 30% | positive |
| | *Corymbia gummifera* | 3 | 100% | 2 | 30% | positive |
| | *Eucalyptus piperita* | 3 | 100% | 2 | 13% | positive |
| | *Syncarpia glomulifera subsp. glomulifera* | 3 | 100% | 2 | 28% | positive |

| | | | | | | |
|---|---|---|---|---|---|---|
| | *Eucalyptus racemosa* | 3 | 50% | 3 | 2% | positive |
| Small tree | *Allocasuarina littoralis* | 4 | 100% | 1 | 14% | positive |
| | *Glochidion ferdinandii* | 3 | 100% | 2 | 28% | positive |
| | *Acacia irrorata subsp. irrorata* | 1 | 50% | 1 | 2% | uninformative |
| Shrub | *Leptospermum polygalifolium* | 5 | 100% | 2 | 24% | positive |
| | *Dodonaea triquetra* | 4 | 100% | 1 | 16% | positive |
| | *Banksia spinulosa* | 3 | 100% | 2 | 16% | positive |
| | *Platylobium formosum* | 3 | 100% | 1 | 9% | positive |
| | *Breynia oblongifolia* | 2 | 100% | 1 | 32% | positive |
| | *Epacris pulchella* | 2 | 100% | 2 | 14% | positive |
| | *Gompholobium latifolium* | 2 | 100% | 1 | 15% | positive |
| | *Grevillea linearifolia* | 2 | 100% | 2 | 3% | positive |
| | *Lomatia silaifolia* | 2 | 100% | 1 | 12% | positive |
| | *Persoonia levis* | 2 | 100% | 1 | 34% | positive |
| | *Polyscias sambucifolia* | 2 | 100% | 1 | 17% | positive |
| | *Acacia terminalis* | 2 | 50% | 1 | 9% | positive |
| | *Maytenus silvestris* | 2 | 50% | 1 | 9% | positive |
| | *Pultenaea daphnoides* | 2 | 50% | 1 | 7% | positive |
| | *Xanthorrhoea latifolia subsp. latifolia* | 2 | 50% | 2 | 2% | positive |
| | *Acacia fimbriata* | 1 | 50% | 0 | 0% | unique |
| | *Acacia implexa* | 1 | 50% | 1 | 4% | uninformative |
| | *Acacia suaveolens* | 1 | 50% | 1 | 28% | uninformative |
| | *Grevillea sericea* | 1 | 50% | 2 | 9% | uninformative |
| | *Hakea salicifolia* | 1 | 50% | 1 | 1% | uninformative |
| | *Hibbertia empetrifolia subsp. empetrifolia* | 1 | 50% | 1 | 10% | uninformative |
| | *Persoonia linearis* | 1 | 50% | 1 | 26% | uninformative |
| | *Podolobium ilicifolium* | 1 | 50% | 2 | 12% | uninformative |
| | *Pomaderris ferruginea* | 1 | 50% | 1 | 3% | uninformative |
| Herb | *Schelhammera undulata* | 2 | 100% | 2 | 8% | positive |
| | *Brunoniella australis* | 2 | 50% | 2 | 7% | positive |
| | *Pratia purpurascens* | 2 | 50% | 2 | 21% | positive |
| Grass | *Tetrarrhena juncea* | 3 | 100% | 2 | 3% | positive |
| | *Poa affinis* | 2 | 50% | 2 | 6% | positive |
| | *Themeda australis* | 2 | 50% | 2 | 24% | positive |
| | *Entolasia stricta* | 4 | 100% | 2 | 53% | constant |
| Graminoid | *Dianella caerulea* | 2 | 100% | 1 | 50% | positive |
| | *Lomandra obliqua* | 2 | 50% | 2 | 19% | positive |
| | *Lomandra longifolia* | 1 | 50% | 2 | 45% | negative |
| Ground fern | *Calochlaena dubia* | 3 | 50% | 3 | 18% | positive |
| | *Pteridium esculentum* | 2 | 100% | 2 | 42% | constant |
| | *Blechnum cartilagineum* | 1 | 50% | 2 | 16% | uninformative |
| Ground orchid | *Cryptostylis subulata* | 1 | 50% | 1 | 2% | uninformative |
| Climber | *Billardiera scandens* | 2 | 100% | 1 | 29% | positive |
| | *Cassytha glabella forma glabella* | 2 | 100% | 1 | 14% | positive |
| | *Glycine clandestina* | 2 | 100% | 2 | 22% | positive |
| | *Smilax glyciphylla* | 2 | 100% | 1 | 19% | positive |
| | *Cayratia clematidea* | 1 | 50% | 1 | 6% | uninformative |
| | *Eustrephus latifolius* | 1 | 50% | 1 | 25% | uninformative |
| | *Pandorea pandorana subsp. pandorana* | 1 | 50% | 1 | 24% | uninformative |
| Sedge/ Rush | *Lepidosperma laterale* | 2 | 100% | 2 | 27% | positive |
| | *Gahnia radula* | 3 | 50% | 4 | 0% | positive |
| | *Gahnia clarkei* | 1 | 50% | 2 | 11% | uninformative |

# Additional Vegetation Units

## Heath — Unit E55
Heath — REMS Unit 55

## Scrub — Unit E56
Scrub — REMS Unit 56

## Other landscape features — Unit E60
Other landscape features — REMS Unit 60

### General Description:
Revised mapping of the REMS area by Eco Logical Pty Ltd (2002) resulted in a small number of new units that have not been described by NPWS (2000). These units have now been abandoned by the LHCCREMS, due to the confusion they have caused (2003 revised edition). All such, polygons adopted from the REMS map in Gosford will now require re-classification. Consequently, no profile has been developed for these communities. All of these abandoned units occur within the low resolution area of the current Gosford map.

**Extent**

| | | |
|---|---|---|
| Heath E55 | NPWS have modelled | 1363.96 ha |
| Scrub E56 | NPWS have modelled | 589.61 ha |
| Other Landscape Features E60 | NPWS have modelled | 12.45 ha |

# Disturbed categories — Units Xx, Xs, Xr, Xapi

### General Description:
Disturbed categories within the current mapping include the following:

- Xx exotic vegetation/ plantations (eg: pine plantations on the Somersby Plateau, Camphor Laurel stands).
- Xs previously cleared areas now undergoing natural regeneration by native species.
- Xr cleared or underscrubbed areas supporting only canopy trees, either within agricultural landscapes or in urban areas. Such areas have been mapped as they may form important linkages between better quality remnant patches of vegetation.
- Xapi areas shown to be supporting native vegetation on 1998 aerial photographs but which have now been cleared. These have been retained as distinct polygons as it is likely that the mapping will be viewed over digital aerial photos on a GIS, and their omission may create confusion in respect to why they have not been mapped.

**Extent**

| | |
|---|---|
| Xx | 172.40 ha |
| Xs | 605.23 ha |
| Xr | 3368.77 ha |
| Xapi | 1.06 ha |