Conversion - Plant Community Types (PCTs) to Lake Macquarie Native Vegetation Community Map Units March 2016

**Introduction**

Stephen Bell from Eastcoast Flora Surveys has, at the request of Lake Macquarie Council, conducted a review of all LMCC, Bell and Driscoll 2015 vegetation community map units (MUs) against Plant Community Types (PCTs) and Biometric Vegetation Types (BVTs). An export of all PCTs within NSW (from the Office of Environment and Heritage - OEH Vegetation Information System - VIS) was used to compare dominant species to the table (“Confidence of PCT Match”) which aims to provide additional information on the matching process. High matches are generally those where sufficient similarities are evident; Medium where some uncertainties are present; and Low where there is considerable doubt over the match, but due to the absence of better matches these have been selected.

LookUp tables were used to populate the “BVT as per PCT” column using the VIS export table, with limited review.

Keith Formation and Class fields, as contained in the VIS PCT export table and extracted through LookUp tables, have also been added (columns “Keith Formation and Keith Class (2004) as per PCT Table VIS export Aug 2015 - coloured indigo”). No attempt has been made to check consistency with existing “Keith Class Equivalent” (white column) that have been allocated directly to the LMCC map unit (in existing reports) rather than indirectly through the “PCT ID”. There will be different interpretations in the application of these to local-scale vegetation units, and it is suggested that the existing allocations made directly from the local Map Units (Keith Class Equivalent) (white column) take precedence over those contained in the VIS export.

The matching of LMCC local-scale units to State-wide PCTs is difficult due to scale issues, and different workers will have differing opinions for some vegetation types. There will be scope in the future to conduct matching such as this in a more systematic way using site allocations from the LMCC analysis to compare with those allocations under the PCT system, and discussions with OEH have commenced on this issue.

Please contact Robbie Economos Lake Macquarie Council reconomos@lakemac.nsw.gov.au if you would like to have some input on these conversions.

**Key**

*No LHCCREMS equivalent - best fit chosen

**Endangered Ecological Community (EEC), Keith Class, LHCCREMS allocated directly to the LMCC Map Unit (MU) rather than indirectly through the PCT**

**PCT allocated by Stephen Bell March 2016 allocated directly to the LMCC Map Unit with BVT, Keith Class and Formation allocated indirectly through PCT & VIS.**

**LHCCREMS and Keith Class allocated directly to the LMCC Map Unit**

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<tbody>
<tr>
<td>035</td>
<td>Bangalay - Old-man Banksia open forest on coastal sands, Sydney Basin Bionogon and South East Corner Bionogon</td>
<td>medium</td>
<td>Dry Sclerophyl Forests (Shrubby sub-formation); South Coast Sands Dry Sclerophyl Forests;</td>
<td>Pelican Bangalay Forest</td>
<td>Eucalyptus botryoides dominates the canopy with Angophora costata, Banksia serrata, and some Coastybea gummifera. Understorey vegetation includes Aztec ericoides, Monotoca elliptica, Acacia longifolia, Ponelia trifolia, Acacia suaveolens, Pentstemon esculentum, Lomandra longifolia, Pomax umbellata and imperata cylindrica.</td>
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<td>Coastal Sand Arippan Blackbutt Forest (MU22)</td>
<td>Coastal Sand Apple-Blackbutt Forest</td>
<td>Coastal Sand Apple-Blackbutt Forest; Coastal Dune Dry Sclerophyl Forests</td>
<td>PCT 1645 considered but relies directly to Unma Coastal Sandt Woodland. PCT 659 (Not listed as a HU community 17/3/ 2016) PCT 659 applies to the Pelican Flats vegetation where Eucalyptus botryoides is diagnostic;</td>
</tr>
<tr>
<td>034</td>
<td>Blackbutt - Narrow-leaved White Mahogany shrubby tall open forest of coastal ranges, northern Sydney Basin Bionogon</td>
<td>medium</td>
<td>Wet Sclerophyl Forests (Shrubby sub-formation);</td>
<td>Cooranbong Blackbutt Tall Forest</td>
<td>Often tall stands of Eucalyptus pilularis on the undulating valley flats around Cooranbong and Martinsville. Largely depleted due to clearing and logging, other species co-occurring include Allocasuarina lorulosa, Callistemon salignus and Ghadowood forest in the mid layer, over a rich herb and grass layer.</td>
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<td></td>
<td>Coastal Sand Apple-Blackbutt Forest</td>
<td>Coastal Sand Apple-Blackbutt Forest (MU22)*</td>
<td>No direct PCT match.</td>
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</table>
Sarcocornia quinqueflora

Dominated by Acacia sophorae

high no data Heathlands; Sydney Coastal
Heaths;

Sydney Coastal Sand
Foredune Scrub

50a Coastal Sand
Foredune
Scrub

Acacia sporoae dominates this shrubland, and stunted
individuals of Leptospermum laevigatum may also be
present in this wind-sheared vegetation. Few other
species are evident, although Capparifruitus glaucescens
and Spinefrax sericeus invariably occur.

Ocurs immediately behind the low grassland of Beach
Spinifex (MU53) along the foredunes of the coastal zone.
Although many areas, particularly north of Swansea, have
been impacted upon by Bitou Bush invasion, some
relatively good quality examples of this community remain
towards the south. Current mapping of this community
under-estimates the total present within the LGA, given
mapping procedures used to cut original interpretation
and linework against Councils veg-noveg layer.

n/a Coastal Sand
Scrub (MU50)

Coastal Heath
Heaths

079 Bitoubush - Paints well
heath on sandstone plateaus of the
Sydney Basin Bioregion

high HN660; HU679; ME015; SR667;
Freshwater
Wetlands; Coastal
Health Swamps;

Freshwater
Wetlands; Coastal
Health
Swamps;

54 Hawkesbury
Hanging
Swamps

Prominent species present include Gilia chenopodioides,
Gahnia sieberiana, BAecceae linicola and
Eupodium minus.

Ocurs in a single area of impeded drainage on
Hawkesbury Sandstone geology within Olerey State
Forest. This swamp is the only known from Lake
Macquarie LGA, although the community becomes more
common to the south into Wyong and Gosford LGAs, and
into western Sydney and beyond. Floristic diversity is
dependent on fire history, and the Olerey stand supports a
more flem-based form as well as a shrubby form.

Coastal Upland
Swamp

Sandstone
Hanging Swamps

n/a Coastal Heath
Swamps

n/a Coastal Swamp
Forests

1054 Paperbark
swamp forest of the
costal lowlands of the NSW
North Coast Bioregion and
Sydney Basin Bioregion

low ME035; ME027; Forested
Wetlands; Coastal
Swamp
Forests;

Coastal Swamp
Forests;

108b Paperbark
Depression Forest (M.
stropheleoides)

Density low trees of Melaleuca styphelioides over
scattered Glycolichon fernandii in the mid-storey, and a
ground layer of Carex longirostrata

Distinct low forest of drainage depressions within a wider
moist forest matrix at the foot of the coastal ranges. Only
a single occurrence of this type has been mapped to date,
and only limited sampling has occurred. Further
investigation is required to determine if this may be a
disturbance artefact from previous logging activities, such
as off the end of Alton Road, Cooranbong, in Olerey State
Forest.

Swamp
Sclerophyll
Forest on Coastal
Postlands (?)

n/a Coastal Swamp
Forests

PCT 1064 appears to be a generic catch-all type.
PCT 1064 was listed as "Provisionally Approved" as at 17-3-2016.

1126 Saltmarsh in estuaries of the
Sydney Basin Bioregion and South East Corner Bioregion

high HN679; HU660; ME035;
SR614;
Saltine Wetlands;
Saltmarshes;

Saltmarshes;

47a Saltmarsh

Sarcocornia quinqueflora subsp. quinqueflora, Samoila repens and Sueda australis in saltmarsh; and Sporobolus virgincas in grasslands.

Ocurs immediately within and adjacent to tidal estuaries.
This community occurs in close association with Swamp
Dock - Russel Forest (MU403), but differs structurally
and floristically.

Saltmarsh
Saltmarsh
(MU47a)

Saltmarsh
Saltmarshes

Could also be PCT 1746 Saltmarsh Estuarine
Complex.

1183 Smooth-barked Apple - Sydney
Peppermint - Turpentine heathy
open forest on plateaux areas of
the Sydney Basin Bioregion

medium HN687; HU622;
Dry Sclerophylly
Forests (Shrubby
sub-formation);
Sydney Coastal
Dry Sclerophylly
Forests;

Sydney Coastal
Dry Sclerophylly
Forests;

25a Narabbeen
Peppermint - Apple
Forest

Eucalyptus ppeeta, Angophora costata, Allocauruma
boulacai and Cryptum gramiscere. Shrub species
include Hibbertia aspera, Cleaaria tamentosa, Polycsis
sambucoides, Gompholobium latifolium and
Gymnostachys anceps. The sparse ground layer
typically supports Emotiasa striata, Brunonrella
australis, Goodenia heterophylla subsp. heterophylla, Pap
affinis, and Microloa stipoides ve. stipoides

Sheltered upper slopes on Narrabeen Sandstone along
the Sugarloaf Range, such as around The Gap, support
this vegetation. Very similar to MU25 but likely to have a
different suite of understorey species - yet to be tested.

n/a Saltmarsh
Saltmarsh (MU47a)

Saltmarsh
Narrabeen Sandstone

Sydney Coastal
Dry Sclerophylly
Forests

PCT 1204 was listed as "Provisionally Approved" as at 17-3-2016.

1204 Spinifex beach strand grassland
Sydney Basin Bioregion and
South East Corner Bioregion

low no data Grasslands;
Maritime
Grasslands;

Maritime
Grasslands;

53 Beach Spinifex

Dominated by Spinifex sericeus. The weed Hydrocotyle
donneris is present in all stands, along with native
species such as Carpoglotus glaucescens and
Scaevola calciunculase

Beach lines south of Swansea support good stands of
Beach Spinifex, where Spinifex sericeus dominates.
Much of the beach sands north of Swansea have been
invaded by Bitou Bush following sand mining, and
indescriminant 4WD use has assisted in the demise of
this community.

n/a Beach Spinifex
(MU53)

Maritime
Grasslands

PCT 1204 was listed as "Provisionally Approved" as at 17-3-2016.

1231 Swamp Mahogany swamp
sclerophylly forest on coastal
lowlands of the Sydney Basin
Bioregion and South East
Corner Bioregion

low HN693; ME010; SR648;
Forestd
Wetlands; Coastal
Swamp
Forests;

Coastal Swamp
Forests;

113 Paperbark - Carex
Backswamp
Forest

Dominated by Melaleuca lineifollia in the low canop,
over a dense ground layer of Carex apressa. Other
wetland species present include Persicaria hydropiper,
Alloanthr merendiculatus and Pseudopithy paradoxa.

