# Assessment of Threatened Ecological Communities of the Coastal Integrated Forestry Operations Approval Region

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Environment Protection Authority

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# Contents

# 1 Introduction

## 1.1 Project rationale

This project was initiated by the NSW Environment Protection Authority (EPA) and the Forestry Corporation of NSW (FCNSW) to support improved recognition, regulation and management of Threatened Ecological Communities (TECs) in NSW native forestry. It represents a coordinated approach to resolve long standing issues surrounding the identification, extent and location of priority TECs that occur on the NSW State Forest estate included within eastern Regional Forest Agreements.

The TEC mapping project aimed to:

- Identifying those TECs most likely to be present in harvest areas and impacted by forestry activities
- Develop an agreed interpretation of each threatened entity in consideration of diagnostic and supplementary information and evidence contained in the final determination of the NSW Scientific Committee
- Develop a methodology to identify, classify and map TECs on State Forests within a defined study area
- Establish regulatory boundaries around TEC management units at an appropriate scale (1:4000) for use in planning and operations

## 1.2 Funding

The TEC Mapping Project is part of a broader suite of projects being undertaken by the EPA, and is complementary to the current coastal Integrated Forestry Operations Approval review.

The TEC Mapping Project was funded by a Waste and Environment Levy Envelope grant and is administered by the NSW Environmental Trust. An amount of $1,270,000 was available over a 3-year funding period to implement the Project. The Project commenced in 2014 and was completed in August 2016 (see figure 1)

## 1.3 The project team

The project was planned and implemented under the oversight of the Director, Forestry Branch. An EPA project manager coordinated TEC related strategic planning and policy matters, end-product use, and all aspects of communication, stakeholder engagement and reporting.

The Office of Environment (OEH) and Heritage Native Vegetation Information Science Branch was contracted to deliver all scientific, analytical, methodological and mapping aspects of the TEC mapping project. A dedicated OEH project team consisting of a senior vegetation scientist (vegetation survey, classification and mapping), a senior scientist (GIS and spatial analysis) and a vegetation scientist (aerial photograph interpretation) was recruited to implement the project under the coordination of the Senior Team Leader Vegetation Ecology and Classification.

Independent specialist consultancies were also engaged to deliver key aspects of the work including botanical survey, aerial photograph interpretation, GIS and spatial analysis, data entry and management. These contributors are listed at Appendix C.

## 1.4 The TEC Project Reference Panel

The EPA convened a TEC Project Reference Panel (TEC Panel), of regional experts to guide and oversee the legal and ecological interpretation of TEC final determinations, to provide technical input on methodologies, analysis and mapping pathways and to review outputs.

The Panel included representatives from the EPA, OEH, FCNSW, the NSW Scientific Committee and regional experts. The Panel operated under a terms of reference and established principles agreed to by project partners. Over the course of the Project, 13 Panel sessions were held.

The principles assumed by the TEC Panel have ensured that the TEC interpretations are, as far as practicable, consistent with relevant final determinations. The core inputs of the Panel in relation to individual TECs are noted in the associated technical reports.