Currently known from only a single location within Lake
Macquarie SCA. This occurrence lies adjacent to Lake
Macquarie, and occurs in an area of impeded drainage
with limited release of accumulated moisture

Swamp
Sclerophyll
Forest on Coastal
Postlands

n/a Swamp
Sclerophyll
Forest on Coastal
Postlands

n/a Swamp
Sclerophyll
Forest on Coastal
Postlands

No appropriate PCT, so included in the broader swamp forest type.
PCT 1231 was listed as "Provisionally Approved" as at 17-3-2016. Placed this with LLCCREMS MU42a.
<table>
<thead>
<tr>
<th>Code</th>
<th>Name</th>
<th>Subregion</th>
<th>Ecoregion</th>
<th>Notes</th>
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</thead>
<tbody>
<tr>
<td>1525</td>
<td>Coastal Wet Gully Forest (MU1)</td>
<td>Northern Warm Temperate Rainforests/Subtropical Rainforests</td>
<td>Coastal Wet Gully Forest</td>
<td>Not enough Fig and Streblus to justify 1525. OEH PCT table includes 1525 as a TEC, see note # Has some species in common with Lowland Rainforest EEC so important to assess whether it meets the EEC criteria onsite.</td>
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<td>1526</td>
<td>Jackwood - Lilly Pilly - Sassafras</td>
<td>Northern Warm Temperate Rainforests</td>
<td>Coastal Warm Temperate Rainforest - Subtropical Rainforest</td>
<td>Species typically present include Cryptocarya microsperma, Cunjevoi microphylla, Eucalyptus microcorys, and Diplazium esculentum. Occurs in well protected gullies on alluvium, along major creeks and in gully heads.</td>
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<td>1527</td>
<td>Jackwood - Lilly Pilly - Coastal Ranges Blackbutt - Wilga Rainforest</td>
<td>Northern Warm Temperate Rainforests</td>
<td>Freshwater Carex Rainforest Sedgeland</td>
<td>Species present include Carex ferox/cavula, Carex appressa and Cyperus exaltatus.</td>
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<td>1536</td>
<td>Turpentine - Lilly Pilly - Coastal Ranges Blackbutt - Wilga Rainforest</td>
<td>Northern Hinterland Wet Sclerophyll Forests</td>
<td>Littoral Rainforest</td>
<td>Tightly packed with a few dominant tree species such as Cupaniopsis anacaroides, Acmena smithii and Guisa semiglauca. Other species include Sipygus paniculatus, Glischidion ferrandieri, Lixostoma australis, Rupanea variabilis, Endiandra sieberi, Pittosporum undulatum, Heliochloa longisulcata, Sminthylla glaucescens, Sminthylla australis, Cissus antarctica, Cissus hypoglauca.</td>
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<td>1556</td>
<td>Tallowwood - Smooth-barked Apple - Blackbutt grass tall open forest of the Central and lower North Coast</td>
<td>Northern Hinterland Wet Sclerophyll Forests; Coastal Ranges Dry Tallowwood – Blackbutt Forest</td>
<td>Coastal Ranges Mesic Blackbutt-Tallowwood Forest</td>
<td>Canopy species present include Eucalyptus pilularis, Eucalyptus microcorys, Allocasuarina torulosa and Syncarpia glomulifera. Understorey vegetation includes Polyophyllum lanceolata, Persoonia esculentum, Gomphosporium virgatum, Persoonia lanata.</td>
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<tr>
<td>PCT</td>
<td>Description</td>
<td>North Coast Wet Sclerophyll Forests</td>
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<td>5</td>
<td><strong>Alluvial Tall Moist Forest</strong></td>
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<td>Eucalyptus saligna is prominent in the emergent canopy layer, often co-occurring with <em>Syncarpia ghmifera</em> and <em>Angophora floribunda</em>, over a lower tree layer of <em>Acmena smithii</em>, <em>Melaleuca stypheloides</em>, <em>Glischidion ferdinandii</em>, <em>Cryptocarya microsperma</em> and <em>Claoxylon australe</em>. Ground layer vegetation includes the grasses <em>Oplismenus imbeclulus</em> and <em>Microleuca stipoides</em> var. <em>stipoides</em>, the ferns <em>Calochlaena dubia</em>, <em>Blenchrum cartaginense</em> and <em>Adiantum aethiopicum</em> and shrubs <em>Corymbia maculata</em>, <em>Hymenosporum flavum</em> and <em>Breynia oblongifolia</em>. The sedges <em>Gymnostachys araeae</em> and <em>Carex longebrachtiata</em> are also common. In some areas, <em>Archontophoenix cunninghamiana</em> is dominant, and most likely forms a distinct community of its own.</td>
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<td>5b</td>
<td>A moist forest type of <em>Eucalyptus saligna</em> and <em>Angophora floribunda</em>, with <em>Callitris saligna</em> and <em>Acacia parramattensis</em> common in the mid-storey, over <em>Pteridium esculentum</em>, <em>Microleuca stipoides</em> var. <em>stipoides</em> and <em>Adiantum aethiopicum</em></td>
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<td>5a</td>
<td>An alluvial forest where <em>Eucalyptus saligna</em> co-occurs with <em>Corymbia maculata</em>, but other canopy species are also present and may be locally dominant. These include <em>Angophora floribunda</em>, <em>Eucalyptus amplifolia</em>, <em>Eucalyptus siderophloia</em> and <em>Eucalyptus globides</em>. Understorey vegetation includes species such as <em>Melaleuca deca</em>, <em>Melaleuca linariifolia</em>, <em>Daviesia ulicifolia</em> and a range of grasses and herbs occur on the ground.</td>
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<tr>
<td>5g</td>
<td>Eucalyptus pilularis is dominant. Common understorey species include <em>Acacia longifolia</em>, <em>Leptospermum polygaloides</em> and <em>Pteridium esculentum</em>, <em>Dodonaea viscosa</em> var. <em>collina</em>, <em>Lomandra longifolia</em>, <em>Endiandra striata</em> and <em>Gahnia clarkii</em>.</td>
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<tr>
<td>9a</td>
<td>A tall forest where <em>Eucalyptus pilularis</em> is clearly dominant, but may also occur with <em>Eucalyptus saligna</em> or <em>Allocasuarina torulosa</em>. The mesic understorey of semi-rainforest species includes <em>Acacia parramattensis</em>, <em>Astrotricha latifolia</em>, <em>Claoxylon tomentosum</em>, <em>Sinoum glandulosum</em>, <em>Claoxylon australe</em> and <em>Cryptocarya glaucescens</em>.</td>
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<tr>
<td>9g</td>
<td>Eucalyptus pilularis is the dominant canopy species present, co-occurring with <em>Allocasuarina torulosa</em> and <em>Angophora costata</em>. A moderately dense understorey of species such as <em>Cryptocarya nigra</em>, <em>Glischidion ferdinandii</em> and <em>Astrotricha latifolia</em> occurs over <em>Gahnia melanocarpa</em> and <em>Lomandra longifolia</em>.</td>
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Eucalyptus saligna, which is closer to 1242 (now decommissioned) than 1568. Other possibilities are 1573 or 1241. An option of *Eucalyptus pilularis* is also considered, but other canopy species are also present and may be locally dominant. These include *Angophora floribunda*, *Eucalyptus amplifolia*, *Eucalyptus siderophloia* and *Eucalyptus globides*. Understorey vegetation includes species such as *Melaleuca deca*, *Melaleuca linariifolia*, *Daviesia ulicifolia* and a range of grasses and herbs occur on the ground. This vegetation type may be ecotonal between the wetter alluvial Bluegum-dominated communities and the drier Spotted Gum communities, and further sampling and investigation is required. A widespread forest type in the Watagan Mountains system, but is currently poorly sampled across its distribution. Merges with Coastal Wet Gully Forest (MU1) and other similar moist vegetation types in protected slope positions. Present in the Watagan Mountains in and around Wallagara NP, and some parts of the Sugarloaf Range. Further investigation is required to determine its relationship to similar moist forests.
<table>
<thead>
<tr>
<th>Level</th>
<th>Name</th>
<th>Sub-Formation</th>
<th>Vegetation</th>
<th>Notes</th>
<th>Unit</th>
<th>Other Units</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>low</td>
<td>Coastal Wet Gully Forest</td>
<td></td>
<td>Eucalyptus saligna, Syncarpia glomulifera, Eucalyptus acmenoides and Allocasuarina torulosa.</td>
<td>Dominated in the canopy by the prominent Eucalyptus agglomerate with Allocasuarina torulosa,</td>
<td>Low</td>
<td>Coastal Wet Open Forest (MU9)</td>
<td>North Coast Wet Sclerophyll Forests</td>
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<td>Corymbia gummifera, Allocasuarina torulosa, Banksia serrata and Eucalyptus acmenoides also occur.</td>
<td>Common mid-storey species include Cryptocarya nigripes, Syncyarea glandulosa, Cordyline stricta and Gymnostachys anepos, over a rich and diverse ground layer of herbs and grasses.</td>
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<td>Northern Hinterland Wet Sclerophyll Forests</td>
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<td>Occurs in the Watagans Mountains on high rainfall slopes and ridges, and merges with other moist forest types. Further investigation is required to determine the relationship between this and similar communities, although the distribution of Eucalyptus agglomerate is distinctive where it occurs.</td>
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<td>The name of 1573 seems to have changed.</td>
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<tr>
<td>High</td>
<td>Sydney Blue Gum - Lilly Pilly mesic tall open forest on coastal ranges and tablelands escarpment</td>
<td></td>
<td>Eucalyptus PCT715 Blue-leaved Stringybark - Blackbutt, Allocasuarina torulosa, Syncarpia glomulifera, Eucalyptus acmenoides and Angophora floribunda.</td>
<td>Most well protected gullies and lower slopes of the Watagans Ranges support Coastal Wet Gully Forest, which in places merges over broad ecotones with Coastal Warm Temperate Rainforest (MU1a). This is an original REM52000 community, and it has been interpreted to mean the sheltered slopes and gullies along the Watagan/Sugarloaf escarpments.</td>
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<td></td>
<td>North Coast Wet Sclerophyll Forests</td>
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<td>Medium</td>
<td>Coastal Ranges Dry Blackbutt Forest</td>
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<td>Characterised, it comprises a canopy dominated by Eucalyptus pilularis, together with Allocasuarina torulosa and Angophora floribunda. Understorey vegetation is generally sparse, but includes Pteridium esculentum, Imperata cylindrica var. major, Lepidopterena laterale, Acacia impexa and Themeda australis.</td>
<td>Occurs along the drier parts of the Watanggan Mountains, and Sugarloaf Range. Commonly impacted upon by past logging practices.</td>
<td></td>
<td>Coastal Ranges Open Forest (MU9)</td>
<td>Northern Hinterland Wet Sclerophyll Forests</td>
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<td>A dry grassy variant of the wider Coastal Ranges open forests, occurring west of Cooranbong and Wyee. It may represent a disturbed form of Coastal Ranges Dry Blackbutt Forest (MU9b), again occurring in the vicinity of that unit and Coastal Foothills Spotted Gum - Ironbark Forest (MU15).</td>
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<td>Some North Coast PCTs may be applicable.</td>
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<tr>
<td>Low</td>
<td>Coastal Ranges Dry Peppermint - Blackbutt Forest</td>
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<td>Characterised in the canopy by Eucalyptus pilularis, Corymbia maculata, Allocasuarina torulosa and Angophora floribunda. Understorey vegetation includes Pteridium esculentum, Pseudobulbosculus asplenoides, Persoonia linearis, Acacia impexa, Dampiera stricta, Entostemma stricta and Imperata cylindrica.</td>
<td>Perhaps an ecocional community occurring at the interface of remnant Hawkesbury sandstone geology and older Narrabeen sediments. Very closely related to Watagans Remnant Hawkesbury Forest (MU9b), and with further data collection and analysis the two may be merged.</td>
<td></td>
<td>Coastal Ranges Open Forest (MU9)</td>
<td>Northern Hinterland Wet Sclerophyll Forests</td>
</tr>
<tr>
<td>High</td>
<td>Coastal Wet Gully Forest</td>
<td></td>
<td>Eucalyptus saligna, Allocasuarina torulosa, Corymbia maculata and Eucalyptus umbra. Important understorey vegetation includes Pteridium esculentum, Persoonia linearis, Glochidion ferridani, Bossiaea obovata and the vines Podolobium ilicifolium, Persoonia linearis, Glochidion ferridani, Bossiaea obovata and Gompholobium latifolium. Ground layer species include Entostemma stricta, Panicum stricta, Dampiera stricta, Diplolaena caerulea and Themeda australis.</td>
<td>Limited sample data suggests it occurs in the Dudley-Whitebridge area. This community requires additional sampling to clarify its relationship with Coastal Ranges Dry Blackbutt Forest (MU9b).</td>
<td></td>
<td>Coastal Ranges Open Forest (MU9)</td>
<td>Northern Hinterland Wet Sclerophyll Forests</td>
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*Note: The table above provides a summary of various forest types and their characteristics within the Sydney region, focusing on Coastal Wet Gully Forest and other associated communities.*
Mapped for a ridge system on Narrabeen sandstone north of Cooranbong, but requires sampling and analysis to determine its relationship to similar communities. Further investigation is required to clarify relationships to Coastal Narrabeen Shrub Forest (MU22).

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Coastal Narrabeen Dry Bloodwood - Apple - Mahogany Forest</th>
<th>Location</th>
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</thead>
<tbody>
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<td></td>
<td>Angophora costata, Corymbia gummifera, Eucalyptus umbra, Eucalyptus pilularis, Eucalyptus soca, and Banksia serrata. Understorey vegetation includes Allocasuarina littoralis, Lepidothamnus littoralis, Banksia spinulosa, Xylemophyllum pumilum, Lepidothamnus polymorphum, Lomandra formosa, and Diospyros cordata, over Xanthorrhoea landscape, Encliandra stricta, Thryptomene australis, and Imparata clypeolata.</td>
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<th>Scenario</th>
<th>Coastal Narrabeen Dry Bloodwood - Apple - Mahogany Forest</th>
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<td>Occurs on a sandy substrate overlying bedrock, often on slopes, and lies in close proximity to larger aeolian sand bodies, but lacks the full diversity of typical 'sand' species in the understorey. At present, this community is noted only for a small section of Awabakal Nature Reserve, and full revision is required to determine its correct place in the classification. It may, for example, represent a minor variant of Coastal Narrabeen Shrub Forest (MU22).</td>
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Previously recorded within parts of Jilliby SCA (outside of Lake Macquarie LGA), and has now also been noted at the top end of the Mandalong Valley. May not differ significantly from other MU12 types, and full sampling is required.

Dominated by Corymbia maclura with Eucalyptus paniculata and/or Eucalyptus siderophloia. Eucalyptus punctata may be locally present but is not consistent, and in many areas Eucalyptus fergusonii and Eucalyptus microcyrus are also locally common.

Dominated by Corymbia maclura, Eucalyptus acmenoides, Allocasuarina torulosa and Eucalyptus fergusonii subsp. fergusonii. Eucalyptus punctata and Syncarpia glomulifera may also be present in some areas. The mesic shrub layer includes Melaleuca styphelioides, Indigofera australis, Rhodamnia tubescens, Acrostichum aculeatum, Creton venosavus, and Cordylina stricta. Ground layer species include Oplomenus imbevillus, Simile australis, Gymnostachys anceps, Aristatum formosum, Dacodia aspera and Dictiodora repens.

Dominated in the canopy by Eucalyptus siderophloia, Allocasuarina torulosa and Eucalyptus acmenoides, with Corymbia maclura in some areas. The shrub layer supports species such as Clerodendrum tomentosum, Hibbertia aspera, Polyscia sambucifo, and Persoonia lineata. Ground layer vegetation includes Microloca stipoles, Imperata cylindrica var. major, Lomandra longifolia, Entostela stricta, Thymetsa australis and Desmodium gunnii.

Characterised by Corymbia maculata, Eucalyptus siderophloia, Eucalyptus paniculata, Allocasuarina torulosa, and Eucalyptus acmenoides. Common understorey species include Acacia falcata, Podostemon elatum, Acacia implexa, Bursaria spinosa and Dodonea triangular. Together with Hakea umbra, Entostela stricta and Imperata cylindrica.

Characterised by Corymbia maculata, Eucalyptus punctata, Eucalyptus paniculata and Eucalyptus umbra, over an understorey of species such as Brennya olboriglofa, Acacia implexa, Persoonia lineata, Dodonea triangular and Dacodia aspera. On the ground, grasses such as Entostela stricta, Themeda australis, Imperata cylindrica and Poa affinis dominate, together with Diellia caerulea, Desmodium hypotrichophyllum and Lomandra longifolia. In places, Macrozamia redunda forms a conspicuous ground layer.

Best fit is PCT1216 Spotted Gum – Grey Ironbark open forest on the foothills of the Central Coast, Sydney Basin Bioregion, but that has been decommissioned.

Best fit is PCT1215 Spotted Gum – Grey Ironbark open forest on the foothills of the Central Coast, Sydney Basin Bioregion, but that has been decommissioned.

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Best fit is PCT1215 Spotted Gum – Grey Ironbark open forest on the foothills of the Central Coast, Sydney Basin Bioregion, but that has been decommissioned.
1586 Grey Ironbark - Broad-leaved Mahogany - Forest Red Gum shrubby open forest on Coastal Lowlands of the Central Coast
dw XU.002. Dry sclerophyll forests (shrub/grass sub-formation);
Hunter-Mackay Dry sclerophyll forests;
15j Lake Macquarie Ironbark Forest
| Dominated by Eucalyptus paniculata, Eucalyptus siderophloia and Eucalyptus punctata, with occasional Angophora costata. Understorey vegetation includes Macrozamia linearis, Persoonia linearis, Bursaria spinosa, Acacia longifolia, Dodonaea viscosa and Acacia falcata. The ground layer is rich in grasses and herbs, and includes Opilimenes imbebold, Dichondra repens, Imperata cylindrica, Glycine clandestina and P oranthera microphylla. |
| Occurs in exposed locations on narrow peninsulas on the shores of Lake Macquarie (eg Point Wolstoncroft), in fine-grained sediments on near-level ground, most likely corresponding to a specific stratum within the Permian rock layers. |
| n/a Coastal Forests - Spotted Gum - Ironbark Forest (MU15)
| Hunter-Mackay Dry sclerophyll forests
| Eastern end of the unit with PCT 1590 would mean it is LHSGIF, but it is clearly not - all those in Unit 15 are moister types. Suggest maybe PCT 1988. |

1586 Grey Ironbark - Broad-leaved Mahogany - Forest Red Gum shrubby open forest on Coastal Lowlands of the Central Coast
dw XU.002. Dry sclerophyll forests (shrub/grass sub-formation);
Hunter-Mackay Dry sclerophyll forests;
15k Coastal foothills moist grey gum - Mahogany Forest
| Canopy of Eucalyptus propinqua, Corymbia maculata and Eucalyptus umbraculifera, with Eucalyptus microcorys and Syncarpia glomulifera occasionally occurring. The understorey is typical of Daviesia ulicifolia, Podolobium diclinum and Podolobium acutifolium, with Themeda australis, Entolasia stricta and Imperata cylindrica on the ground. |
| Occurs on sheltered slopes in the south-eastern parts of the LGA. This community is yet to be sampled in detail, and hence relationships between it and other units within the Coastal Foothills group (MU15) are yet to be clarified. However, the presence of Eucalyptus propinqua in this community distinguishes it from several others. |
| n/a Coastal Forests - Spotted Gum - Ironbark Forest (MU15)
| Hunter-Mackay Dry sclerophyll forests
| There are no PCTs with Eucalyptus fergusonii, so have to opt for the related Eucalyptus paniculata, and hence PCT 1988. |

1586 Grey Ironbark - Broad-leaved Mahogany - Forest Red Gum shrubby open forest on Coastal Lowlands of the Central Coast
dw XU.002. Dry sclerophyll forests (shrub/grass sub-formation);
Hunter-Mackay Dry sclerophyll forests;
15l Sugarloaf Uplands dry spotted gum - Ironbark Forest
| Dominated by Corymbia maculata, Eucalyptus fergussonii subsp. fergussonii, Eucalyptus umbraculifera and Eucalyptus punctata. The typical open shrub layer includes Persoonia linearis, Macrozamia linearis, Microlepis stipoides var. stipoides, Entolasia stricta and Lepidosperma laterale. |
| Occurs on the higher ridges and exposed slopes of the Sugarloaf Range. Eucalyptus fergussonii subsp. fergussonii is a listed rare eucalypt, however it is a community dominant in this community. |
| n/a Coastal Forests - Spotted Gum - Ironbark Forest (MU15)
| Hunter-Mackay Dry sclerophyll forests
| There are no PCTs with Eucalyptus fergusonii, so have to opt for the related Eucalyptus paniculata, and hence PCT 1988. |

1586 Grey Ironbark - Broad-leaved Mahogany - Forest Red Gum shrubby open forest on Coastal Lowlands of the Central Coast
dw XU.002. Dry sclerophyll forests (shrub/grass sub-formation);
Hunter-Mackay Dry sclerophyll forests;
15m Jilliby spotted gum - Northern Ironbark - Mahogany Forest
| Supports Corymbia maculata, Eucalyptus umbraculifera and Eucalyptus siderophloia, and an understorey of species such as Podolobium ilicifolium, Leucopogon juniperinus and Podolobium acutifolium occurs over a ground layer of Entolasia stricta, Themeda australis, Aristida vagans and Juncus palidus. |
| Occurs in the Mandalong Valley in the south-west of the LGA. Fulfils an almost equivalent role to Jilliby Spotted Gum – Fergusons Ironbark – Mahogany Forest (MU15n), which occurs in a similar locality. |
| n/a Coastal Forests - Spotted Gum - Ironbark Forest (MU15)
| Hunter-Mackay Dry sclerophyll forests
| There are no PCTs with Eucalyptus fergusonii, so have to opt for the related Eucalyptus paniculata, and hence PCT 1988. |

1586 Grey Ironbark - Broad-leaved Mahogany - Forest Red Gum shrubby open forest on Coastal Lowlands of the Central Coast
dw XU.002. Dry sclerophyll forests (shrub/grass sub-formation);
Hunter-Mackay Dry sclerophyll forests;
15n Jilliby spotted gum - Fergusons Ironbark - Mahogany Forest
| Corymbia maculate with Eucalyptus fergussonii subsp. fergussonii, Eucalyptus punctata and Eucalyptus umbraculifera. Understorey vegetation includes Podolobium acutifolium, Daviesia ulicifolia, Persoonia linearis and Bursaria spinosa, over Entolasia stricta, Daniele caerulea, Lomandra filiformis subsp. coriacea, and Lepidosperma laterale. |
| Occurs in and around the Mandalong Valley, where it adjoins areas currently mapped as Jilliby Spotted Gum – Northern Ironbark – Mahogany Forest (MU15n), which occurs in a similar locality. |
| n/a Coastal Forests - Spotted Gum - Ironbark Forest (MU15)
| Hunter-Mackay Dry sclerophyll forests
| There are no PCTs with Eucalyptus fergusonii, so have to opt for the related Eucalyptus paniculata, and hence PCT 1988. |