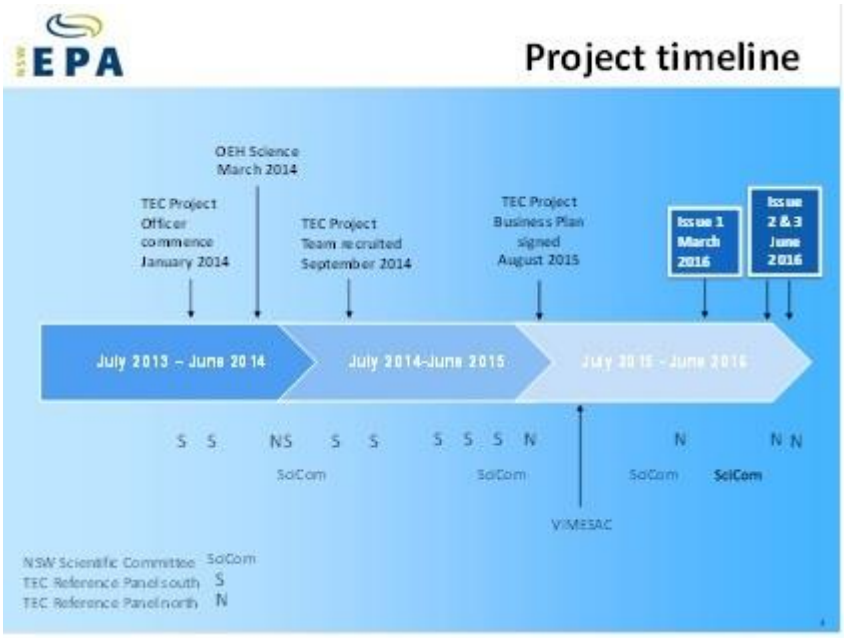


*Figure 1: Project timeline*

## 1.5 NSW Scientific Committee

The EPA and project team have engaged with the NSW Scientific Committee on a regular basis throughout the Project; providing updates on key findings and in relation to issues encountered in interpreting final determinations. A sitting member of the NSW Scientific Committee has attended most TEC Panel sessions. The project outputs have been submitted to the NSW Scientific Committee.

## 1.6 Vegetation Information and Mapping Scientific Advisory Committee

The TEC interpretation principles, classification and mapping methods were presented to VIMESAC, the OEH independent vegetation information and mapping scientific advisory committee.

# 2 Assessment area

## 2.1 State Forest areas

The Project Study Area includes all Crown Forest estate situated within the boundaries of the Upper North East, Lower North East, Southern and Eden Integrated Forestry Operations Approval (IFOA) regions. A total of 315 state forests were included in this assessment and are listed at Appendix A, and shown in figures 2 and 3. Additionally, Crown Forests situated within the Central Tablelands area comprising part of the Bathurst and Mudgee forest management areas are also included in the Study Area. These forests are not covered by an IFOA but are identified for assessment for the purposes of this project.

**Table 1: State Forests by IFOA region**

| IFOA Region | Area (Hectares) | Proportion of all State Forest in Study Area |
|---|---|---|
| **Eden** | 164146 | 12% |
| **Southern** | 281907 | 20% |
| **Lower North-East** | 472381 | 34% |
| **Upper North-East** | 414570 | 29% |
| **Non IFOA (central NSW)** | 70561 | 5% |
| **Total** | 1403565 | |

## 2.2 Exclusions

Figures 2 and 3 also illustrate areas that are not subject to this assessment. These include those areas defined as Forest Management Zones 5 (Hardwood Plantations) and Zone 6 (Softwood Plantations). Small areas of native forest wholly enclosed or adjoining Forest Management Zone 6 (Softwoods) are also excluded from assessment as they are considered to be outside of the authority of the IFOA.