1586 Grey Ironbark - Broad-leaved Mahogany - Forest Red Gum shrubby open forest on Coastal Lowlands of the Central Coast
dw XU.002. Dry sclerophyll forests (shrub/grass sub-formation);
Hunter-Mackay Dry sclerophyll forests;
15o Sugarloaf Uplands moist spotted gum - Ironbark Forest
| Supports a canopy of Corymbia maculate and Eucalyptus fergussonii subsp. fergussonii, joined by Eucalyptus acmenoides and Eucalyptus punctata. Understorey vegetation supports species such as Hibbertia aspera, Persoonia linearis, Macrozamia linearis and Bursaria spinosa, and Entolasia stricta, Daniele caerulea, Lomandra filiformis, coriacea, and Lepidosperma laterale. Vines and scramblers, such as Hibbertia scandens, Smilax australis, Eustephia latifolia, and Pandorea pandorana are also common. |
| Occurs on the more sheltered slopes of the Sugarloaf Range. Currently not represented on LGA mapping, but is included within other units of the Coastal Foothills complex. Relative to its dryer counterpart (MU15), understorey vegetation is slightly more mesic. |
| n/a Coastal Forests - Spotted Gum - Ironbark Forest (MU15)
| Hunter-Mackay Dry sclerophyll forests
<p>| There are no PCTs with Eucalyptus fergusonii, so have to opt for the related Eucalyptus paniculata, and hence PCT 1988. |</p>
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<tr>
<td>158</td>
<td><strong>Dry Ironbark-Dotted-leaved Mahogany - Forest Red Gum</strong></td>
<td><strong>Dry Sclerophyll Forests</strong> (Shrub/grass sub-formation); <strong>Hunter-Macleay Dry Sclerophyll Forests</strong>; <strong>Sugarloaf Uplands Paperbark Thicket</strong></td>
<td>Paperbark scrub clearly dominated by <em>Melaleuca nodosa</em>. Emergent canopy trees can include any of Corymbia maculata, Eucalyptus puncticulata, <em>Eucalyptus fergusoni</em> subsp. <em>fergusoni</em> or <em>Eucalyptus umbra</em>. Few other shrub species are common in this vegetation type, but <em>Eucarpis pulchella</em>, <em>Leptospermum polygalifolium</em> subsp. <em>cistmontanum</em> or <em>Acrocarpa divericata</em> may occur. Grasses and graminoids dominate the ground layer, including Themeda australis, <em>Panicum similare</em>, <em>Pilothrix desute</em> and <em>Arundina vagans</em> Occurs on level or very gently sloping spurs and ridges with compacted clay soils. This type is currently not represented in associated mapping.</td>
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<td><strong>Spotted Gum - Broad-leaved Mahogany - Red Ironbark shrubby-open forest</strong></td>
<td><strong>Dry Sclerophyll Forests</strong> (Shrub/grass sub-formation); <strong>Hunter-Macleay Dry Sclerophyll Forests</strong>; <strong>Hinterland Spotted Gum - Red Ironbark Forest</strong></td>
<td>Dominated by Corymbia maculata and <em>Eucalyptus fergusoni</em>, with occasional <em>Angophora costata</em>, <em>Eucalyptus umbra</em> or <em>Eucalyptus puncticulata</em>. Understorey species common include <em>Pultenaea villosa</em>, <em>Davallia ulvolkia</em> <em>ulvolkia</em> subsp. <em>ulvolkia</em> and <em>Leptospermum polygalifolium</em> subsp. <em>cistmontanum</em> in the shrub layer, over a grassy ground layer of Themeda australis. <em>Entolasia stricta</em>, <em>Joycea paepala</em>, <em>Microthamnium stipoides</em> var. <em>stipoides</em> and <em>Panicum similare</em> in some areas, thickets of <em>Melaleuca nodosa</em> can occur.</td>
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<tr>
<td>1591</td>
<td><strong>Red Ironbark - Spotted Gum - Prickly-leaved Paperbark shrubby-open forest of the Lower Hunter</strong></td>
<td><strong>Dry Sclerophyll Forests</strong> (Shrub/grass sub-formation); <strong>Hunter-Macleay Dry Sclerophyll Forests</strong>; <strong>Depression Paperbark Thicket</strong></td>
<td>Characterized by a dominance of <em>Eucalyptus fergusoni</em> in the canopy, often forming monospecific stands of this species. Other canopy species present include <em>Eucalyptus cinerea</em> and <em>Corymbia gummifera</em>. <em>Paperbarks</em> (<em>Melaleuca decora</em>, <em>Melaleuca nodosa</em>) form a mid-layer, with other shrubs including <em>Dodonaea triquetra</em>, <em>Acacia longfolia</em> subsp. <em>longfolia</em> and <em>Pultenaea palseae</em>. <em>Themeda australis</em>, <em>Pilothrix desute</em>, <em>Entolasia stricta</em>, <em>Panicum similare</em> and <em>Gahnia radula</em> are prominent in the ground layer.</td>
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<td><strong>Red Ironbark - Spotted Gum - Prickly-leaved Paperbark shrubby-open forest of the Lower Hunter</strong></td>
<td><strong>Dry Sclerophyll Forests</strong> (Shrub/grass sub-formation); <strong>Hunter-Macleay Dry Sclerophyll Forests</strong>; <strong>Depression Paperbark Thicket</strong></td>
<td><em>Melaleuca decora</em>, <em>Melaleuca nodosa</em>, <em>Bursaria spinosa</em> (+/- <em>Eucalyptus fergusoni</em>), with a well developed grass and herb layer. Within the wider landscape of Red Ironbark – Paperbark Forest (MU110a), moist depressions support a range of wetter grasses and sedges, and less <em>Eucalyptus fergusoni</em>, but a more prominent <em>Melaleuca decora</em> subcanopy. Often occur adjacent to roads or easements and hence may be an artefact of these. See Bell (2009) for further information.</td>
</tr>
<tr>
<td>1598</td>
<td><strong>Forest Red Gum-grassy-open forest on floodplains of the lower Hunter</strong></td>
<td><strong>Floodplain Wetlands</strong>; <strong>Coastal Floodplain Wetlands</strong>; *<em>River Flat</em>  <strong>Eucalypt Forest on Coastal Floodplains</strong></td>
<td><em>Eucalyptus tereticornis</em> with <em>Angophora floribunda</em>, and * Allocasuarina littoralis*, <em>Acacia longfolia</em>, <em>Leptospermum polygalifolium</em>, <em>Melaleuca dypteryoides</em>, <em>Melaleuca sinclairii</em>, <em>Brenna oblongifolia</em>, <em>Dodonaea triquetra</em>, <em>Imparata cylindrical</em>, <em>Lomandra longifolia</em>, and <em>Entolasia stricta</em>. Remnants of this type occur on alluvial flats of Lake Macquarie and associated lagoons. Restricted in distribution in the region, and has commonly been converted to foreshore parks and picnic areas. Some good intact examples occur in the Eraring area, and Landscape groups have been removing extensive stands of <em>Lantana</em> from these stands.</td>
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| **Coastal Valley Grassy Woodlands** | Mu 38 | Occurs as remnant stands around the foreshore of Lake Macquarie, typically on clayey footslopes rather than alluvial deposits. Further investigation is required, including additional sampling, to ascertain relationships between all units currently ascribed to Mu38.

**Eucalyptus tereticornis** and **Angophora floribunda** are joined by **Eucalyptus siderophloia** in the canopy, over a scattered shrub layer of **Melaleuca rossii**, **Acacia falcata** and **Glochidion fordiann**. The well-developed ground layer is dominated by **Lamandla longifolia**, **Entolasia stricta**, **Microtoma stipites** var. **stipites**, **Panicum eliame** and **Imperata cylindrica**.

**Sydney Coastal Dry Sclerophyll Forests** | Mu 833 | An original REINS2000 vegetation unit which has been progressively sub-divided to accommodate more detailed revision across the region. Some areas remain on the current map layer which will require allocation to new divisions.

**Angophora costata**, **Corymbia gummifera**, **Eucalyptus umbra**, and **Eucalyptus capitellata** occurs over an understory of **Persoonia linearis**, **Acacia myrtifolia**, **Leptospermum polygalifolium**, **Lamaita formosa**, **Dieldrya retorta**, **Themeda australis**, **Entolasia stricta**, **Pteridium esculentum**, **Lamandla obliqua**, **Phylanthus hirtellus**, **imperata cylindrica**, and **Lepidosperma laterale**.

**Sydney Coastal Dry Sclerophyll Forests** | Mu 30 | Occurs on the lowlands near the F3 Freeway in the north-west of the LGA. It is possible that this community equates to a localised form of MU30h (Sugarloaf Lowlands Bloodwood – Apple Forest), but requires further investigation.

**Sugarloaf Uplands Bloodwood - Apple Forest** | Mu 30f | Characterised by **Eucalyptus piperita** in the canopy, where it occurs with **Angophora costata** and **Corymbia gummifera**. Understorey species include **Pultenaea euchila**, **Acacia terminalis**, **Dodonaea cistmontanum**, **Dorriea triquetra**, **Leptospermum polygalifolium** subsp. **collina**, **Pteridium esculentum**, **Lamandla confertifolia** subsp. **pallida**, **Lepidosperma laterale** and **Entolasia stricta** on the ground.

**Fremans Peppermint-Apple-Bloodwood Forest** | Mu 30f | Centred on Freeman’s Waterhole, this vegetation type is characterised by **Eucalyptus piperita**.

**Sydney Coastal Dry Sclerophyll Forests** | Mu 30a | Originally defined for the northern Wyong area, and parts of southern Lake Macquarie (mainly south of Merimb) appear to support similar vegetation. Further clarification of this type and other defined forms of Mu30 is required to determine position in the classification.

**Sugarloaf Bloodwood - Apple Forest** | Mu 30b | Dominated by **Angophora costata**, **Corymbia gummifera** and **Eucalyptus umbra**, and dominant shrub and understorey species include **Persoonia linearis**, **Podolobium dichotomum**, **Macrozamia reducata**, **Daviera ulovifolia** subsp. **ulovifolia**, and **Pteridium esculentum** in the shrub layer, over **Themeda australis**, **Joyce pallida**, **Kantothronovo laevifolia**, **Microtoma stipites** var. **stipites**, and **Phyllanthus hirtellus**.

**Fremans Peppermint-Apple-Bloodwood Forest** | Mu 30f | Centred on Freeman’s Waterhole, this vegetation type is characterised by **Eucalyptus piperita**.

**Sydney Coastal Dry Sclerophyll Forests** | Mu 30c | Occurs as remnant stands around the foreshore of Lake Macquarie, typically on clayey footslopes rather than alluvial deposits. Further investigation is required, including additional sampling, to ascertain relationships between all units currently ascribed to Mu38.

**Sydney Coastal Dry Sclerophyll Forests** | Mu 30e | Occurs on the lowlands near the F3 Freeway in the north-west of the LGA. It is possible that this community equates to a localised form of MU30h (Sugarloaf Lowlands Bloodwood – Apple Forest), but requires further investigation.

**Dominated by** **Eucalyptus globobile**, **Angophora costata**, **Corymbia gummifera**, **Eucalyptus umbra**, and **Eucalyptus capitellata** occurs over an understory of **Persoonia linearis**, **Acacia myrtifolia**, **Leptospermum polygalifolium**, **Lamaita formosa**, **Dieldrya retorta**, **Themeda australis**, **Entolasia stricta**, **Pteridium esculentum**, **Lamandla obliqua**, **Phylanthus hirtellus**, **imperata cylindrica**, and **Lepidosperma laterale**.

**On the ground,** **Doryanthes excelsa** is common, along **Themeda australis**, **Joyce pallida**, **Kantothronovo laevifolia** subsp. **pallida**, **Lepidosperma laterale** and **Entolasia stricta** on the ground.
<table>
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<tr>
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<th>Key Canopy Species</th>
<th>Notes</th>
</tr>
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<tbody>
<tr>
<td>1619</td>
<td>Smooth-barked Apple - Red Bloodwood - Brown Stringybark Hapjin Banksia heathy open forest of coastal lowlands</td>
<td>Narrabeen, Permian sediment (Moon Island Beach subgroup) geology, Sydney Coastal Dry Sclerophyll Forests</td>
<td>Eucalyptus globulus, Eucalyptus capители, Eucalyptus umbra, Angophora costata</td>
<td>Closest related to the Sugarloaf Uplands Bloodwood – Apple Forest (MU30b). Sugarloaf Lowlands Bloodwood - Apple Forest occurs largely on Narrabeen and Permian sediments (Moon Island Beach subgroup) geology, and is floristically simpler.</td>
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<tr>
<td>1620</td>
<td>Grey Ironbark - Broad-leaved Mahogany - Smooth-barked Apple coastal headland low open forest of the Central Coast</td>
<td>Sydney Coastal Dry Sclerophyll Forests;</td>
<td>Eucalyptus umbra, Angophora costata, over an understory of Banksia spathulata, Abietenia aspera,</td>
<td>Occurs on coastal headlands and associated low hills where there is some immediate protection from onshore winds.</td>
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<td></td>
<td></td>
<td></td>
<td>Lasiopterum parvifolium, Arctotheca divaricata, Leptospermum polygalifolium and Polycias sambuccifolia.</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Ground vegetation includes species such as Entolasia stricta, Dianella caerulea, Imperata cylindrica, and</td>
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<td></td>
<td></td>
<td></td>
<td>Lomandra longifolia. In some areas, Eucalyptus paniculata may also occur in the canopy.</td>
<td></td>
</tr>
<tr>
<td>1622</td>
<td>Grey Gum - Smooth-barked Apple - Blue-leaved Stringybark shrub - grass open forest on coastal ranges of the Sydney Basin</td>
<td>Sydney Coastal Dry Sclerophyll Forests;</td>
<td>Eucalyptus punctata and Eucalyptus paniculata are dominant. Other canopy species present in this</td>
<td>Occurs on exposed and rocky sandstone escarpment edges and spur ends within the Watagan Ranges. This community is similar to others within the Hunter Range dry forests, and some further clarifications are required.</td>
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<tr>
<td></td>
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Coastal Sheltered

1592 Gum - Smooth-barked Apple - Blue-leaved Stringybark - grass open forest on coastal ranges of the Sydney Basin

eq 836 Dry Sclerophyll Forests (Shrubby sub-formation); Sydney Coastal Dry Sclerophyll Forests; 21f Hunter Range Dry Mahogany - Apple Forest

Generally supports Eucalyptus umbrina as the key dominant species, but with any of Angophora floribunda, Eucalyptus paniculata, Eucalyptus fgescens. Eucalyptus agglomerate, Eucalyptus punctata and Allocasuarina torulosa often present. Understorey vegetation commonly includes Podolobium aciculiferum, with Olearia tomentosa, Adenolasia cornicula, Entolasia stricta, Passiflora distans, Passiflora cinforfome and Lomandra longifolia.

Best developed on exposed rocky spur ends and exposed slopes within Jilliby State Conservation Area, off Prickly Ridge Road. Further sampling and analysis is required to determine the relationship of this community with other forms of Hunter Range forest types.

1592 Gum - Smooth-barked Apple - Blue-leaved Stringybark - grass open forest on coastal ranges of the Sydney Basin

medium 836 Dry Sclerophyll Forests (Shrubby sub-formation); Sydney Coastal Dry Sclerophyll Forests; 21g Hunter Range Dry Stringy Bark - Blackbutt Forest

Dominated by a canopy of Eucalyptus agglomerate and Eucalyptus pilularis. Above the E. agglomerate, Eucalyptus punctata and Allocasuarina torulosa also present. Understorey species include Acacia simplex, Podolobium aciculiferum and Acacia ulicifolia, with Entolasia stricta, Cleistochloa rigida and Panicum sylvile on the ground.

Forestally similar to Hunter Range Dry Mahogany – Apple Forest (MU21), and some further investigation is required to determine the status of both. While Eucalyptus agglomerate is occasionally present in MU21, it is clearly not a dominant feature as it is in this community.

1594 Smooth-barked Apple - Swamp Mahogany - Red Mahogany - Cabbage Palm open forest on lowlands of the Central Coast

medium 838 Dry Sclerophyll Forests (Shrubby sub-formation); Sydney Coastal Dry Sclerophyll Forests; 37f Swamp Mahogany - Livistona Swamp Forest

Comprises a distinct canopy of Livistona australis with Eucalyptus robusta and occasional Melaleuca quinquenervia and Casuarina glebea. A scattered mid-layer of species such as Ficus coronata and Omoranthus populifolius occurs with young Livistona over a ground layer of Hypoxis marreri, Opisthomen imbecillus, Commelina cyanea and Gahnia clarkei.

Occurs principally on the poorly drained sand flats around Pelican and Belmont South. As with many communities where Livistona is characteristic, considerable frond-fall litter prevents the development of a diverse ground layer.

1597 Smooth-barked Apple - Turpentine - Sydney Peppermint heathy woodland on sandstone ranges of the Central Coast

eq 641 Dry Sclerophyll Forests (Shrubby sub-formation); Sydney Coastal Dry Sclerophyll Forests; 11 Coastal Sheltered Apple - Peppermint Forest

Clearly dominated by Eucalyptus piperita and Angophora costata, and with a sparse or moderate cover of understorey shrubs and grasses such as Allocasuarina littoralis, Pteridium esculentum, Entolasia stricta, Themeda australis, and Imperata cylindrica.

Occurs in dry drainage lines and associated slopes, generally at southerly to south-easterly aspects. Dominates in shallow drainage lines in small catchments around northern and central Lake Macquarie. Often cleared for grazing, cropping or horticulture, and is generally restricted in extent. Eucalyptus piperita as a dominant is diagnostic.

1597 Smooth-barked Apple - Turpentine - Sydney Peppermint heathy woodland on sandstone ranges of the Central Coast

eq 641 Dry Sclerophyll Forests (Shrubby sub-formation); Sydney Coastal Dry Sclerophyll Forests; 11a Riparian Paperbark - Peppermint Forest

Canopy of Eucalyptus piperita, Eucalyptus punctata and Angophora costata. The tall shrub layer includes Callicoma serratifolia, Glischrochiton fernandi and Melaleuca laevis, and with a dense ground layer of Gahnia clarkei.

Minor drainage lines on the lower elevation undulating country of the coastal plains support a swampy community, typically occupies only narrow bands 15m or less in width.

1597 Smooth-barked Apple - Turpentine - Sydney Peppermint heathy woodland on sandstone ranges of the Central Coast

eq 641 Dry Sclerophyll Forests (Shrubby sub-formation); Sydney Coastal Dry Sclerophyll Forests; 11c Awaba Peppermint - Black Wattle Riparian Forest

Emergent Eucalyptus piperita, Angophora costata, Allocasuarina torulosa - + Corymbia gummifera - over Callicoma serratifolia, Glischrochiton fernandi, Gahnia melanocarpa, Oplismenus imbecillus.

Narrow rocky gully lines high in the catchment where Callicoma serratifolia dominates the small tree shrub layer. Emergent Epineria and Acoscia with Allocasuarina raimondii.

1596 Scribbly Gum - Red Bloodwood Arctinophora inopina heathy woodland on lowlands of the Central Coast

high 859 Dry Sclerophyll Forests (Shrubby sub-formation); Sydney Coastal Dry Sclerophyll Forests; 31 Coastal Plains Sclerophyll Woodland

Eucalyptus haemastoma, Corymbia gummifera, Eucalyptus caesia and Angophora costata in the canopy, over a diverse understorey of heathy shrubs, sub-shrubs and forbs, including Lambertia formosa, Leptospermum trinervium, Banksia oblongifolia, Allocasuarina littoralis, Hakea laevis, Leptospermum arborescens, Aratula warburgii, Entolasia stricta, Phleum pusillum, Haplopappus tenuifolius, Lomandra obtipila.

Widespread on Narrabeen sediments of the Central Coast hinterland.
Scribbly Gum - Red Bloodwood -

Common species include *Banksia oblongifolia*, *Angophora inopina* (shrub form), *Halocarpus bauerii* and *Ptilothrix debilis*. Occurs on the Narabeen coastal plains of southern Lake Macquarie LGA, and forms a mosaic within the wider matrix of Coastal Plains Scribbly Gum Woodland (MU31). Meagable on aerial photographs, the distribution of this community is dynamic and responds to disturbance events such as fire or partial clearing. Very often good habitat for terrestrial orchids.

Sydney Coastal Dry Sclerophyll Forests (Shrubby sub-formation);

Occurs on the Narrabeen coastal plains of southern Lake Macquarie LGA, and forms a mosaic within the wider matrix of Coastal Plains Scribbly Gum Woodland (MU31). Meagable on aerial photographs, the distribution of this community is dynamic and responds to disturbance events such as fire or partial clearing. Very often good habitat for terrestrial orchids.

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Sydney Coastal Dry Sclerophyll Forests;

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<tr>
<td></td>
<td>PCT1646</td>
<td>Smooth-barked Apple - Blackbutt - Old Man Banksia woodland on coastal sands of the Central and Lower North Coast</td>
<td>Eucalyptus pilularis, Banksia serrata, and Angophora costata. Dominated by Eucalyptus pilularis with Angophora costata and Corymbia glauca. Includes Banksia serrata. Moderately dense forest. Occurs on coastal sand bodies within parts of Awabakal Nature Reserve and in the Jewells Swamp area.</td>
</tr>
<tr>
<td></td>
<td>PCT1646</td>
<td>Coastal Sand Apple-Blackbutt Forest</td>
<td>Eucalyptus pilularis, Banksia serrata, and Angophora costata. Dominated by Eucalyptus pilularis with Angophora costata and Corymbia glauca. Includes Banksia serrata. Moderately dense forest. Occurs on coastal sand bodies within parts of Awabakal Nature Reserve and in the Jewells Swamp area.</td>
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<tr>
<td></td>
<td>PCT1646</td>
<td>Sand Mantled Banksia Forest</td>
<td>Open forest of Angophora costata, Banksia serrata and Corymbia glauca on sandy wind-blown deposits. Common understory species include Monotoca ephatica, Peronospora lineata, Acacia longifolia, Pandanus microcarpus, and Dianella caerulea. Occurs in a few location in the south-east of Lake Macquarie LGA, such as near Catherine Hill Bay and Swansea.</td>
</tr>
<tr>
<td></td>
<td>PCT1646</td>
<td>Forested Wetlands</td>
<td>Eucalyptus resinifera, Angophora costata, Melaleuca linariifolia, Melaleuca sieberi and Eucalyptus globidioides in the canopy, over a sparse understory of Acacia longifolia, Pultenaea villosa and Banksia spinulosa var. collina in the shrub layer, and several grasses and sedges on the ground. Various species can be common, although generally not in large, dense stands. Occurs in a few location in the south-east of Lake Macquarie LGA, such as near Catherine Hill Bay and Swansea.</td>
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### Sydney Coastal Dry Sclerophyll Forests (Shrubby sub-formation)

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<td></td>
<td>PCT1646</td>
<td>Smooth-barked Apple - Scrubby Gum - shrub woodland on lowlands of the Central Coast</td>
<td>Eucalyptus racemosa and Angophora costata, with occasional Corymbia glauca and Eucalyptus capitolata. Understorey vegetation includes Diuris labrosa, Gomphocarpus tetragonus, Lampranthus minervae and Acacia ulicifolia, over high abundance of Entosia stricta, Aristida vagans, Zygia palida and Lomandra obliqua. Characteristics of a canopy of Eucalyptus racemosa and Angophora costata, with occasional Corymbia glauca and Eucalyptus capitolata. Understorey vegetation includes Diuris labrosa, Gomphocarpus tetragonus, Lampranthus minervae and Acacia ulicifolia, over high abundance of Entosia stricta, Aristida vagans, Zygia palida and Lomandra obliqua. Not particularly similar to Snappy Gum Ridgetop Heathy Forest (MU31j) and Killingworth Snappy Gum Forest (MU111c). Not relevant PCT for Eucalyptus racemosa on coastal plains.</td>
</tr>
<tr>
<td></td>
<td>PCT1646</td>
<td>Cockle Creek Dune Forest</td>
<td>Eucalyptus racemosa occurs with Corymbia glauca, Angophora costata and occasionally Eucalyptus populnea. Understorey vegetation includes Pandanus microcarpus, Alloclavia marginata, Hibbertia empetrifolia, Polycasias sambuculifolia, Dodonaea viscosa, Themeda australis and Lomandra obliqua. Occurs predominantly on ridges and slopes of Permian geology (Adamstown subgroup), in and around the townships of Khiabah and Whitebridge and extending to near Jewells. As with other similar communities, Eucalyptus racemosa is diagnostic for this type. Some further targeted sampling and analysis is required to confirm relationships between this unit and Snappy Gum Ridgetop Heathy Forest (MU31j) and Killingworth Snappy Gum Forest (MU111c).</td>
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<td></td>
<td>PCT1646</td>
<td>Killingworth Snappy Gum Forest</td>
<td>Eucalyptus racemosa occurs with Corymbia glauca, Angophora costata and occasionally Eucalyptus populnea. Understorey vegetation includes Pandanus microcarpus, Alloclavia marginata, Hibbertia empetrifolia, Polycasias sambuculifolia, Dodonaea viscosa, Themeda australis and Lomandra obliqua. Occurs predominantly on ridges and slopes of Permian geology (Adamstown subgroup), in and around the townships of Khiabah and Whitebridge and extending to near Jewells. As with other similar communities, Eucalyptus racemosa is diagnostic for this type. Some further targeted sampling and analysis is required to confirm relationships between this unit and Snappy Gum Ridgetop Heathy Forest (MU31j) and Killingworth Snappy Gum Forest (MU111c).</td>
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<td>PCT1646</td>
<td>Smooth-barked Apple - Red Mahogany - Swamp Mahogany Melaleuca sieberi heathy swamp woodland of coastal lowlands</td>
<td>Eucalyptus resinifera, Angophora costata, Melaleuca linariifolia, Melaleuca sieberi and Eucalyptus globidioides in the canopy, over a sparse understory of Acacia longifolia, Pultenaea villosa and Banksia spinulosa var. collina in the shrub layer, and several grasses and sedges on the ground. Various species can be common, although generally not in large, dense stands. Occurs in a few location in the south-east of Lake Macquarie LGA, such as near Catherine Hill Bay and Swansea.</td>
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<td>PCT1646</td>
<td>Swanage Swampy Forest</td>
<td>Eucalyptus resinifera, Angophora costata, Melaleuca linariifolia, Melaleuca sieberi and Eucalyptus globidioides in the canopy, over a sparse understory of Acacia longifolia, Pultenaea villosa and Banksia spinulosa var. collina in the shrub layer, and several grasses and sedges on the ground. Various species can be common, although generally not in large, dense stands. Occurs in a few location in the south-east of Lake Macquarie LGA, such as near Catherine Hill Bay and Swansea.</td>
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### Coastal Dune Dry Sclerophyll Forests

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Could also be PCT1618 Smooth-barked Apple - White Stringybark - Red Mahogany - Melaleuca sieberi shrubby open forest on lowlands of the lower North Coast.

Coastal Swamp Forests

Paperbark Clay

Wyong Paperbark

Could also be PCT 771 Coast Banksia - Coast high HU867; Dry Sclerophyll 1653 Coast Tea Tree - Coast Banksia Forests (Shrubby sub-formation); Riparian Melaleuca Swamp Woodland (MU42)

Riparian Melaleuca Swamp Woodland (MU42)

Distinguished it from related types. Targeted sampling and assessment will likely subsume this type back as a localised variant of Red Mahogany – Apple – Paperbark Forest (MU42).

Dry Sclerophyll Forests

Leptospermum lanegavum, Banksia integrifolia subsp. integrifolia and Monotoca elliptica dominate the tallest layer, with occasional shrubs such as Leucopogon parviflorus and Correa alba also present. In some areas, Cupaniopsis anacaroides occurs as scattered individual shrubs, and Acacia sophorae is often present. Chrysanthemeodiosis minoroides is also a component of this community.

Determined canopy species include Eucalyptus resinifera, Angophora costata and Syncarpia glomulifera, over Glischidion ferndard, Melaleuca sieberi and Allocasuarina littoralis. Known from two locations at Wyee and near Montese, and the presence of Syncarpia glomulifera in it distinguished it from related types. Targeted sampling and assessment will likely subsume this type back as a localised variant of Red Mahogany – Apple – Paperbark Forest (MU42).

Coastal Sand Forests

Leptospermum lanegavum, Banksia integrifolia subsp. integrifolia and Monotoca elliptica dominate the tallest layer, with occasional shrubs such as Leucopogon parviflorus and Correa alba also present. In some areas, Cupaniopsis anacaroides occurs as scattered individual shrubs, and Acacia sophorae is often present. Chrysanthemeodiosis minoroides is also a component of this community.

Occurring on the landward side of Coastal Sand Forestone Scrub (MU50a), Coastal Sand Banksia Scrub is structurally more complex than that community, yet remains floristically simple.

Coastal Headland Heaths

Originally defined during the REMS2000 regional project, but has not yet been examined since in any detail. This community occurs on narrow alluvial deposits in the well-protected gullies of the Wallarah Peninsula in the south-east. Apple (Angophora costata), as defined in the original circumscription, is not apparent in areas sampled to date.

Coastal Sand Scrub (MU50)

Occurs in highly exposed locations along the coast. Fire history and other disturbances have a role in the current distribution of this community, and it often forms a mosaic with Coastal Headland Shrubland (MU51a). Current mapping likely excludes some areas of this community, as the process of cutting original lineart to Council's veg-noveg layer has eliminated some patches.

Cooktown Pink - Coastal Tea Tree Coastal Wetlands/ Coastal Swamp Forests

Pittosporum undulatum, Banksia spinulosa, Banksia oblongifolia, Isopogon anermonifolius, Epacris pulchella and Hakea latifolia. Other characteristic species include Melaleuca styphelioides, Acerena smithii, Discypos arcturus, Pittosporum undulatum and Glischidion ferndard, over a ground layer of Aristotome aethiopicum, Oplismenus imbecillis and Dicorycea transversa.

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Typified by a canopy of Livistona australis, Corymbia maculata and Eucalyptus peroniana. Other characteristic species include Melaleuca styphelioides, Acerena smithii, Discypos arcturus, Pittosporum undulatum and Glischidion ferndard, over a ground layer of Aristotome aethiopicum, Oplismenus imbecillis and Dicorycea transversa.

Typical species in this community include Melaleuca nodosa, Banksia spinulosa, Banksia oblongifolia, Leupogon anemonifolius, Epacons puchelis and Hekea leveges. On the ground, Karthorrhoea selijfiksis is characteristic, together with Pilothriv deusta and various grasses.

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Occurs in areas close to the coast around Catherine Hill Bay and Caves Beach, principally on clay soils, but where a light veneer of wind-blown sand allows other 'sandy-base- ed' species to also predominate.

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Occurs on wind-swept coastal headlands, and forms a mosaic with both Coastal Headland Grassland (MU51a) and Coastal Headland Paperbark Scrub (MU51d). Boundaries between the three are dynamic in response to fire events.

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Occurs as small, disjunct and restricted patches within the lower Hunter region, generally within a wider matrix of Hinterland Spotted Gum – Ironbark Forest (MU71b). Only a single stand is currently known from Lake Macquarie LGA, and additional patches are present in the adjacent Cessnock LGA west of Mt Sugarloaf. Current-day occurrences may possibly be an artefact of previous disturbances.

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1701  Prickly-leaved Paperbark - Fern-leaved Banksia heath on coastal headlands of Central Coast  

mud 45915  Heathlands; Coastal Headland Heath;  

Coastal Headland Paperbark Scrub  
Melaleuca nodosa dominates these areas, often forming impenetrable thickets interspersed with more open grassy patches. Other emergent shrubs include Callistemon linearis, Acrotriche divaricata and Lissanthe strigosa. Within openings in the shrub layer, Themeda australis is the dominant ground cover, together with Anistea warburgi, Lasiopetalum parviflorum and Pilicinia decussata.  

Forms a low or tall dense heath on exposed coastal headlands on clay soils.  

Thermola grassland on seashore and headlands  
Coastal Headland Complex (MU51) Coastal Headland Heath

1702  Wooma Banksia-Monotoca scoparia heath on coastal sands of the Central Coast and lower North Coast  

high 45917  Heathlands; Coastal Headland Heath;  

Coastal Sand Wooma Heath  
Characterised by an often dense mid-layer of Banksia aemula, with studded Corymbia guttata and Anghoropa costata also present. Other prominent shrubs include Riciancarpus pinifolius, Actus ericoides, DiWindya retorta, Monotoca scoparia, and Leucopogon ericoides.  

Occurs only on the elevated coastal sand masses in the vicinity of Awabakal NR and Munmorah SCA. Further clarification is required between this community and the related Coastal Sandplain Dry Heath (MU34c), which appears to occur on shallower sands.  

Woo Coastal Sand Wooma Heath (MU34c) Wooma Sand Heath

1703  Wooma Banksia-Monotoca scoparia heath on coastal sands of the Central Coast and lower North Coast  

medium 45917  Heathlands; Coastal Headland Heath;  

Coastal Sandplain Dry Heath  
Banksia aemula, Acantholasmum dodyia, Baeccata ensata, Joepogon amnemonifolius, Lemberia forinosa and Monotoca scoparia.  

Occurs on shallower sands of the coastal sand masses in and around Awabakal NR and Munmorah SCA. Closely related to Coastal Sand Wallum Heath (MU34a), and requires further investigation.  

Woo Coastal Sand Wooma Heath (MU34c) Wooma Sand Heath

1704  Fern-leaved Banksia - Prickly-leaved Paperbark-Tanton - Lepocarpus tenax wet heath on coastal sands of the Central Coast and lower North Coast  

high 45918  Freshwater Wetlands; Coastal Heath Swamps;  

Tomago Strand Intermediate Heath  
Prominent species present include Leptospermum polygalifolium, Banksia oblongifolia, Melaleuca nodosa, Phloeochna incertae and Epacris microphylla, and the segetal Leptospermum tenax and Leptosyce scrassa.  

Parts of the heath within the Jewels Swamp area supports vegetation that is floristically similar to that present on the Tomago Sandhills north of Newcastle. The only known stand in Lake Macquarie has been dissected by the Pacific Highway, and is becoming weed infested.  

Coastal Wet Sand Cyperoid Heath (MU44) Coastal Heath Swamps

1705  Fern-leaved Banksia - Prickly-leaved Paperbark-Tanton - Lepocarpus tenax wet heath on coastal sands of the Central Coast and lower North Coast  

medium 45918  Freshwater Wetlands; Coastal Heath Swamps;  

Munmorah Impeded Sand Sedgeland  
Prominent species present include Leptospermum juniperinum, Sprengelia sprengelioides, Epacris obtusifolia, Banksia oblongifolia and Xanthorrhoea fulva.  

A wet heath occurring on coastal sands where drainage is particularly poor, and a range of segetal species dominate the ground layer. Closely related to other wet heaths, further analysis of sample data is required to clarify relationships.  

Coastal Wet Sand Cyperoid Heath (MU44) Coastal Heath Swamps

1706  Leptospermum inverellitae- Callistemon linicatus- Xanthorrhoea fulva wet heath on coastal sands of lower North Coast  

eaw 45920  Heathlands; Walkum Sand Heath;  

Munmorah Grasstree Wet Heath  
Xanthorrhoea fulva characterises this community and is the dominant species present.  

Occurs in broad, impeded basins and drainage lines in the southern parts of the LGA, generally within a Narrabeen sandstone landscape. Stands are typically relatively small, and may form a mosaic with other wet heaths on the coastal plain. Larger occurrences are present to the south in Wyong LGA.  

Coastal Wet Sand Cyperoid Heath (MU44) Coastal Heath Swamps

1707  Leptospermum inverellitae- Callistemon linicatus- Xanthorrhoea fulva wet heath on coastal sands of lower North Coast  

eaw 45920  Heathlands; Walkum Sand Heath;  

Coastal Sand Bottlebrush Wet Heath  
Acazia elongata, Callistemon linicatus and Leptospermum juniperinum, over segetal such as Lepocarpus tenax and Sclerolepis brevifoilt.  

Occurs on the coastal sand sheets in the Belmont-Jewells area. Similar floristically to other wet heaths in Lake Macquarie, and further work is required to clarify relationships.  

Coastal Wet Sand Cyperoid Heath (MU44) Coastal Heath Swamps

1708  Erialea oblongifolia-Hakea teretifolia - Lepocarpus tenax-Lepocarpus scoparia wet heath on sandstone ranges of the Central Coast  

medium 45921  Freshwater Wetlands; Coastal Heath Swamps;  

Coastal Plains Wet Heath  
Banksia oblongifolia, Hakea teretifolia, Baeccata dianthifolia and Melaleuca thymioida. Scattered taller shrubs of Melaleuca sieberi and Anghoropa inspina may also be present.  

Occurs in broad shallow drainage lines on the coastal plains in the south of the LGA, most commonly within a landscape supporting Coastal Plains Scrub and Banksia oblongifolia  

Coastal Plains Wet Heath (MU44a) Coastal Heath Swamps

PCT823 (now decommissioned) would have been a better fit. This is effectively a wet heath, not a sedgeland.

1709  Erialea oblongifolia-Hakea teretifolia-Lepocarpus tenax-Lepocarpus scoparia wet heath on sandstone ranges of the Central Coast  

medium 45921  Freshwater Wetlands; Coastal Heath Swamps;  

Munmorah Grasstree Wet Heath  
Xanthorrhoea fulva characterises this community and is the dominant species present.  

Occurs in broad, impeded basins and drainage lines in the southern parts of the LGA, generally within a Narrabeen sandstone landscape. Stands are typically relatively small, and may form a mosaic with other wet heaths on the coastal plain. Larger occurrences are present to the south in Wyong LGA.  

Coastal Wet Sand Cyperoid Heath (MU44) Coastal Heath Swamps

No Central Coast PCTs dominated by Xanthorrhoea fulva, as have opted for North Coast type, which is (very) broadly similar.

1710  Erialea oblongifolia-Hakea teretifolia-Lepocarpus tenax-Lepocarpus scoparia wet heath on sandstone ranges of the Central Coast  

medium 45921  Freshwater Wetlands; Coastal Heath Swamps;  

Coastal Plains Wet Heath  
Banksia oblongifolia, Hakea teretifolia, Baeccata dianthifolia and Melaleuca thymioida. Scattered taller shrubs of Melaleuca sieberi and Anghoropa inspina may also be present.  

Occurs in broad shallow drainage lines on the coastal plains in the south of the LGA, most commonly within a landscape supporting Coastal Plains Scrub and Banksia oblongifolia  

Coastal Plains Wet Heath (MU44a) Coastal Heath Swamps

PCT684 is perhaps more fitting, but not present in Hunter apparently.
Estuarine Paperbark Scrub Forest

Characterised by dense thickets of paperbarks (Melaleuca nodosa, Melaleuca sieberi) with stunted emergent eucalypts such as Eucalyptus resinifera. Understorey vegetation is often limited, although clumps of Gahnia clarkei and Baumea juncea are typical. Grasses, such as Microseris stipoides var. stipoides, are common. Occupies in limited extent on compacted clay soils near estuarine swamp systems. As all forms of MU43 have been poorly sampled, further investigation is required to determine relationships between this community and the related units White Stringybark – Paperbark Scrub-Forest (MU43e) and Forest Redgum – Paperbark Scrub-Forest (MU43f), which may simply be variants of the one community.

White Stringybark Paperbark Scrub-Forest

Eucalyptus globulus characterises the emergent canopy. The mid-storey comprises a dense layer of Melaleuca nodosa and Melaleuca decorata, over a sparse shrub layer but well developed ground layer. Occupies a similar landscape position to Estuarine Paperbark Scrub-Forest (MU43a), and differs principally in the replacement of Eucalyptus resinifera and Eucalyptus paniculata with Eucalyptus globulus in the emergent canopy. As all forms of MU43 have been poorly sampled, further investigation is required to determine relationships between this community and the related units Estuarine Paperbark Scrub-Forest (MU43a) and Forest Redgum – Paperbark Scrub-Forest (MU43f).

Forest Red Gum Paperbark Scrub-Forest

Eucalyptus tereticornis characterises the emergent canopy. The mid-storey comprises a dense layer of Melaleuca nodosa, over a sparse shrub layer and well developed ground layer. Occupies a similar landscape position to Estuarine Paperbark Scrub-Forest (MU43a), but supports Eucalyptus tereticornis in the emergent canopy. As all forms of MU43 have been poorly sampled, further investigation is required to determine relationships between this community and the related units Estuarine Paperbark Scrub-Forest (MU43a) and White Stringybark – Paperbark Scrub-Forest (MU43f).

Swamp Mahogany - Flax-leaved Swamp Forest

Typified by the presence of Eucalyptus robusta in the emergent canopy, and may occur with a range of associates including Melaleuca linariifolia, Melaleuca sieberi, Eucalyptus resinifera, and Eucalyptus tereticornis. The understorey is variable, often with a dense shrub layer of species such as Acacia longifolia, Omalanthus nutans, Leptospermum juniperinum, Melaleuca thymifolia and Pultenaea villosa, and the sedges Gahnia clarkei, Chorizandra cymbaria and Baloskion tetraphyllous subsp. meiostachyus. Common in the better defined drainage lines. It is also a Koala feed tree, and is a winter-flowering eucalypt that provides a food source for several other threatened fauna species. Recorded at Wyee near the M1 motorway, and additional stands may become apparent with further work, particularly to the west. There is some uncertainty regarding how this community differs from other forms of MU37.

Swamp Mahogany - White Stringybark Swamp Forest

Eucalyptus microcorys co-dominants with Eucalyptus robusta. Mid-layer vegetation includes Melaleuca styphelioides, Callistemon salignus and Glochidion ferdinandi, with Gahnia clarkei, Microseris stipoides var. stipoides, Advantium aristophicum and Oplismenus imbecillis prominent on the ground. Recorded at Wyee near the M1 motorway, and additional stands may become apparent with further work, particularly to the west. There is some uncertainty regarding how this community differs from other forms of MU37.

Swamp Mahogany - Narrow-leaved Alluvial Paperbark Thicket

Dense stands of Melaleuca linariifolia within shallow drainage lines on the coastal plains, where impeded drainage supports a dense ground layer of Gahnia clarkei. Other common species include the shrub Glochidion ferdinandi and the tree fern Cyathea australis and/or Cyathea leichhardtiana. Recorded at Wyee near the M1 motorway, and additional stands may become apparent with further work, particularly to the west. There is some uncertainty regarding how this community differs from other forms of MU37.
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<th>Description</th>
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<th>Legal Status</th>
<th>Notes</th>
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<td>1718</td>
<td>Swamp Mahogany - Flax-leaved Paperbark swamp forest on coastal lowlands of the Central Coast</td>
<td>Dense stands of <em>Gahnia clarkei</em> dominate the ground, often with Carex longibracteata, <em>Adiantum aethiopicum</em> and the occasional <em>Cyathea</em> sp. <em>Melaleuca linariifolia</em> dominates the sub-canopy, often with some <em>Melaleuca stypheloides</em> and <em>Eucalyptus papyrus</em> as an emergent or overhanging species. Other characteristic species present include <em>Ficus coronate</em> and <em>Glochidion ferdinandi</em>.</td>
<td>High HUM32, Forested Wetlands; Coastal Swamp Forests;</td>
<td>Swamp Mahogany - Paperbark Forest (MUS179)</td>
<td>Might not qualify for the EEC if MU37 occurs on coastal sand deposits so important to assess whether it meets the EEC criteria onsite.</td>
</tr>
<tr>
<td>1719</td>
<td>Paperbarks - Woollybutt swamp forest on coastal lowlands of the Central Coast</td>
<td>Dense stands of <em>Gahnia clarkei</em> dominate the ground, often with Carex longibracteata, <em>Adiantum aethiopicum</em> and the occasional <em>Cyathea</em> sp. <em>Melaleuca linariifolia</em> dominates the sub-canopy, often with <em>Melaleuca stypheloides</em> and <em>Eucalyptus papyrus</em> as an emergent or overhanging species. Other characteristic species present include <em>Ficus coronate</em> and <em>Glochidion ferdinandi</em>.</td>
<td>High HUM33, Forested Wetlands; Coastal Swamp Forests;</td>
<td>Swamp Mahogany - Paperbark Forest (MUS179)</td>
<td>Coastal Swamp Forests</td>
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<td>1720</td>
<td>Cabbage Gum - Forest Red Gum - Flax-leaved Paperbark Floodplain Forest of the Central Coast</td>
<td>Dense stands of <em>Gahnia clarkei</em> dominate the ground, often with Carex longibracteata, <em>Adiantum aethiopicum</em> and the occasional <em>Cyathea</em> sp. <em>Melaleuca linariifolia</em> dominates the sub-canopy, often with some <em>Melaleuca stypheloides</em> and <em>Eucalyptus papyrus</em> as an emergent or overhanging species. Other characteristic species present include <em>Ficus coronate</em> and <em>Glochidion ferdinandi</em>.</td>
<td>High HUM34, Forested Wetlands; Coastal Floodplain Wetlands;</td>
<td>Swamp Mahogany - Paperbark Forest (MUS179)</td>
<td>Coastal Swamp Forests</td>
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<td>1723</td>
<td><em>Melaleuca bicorevosa</em> - Swamp <em>Mahogany</em> - Cabbage Palm swamp forest of the Central Coast</td>
<td>Dense stands of <em>Gahnia clarkei</em> dominate the ground, often with Carex longibracteata, <em>Adiantum aethiopicum</em> and the occasional <em>Cyathea</em> sp. <em>Melaleuca linariifolia</em> dominates the sub-canopy, often with some <em>Melaleuca stypheloides</em> and <em>Eucalyptus papyrus</em> as an emergent or overhanging species. Other characteristic species present include <em>Ficus coronate</em> and <em>Glochidion ferdinandi</em>.</td>
<td>High HUM37, Forested Wetlands; Coastal Swamp Forests;</td>
<td>Swamp Mahogany - Cabbage Palm Forest (MUS179)</td>
<td>Coastal Swamp Forests</td>
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<td>1724</td>
<td>Broad-leaved Paperbark - Swamp Oak - Saw Sedge swamp forest on coastal lowlands of the Central Coast and Lower North Coast</td>
<td>Dense stands of <em>Gahnia clarkei</em> dominate the ground, often with Carex longibracteata, <em>Adiantum aethiopicum</em> and the occasional <em>Cyathea</em> sp. <em>Melaleuca linariifolia</em> dominates the sub-canopy, often with some <em>Melaleuca stypheloides</em> and <em>Eucalyptus papyrus</em> as an emergent or overhanging species. Other characteristic species present include <em>Ficus coronate</em> and <em>Glochidion ferdinandi</em>.</td>
<td>High HUM38, Forested Wetlands; Coastal Swamp Forests;</td>
<td>Swamp Mahogany - Cabbage Palm Forest (MUS179)</td>
<td>Coastal Swamp Forests</td>
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<td>1725</td>
<td><strong>Swamp Mahogany - Broad-leaved Paperbark - Swamp Water Fern - Pumic Rush swamp forest on coastal lowlands of the Central Coast and Lower North Coast</strong> 8w HU939; Forested Wetlands; Coastal Swamp Forests; <strong>37</strong></td>
<td><strong>Dune Swale Swamp Forest</strong> Eurya fulgens over a scrubby understorey of species such as Callicoma serratifolia, Elaeocarpus excelsulus, Doodonia nigra, Leptopomum polygalifolium subsp. obovatum and Phaeomorpha esculentum. Ground layer vegetation is distinct in the high abundance of Batis kochii, Galphima decorti and Entodisma marginata. Occurs in poorly drained drainage lines on coastal sandplains. Currently poorly sampled (a single sample from Awabakal NR), and further clarification of species composition is required through additional sampling. Swamp Sclerophyl Forest on Coastal Floodplains EEC (7). Coastal Swamp Forests</td>
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<td>1727</td>
<td><strong>Swamp Oak - Sea Rush - Baumea juncea swamp forest on coastal lowlands of the Central Coast and Lower North Coast</strong> 8w HU941; Forested Wetlands; Coastal Floodplain Wetlands; <strong>40</strong></td>
<td><strong>Swamp Oak - Rushland Forest</strong> Casuarina glauca clearly dominates this community, with an understorety of sedges and rushes such as Juncus kraussii subsp. australiensis and Baumea juncea, and the herb Asparagus plumosus. Occurs adjacent to tidal estuaries on Lake Macquarie and associated inlets. Areas that have been previously cleared and then left to regenerate are quickly re-colonised by non-native species such as S Melania ericifolia forms small, dense thickets. Swamp Oak Floodplain Forest on Coastal Floodplains MU37. Coastal Floodplain Wetlands</td>
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<td>1727</td>
<td><strong>Swamp Oak - Sea Rush - Baumea juncea swamp forest on coastal lowlands of the Central Coast and Lower North Coast</strong> 8w HU941; Forested Wetlands; Coastal Floodplain Wetlands; <strong>40c</strong></td>
<td><strong>Estuarine Juncus Rushland</strong> Dominated almost exclusively with Juncus kraussii subsp. australiensis. Occurs on near-littoral tidal flats associated with Mangrove Estuarine Complex (MU47) and Swamp Oak - Rushland Forest (MU40). No PCT for Juncus kraussii sedgelands, but as these are associated with estuarine Swamp Oak forest it makes sense to link it with 1727. Coastal Floodplain Wetlands</td>
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<td>1727</td>
<td><strong>Swamp Oak - Sea Rush - Baumea juncea swamp forest on coastal lowlands of the Central Coast and Lower North Coast</strong> 8w HU941; Forested Wetlands; Coastal Floodplain Wetlands; <strong>40d</strong></td>
<td><strong>Lake Macquarie Headland Swamp Oak Forest</strong> Casuarina glauca dominates the canopy in these areas, over an understorety of Acacia longifolia, Brevia oblongifolia, Myrmeleontis variabilis and Phaeomorpha esculentum. At Catherine Hill Bay, the large sedge Galphima decorti is prominent. Occurs in localised stands on some exposed headlands on the edge of Lake Macquarie, and also on one coastal headland near Catherine Hill Bay. There is some uncertainty over whether some or all of these stands are the result of previous clearing events, which have subsequently re-established as dense stands of Casuarina glauca. Similar effects have been noted to the south in Pittwater LGA. Coastal Floodplain Wetlands</td>
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<td>1730</td>
<td><strong>Swamp-paperbark - Baumea juncea swamp shrubland on coastal lowlands of the Central Coast and Lower North Coast</strong> 8w HU944; Forested Wetlands; Coastal Swamp Forests; <strong>100a</strong></td>
<td><strong>Swamp Paperbark Thicket (Floodplain Alluvials)</strong> Melaleuca ericifolia over Baumea juncea, Phragmites australis and Centella asiatica. Occurs principally as a fringe around coastal estuaries or lagoons. This fringe is typically less than 20m in width. Similar vegetation also occurs in previously cleared floodplain habitats, such as in the Mandoon Valley, where Melaleuca ericifolia forms small, dense thickets. This vegetation type occurs in similar situations to the south and north of Lake Macquarie. Coastal Floodplain Wetlands</td>
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<td>1735</td>
<td><strong>Cladium procumbens coastal freshwater wetland</strong> 8w HU949; Freshwater Wetlands; Coastal Freshwater Lagoons; <strong>46h</strong></td>
<td><strong>Freshwater Cladium Sedgeland</strong> Cladium procumbens +/- Phragmites australis and Typha orientalis. Forms large monospecific stands in the coastal sands of Jewells and Belmont, merging into surrounding sedgelands of Phragmites and/or Typha. May also include stunted but widely scattered Melaleuca quinquenervia. Freshwater Wetlands on Coastal Floodplains Coastal Freshwater Lagoons</td>
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<td>1736</td>
<td><strong>Water Couch - Tall Spike Rush freshwater wetland of the Central Coast and Lower Hunter</strong> 8w HU950; Freshwater Wetlands; Coastal Freshwater Lagoons; <strong>46</strong></td>
<td><strong>Freshwater Wetland Complex</strong> Various, but may include Persicaria strigose, Azolla pinnata, Maundia triglochinoides, Phragmites australis and Triglochin procurnen. Typha australis, Hemarthria uncinata. Commonly represented only in disused man-made dams or previously cleared swamp forests across much of Lake Macquarie LGA. Variation in dominant sedge species can occur, depending on the colonisation history of the particular water body, and depth of water. Some attempt has been made to differentiate different wetland communities (see other Unit 4.14), but further variations will likely be documented with additional sampling. Freshwater Wetlands on Coastal Floodplains Coastal Freshwater Lagoons</td>
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<td>1736</td>
<td><strong>Water Couch - Tall Spike Rush freshwater wetland of the Central Coast and Lower Hunter</strong> 8w HU950; Freshwater Wetlands; Coastal Freshwater Lagoons; <strong>125</strong></td>
<td><strong>Water Couch Meadow</strong> Paspalum distichum dominates in locally monospecific meadows. Occurs as small patches or strips along the side of freshwater lagoons or creeks, where sufficient shallow water is present. No targeted sampling of these areas has been undertaken, and known occurrences are too small to map. Coastal Freshwater Lagoons Placed this with LHCCREMS MU46, within which it broadly fits.</td>
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Coastal Freshwater Lagoons

Freshwater Wetland Complex (MU46)

1739 Woolly Water lily - Sand Couch coastal freshwater wetland

Temporary impoundments, such as for irrigation or stock watering, may result in shallow, temporary lagoons. These support a vegetation community dominated by Phragmites australis, but this is not a permanent type. This vegetation type occurs only in coastal sand swamp systems.

Typha orientalis dominates these areas almost exclusively. Disused farm dams or open depressions with reasonable levels of water retention support a sedgeland of Typha orientalis. It is likely that additional stands are present throughout the LGA.

1740 Lepironia articulata sedgeland

Freshwater Wetland Complex (MU46)

Lepironia articulata dominates, with the ground layer supporting species such as the grass Pseudophlebus paradoxa and the herb Villarosa exalata.

Known only from Redhead Lagoon within the Awabakal NR, where it forms a band of tall sedgeland around the rim of the deeper water body. Regionally, this vegetation type is rare, and occurs only in coastal sand swamp systems.

1741 Jointed Twig-rush sedgeland

Freshwater Wetland Complex (MU46)

Isolated sedgeland patches in coastal swamps, such as those at Forster, are commonly present in disused water bodies throughout the region. Mapped only for a single site at Catherine Hill Bay, but likely to occur across the City.

1742 Grey Mangrove low closed forest

Freshwater Wetland Complex (MU46)

Known only on remnant Hawkesbury Sandstone geology in and around 'The Pines' picnic area in Olney State Forest. Commonly found on Hawkesbury Sandstone further to the south and west, where that geological strata outcrops more consistently.

1747 Red Bloodwood - Silvertop Ash - Shrubby Dry Sclerophyll forests

Freshwater Wetland Complex (MU46)

Dominated in the canopy by Eucalyptus sieberi, Eucalyptus piperita, Corymbia gummifera, Eucalyptus scias, Banksia sieberiana, Acacia kulnurensis, Melaleuca quinquenervia, and Tetrarhena juncea.

Occurs only on remnant Hawkesbury Sandstone geology and around ‘The Pines’ picnic area in Olney State Forest. Vegetation in this unit is more typical of that found on Hawkesbury Sandstone further to the south and west, where that geological strata outcrops more consistently.

Another option may be 1010, but that is probably a North Coast type. PCT 1808 was listed as “Provisionally Approved” as at 17-3-2016.

1757 Banskia spinulosa, Acacia kulnurensis, Banksia serrata, Eucalyptus piperita, Corymbia gummifera, Eucalyptus scias, Banksia sieberiana, Acacia kulnurensis, Melaleuca quinquenervia, and Tetrarhena juncea.

1750 Common Reed on the margins of estuaries and brackish lagoons along the New South Wales coastline

Freshwater Wetland Complex (MU46)

Phragmites Rushland

Dominated by Gahnia sieberiana , and forms large dense stands in enclosed sand-based freshwater wetland systems.

Another option is 1011 that could cover man-made occurrences of this community. PCT 1911 was listed as “Provisionally Approved” as at 17-3-2016.

1751 Seagrass meadows of the estuaries and lagoons of the New South Wales coast

Freshwater Wetland Complex (MU46)

Zostera sp. Fossilina sp. Halophila sp. Seagrass occurs in the shallower reaches of Lake Macquarie, but has not been targeted or sampled during this study.

Another option may be 1010, but that is probably a North Coast type. PCT 1913 was listed as “Provisionally Approved” as at 17-3-2016.
<table>
<thead>
<tr>
<th>MU 1g</th>
<th>MU 3e</th>
<th>MU 40c</th>
<th>MU 40d</th>
<th>MU 43c</th>
<th>MU 44a, 44g, and 44i</th>
<th>MU 45</th>
<th>MU 46c</th>
<th>MU 51a-d</th>
<th>MU 54a</th>
<th>MU 114</th>
<th>MU 122</th>
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<tbody>
<tr>
<td><strong>Notes on allocation to LHCCREMS &amp; EECs</strong></td>
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<td>Will not fit under Lowland Rainforest EEC, as the floristics don't fall within or are associated with any of the subfaiths of Floyd that are listed in paragraph 4. Also, paragraph 5 states that warm temperate rainforests occurring at on sandstones, shales and mudstones in localized gullies from the Sydney Basin are not included, unless they occur in conjunction with the subfaiths mentioned in paragraph 4. However, MU1g has some species in common with the Lowland Rainforest EEC. Individual site assessment is required to determine whether the Lowland Rainforest EEC criteria are met.</td>
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<td>Is dominated by Backhousia myrtifolia and Acmena smithii, neither of which are included in the Lower Hunter DRI EEC, and there are many other listed species which are not present. So MU 3e is not considered part of this EEC.</td>
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<td>Occurs in very limited areas in Lake Macquarie. The larger areas have absolutely no Casuarina glauca.</td>
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<td>Occurs in areas that are not on floodplain, but on elevated rises close to the Lake. This however, could be a result of disturbance (the Swamp Oak having been cleared and now what remains are Juncus reedlands).</td>
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<td><strong>For the purposes of this project, map, MU43a is a subgroup and is not the LHCCREMS MU43a.</strong></td>
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<td>MU43c is more characteristic of MU37 than MU42a however both are equally wrong. MU33 rather than MU31 - Not really a coastal sand but the structure and floristics are closer than a heathy woodland but neither match well.</td>
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<td>Are all forms of wet heath, so would not be included in Freshwater Wetlands EEC. The determination for this one includes aquatic and ‘wetland’ species, but very few (if any) typical wet heath species.</td>
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<td>Could be included in Sydney Freshwater Wetlands (SWF) EEC rather than Freshwater Wetlands on floodplains EEC. These areas typically occur on sand substrates (e.g Awabakal NR), which fits in better with SWF.</td>
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<td>This is a very localized wetland type that occurs within well-developed rainforest. It may even be an artifact from previous disturbance. It has been sampled. Floristically it does not really fit with either Lowland RF or Freshwater Wetlands EEC so it is not an EEC in the latest reports. The earlier suggestion that it be included within Lowland Rainforest 1 EEC was purely recognising the very small size of known stands, and their locations within wider rainforest environments - this made sense from a landscape perspective. But floristically, they are not a rainforest. Similarly with Freshwater wetlands, there is a location where these sedgelands occur on their own outside of surrounding rainforest.</td>
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<td>Certainly will be the EEC, and parts of the mapped distribution of the other variants may also contain the EEC. Coastal headlands are dynamic and the structure changes due to management and fire – former shrublands can be burnt and then start up again as grasslands dominated by Themeda. Also, the aerial photos used for the mapping will show a certain stage in the transition from grasslands to shrublands, and in some areas this may be very different today. The determination states that the structure may be open shrubland or open grassland with a grassy matrix underneath, and that patches as small as a few square metres are included.</td>
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<td>A site-by-site inspection of potential areas within the Map Units 51b, 51c and 51d will be required to determine whether the EEC is present. There may be small occurrences of Themeda grassland. The Final Determination indicates that the Themeda Grassland EEC can occur in patches of a few square metres. These areas may contain small patches of Themeda grassland EEC, even though overall Map Unit is not equivalent to any EEC.</td>
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<td>The Coastal Upland Swamps EEC only occurs on Hawkesbury Sandstone, this site is Permian so it is not the Coastal Uplands Swamps EEC.</td>
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<td>Melaleuca linarifolia is more characteristic of MU37 than MU42a however both are equally wrong.</td>
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