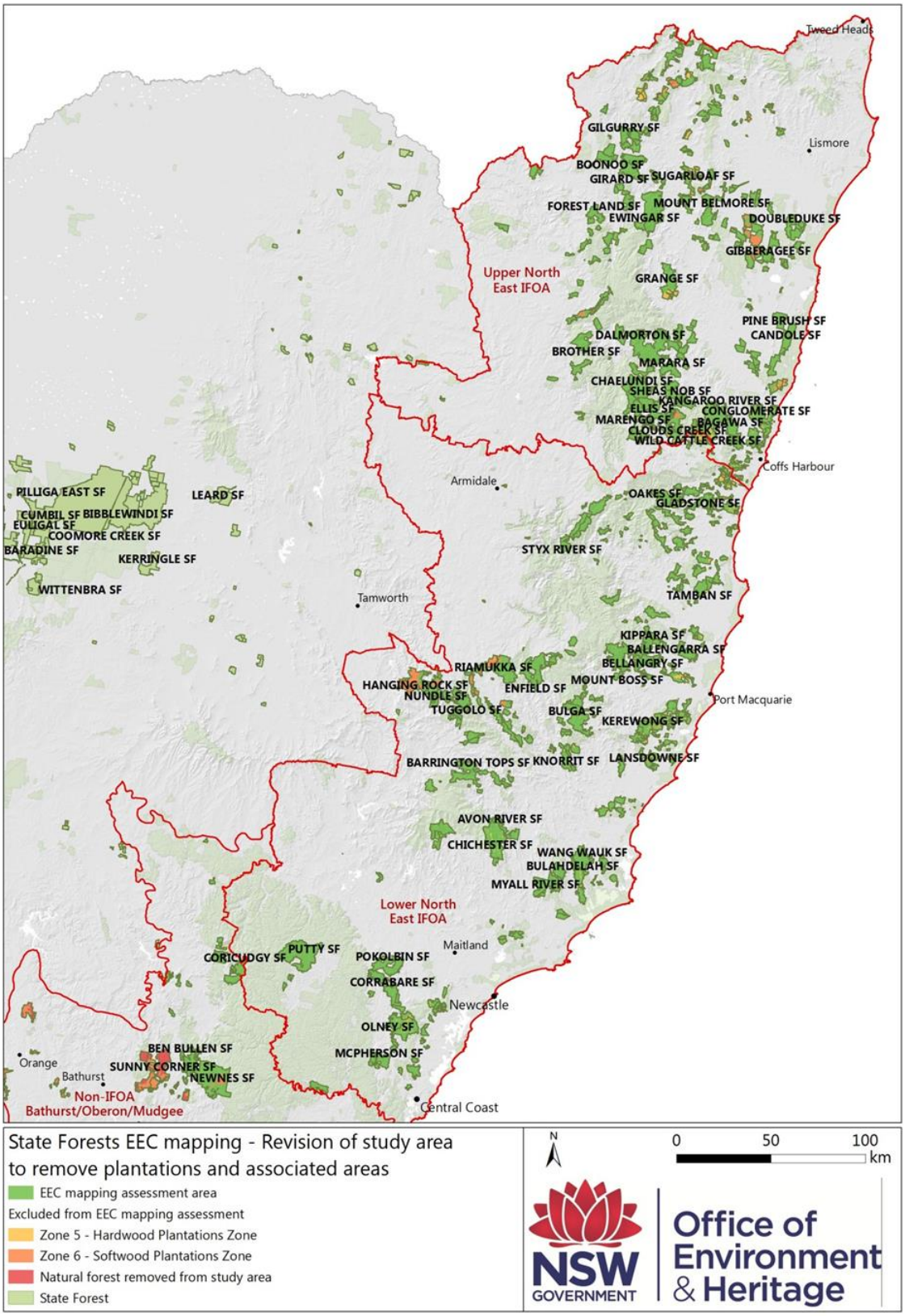


**Figure 2: Northern NSW IFOA Regions**

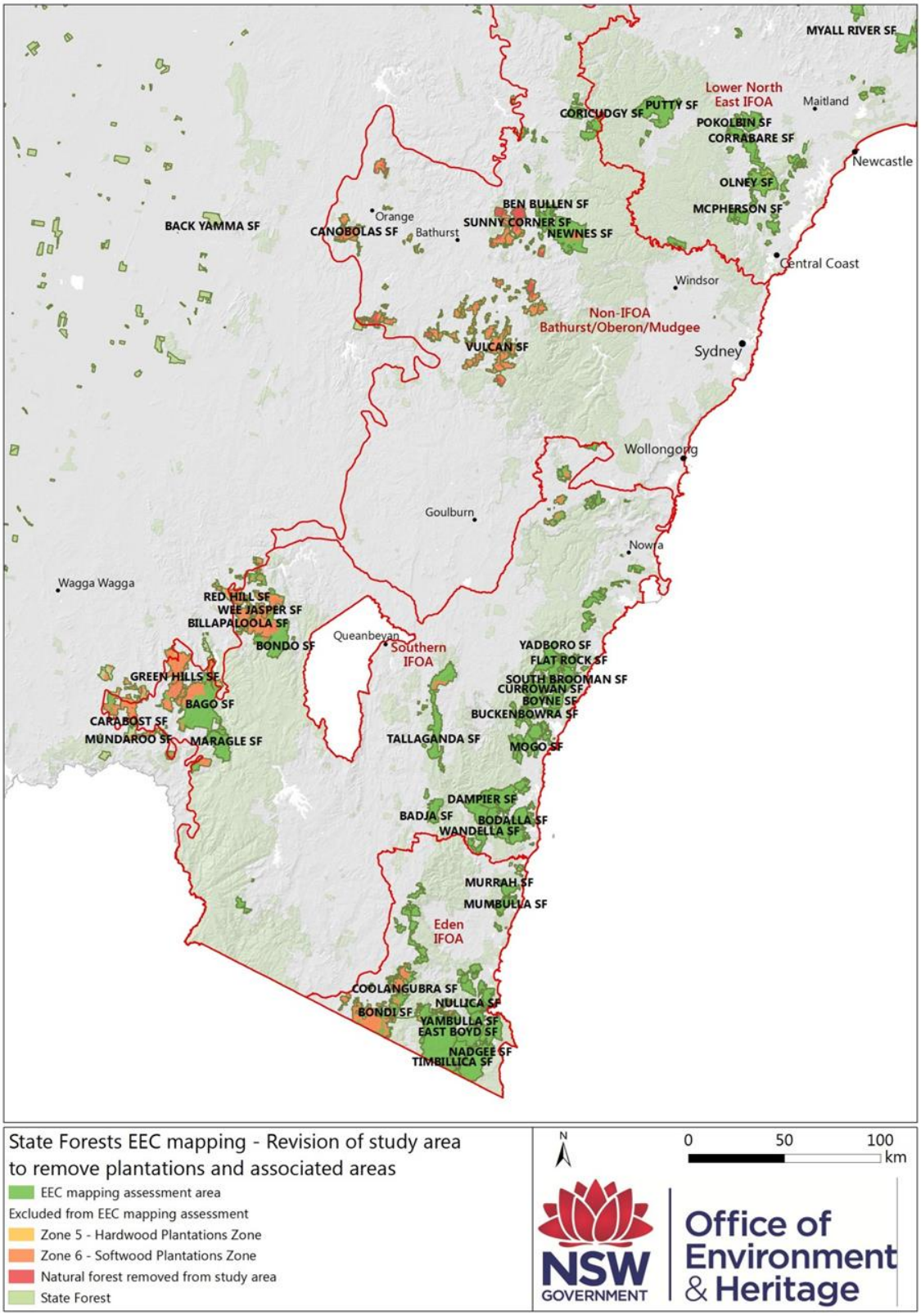


**Figure 3: Southern NSW IFOA Regions**

# 3 Assessed TECs

## 3.1 Prioritisation process

The EPA and FCNSW identified a priority list of TECs to be assessed against a prescribed set of criteria that weights the relative priority of each of the 103 TECs listed under the *NSW Threatened Species Conservation Act, 1995* (Appendix B).

This prioritisation process was initiated to ensure that investment and available resource was directed to the TECs most likely to be impacted by forestry activities within the Study Area.

A range of factors were considered in ranking the TECs for mapping and interpretation. These include but are not limited to:

- conservation status of the TEC under State and Federal Acts
- the known extent of the TEC within harvestable areas and on other tenures
- the degree to which TEC is protected by existing measures such as IFOA prescriptions or Forests NSW Forest Management Zones (FMZs) or exclusions zones
- potential impacts or threat from forestry activities as referenced in the final determination i.e. if forestry activities are listed, known or predicted to be a primary or contributing threat, or, are implied to cause indirect impacts such as fragmentation, removal of debris or loss of hollows
- the inclusion of species within the TEC identified by FCNSW as a priority for timber supply purposes or a commercial value forest type
- regulatory history

Twenty-five TECs deemed to be most at risk from forestry activities were identified as likely to occur on Crown Forest within the study area. These are listed in table 2, and include those TECs most frequently presenting regulatory challenges in the forestry context.

The effort and time required to confidently map each TEC at the commencement of the Project was unknown, and would vary according to the methods applied. Consequently, the number of TECs that could be mapped within the Project term was also unknown. In light of this uncertainty, the work schedule of the mapping team was largely guided by the outcomes of this risk assessment process. However, in the interests of maximising efficiencies, the priority TECs in Table 2 were assessed in groups that were floristically and environmentally related. For example, floodplain (6) and rainforest (3) TECs were assessed in sets, and the study area was partitioned into north coast, south coast and tableland focus areas.

During the course of the Project a number of priority TECs were nominated for review by the NSW Scientific Committee. Where assessment had not already commenced, these TECs were relegated in the priority list pending advice from the NSW Scientific Committee.

On this basis, assessment and mapping continued through to project close at 30 June 2016. This resulted in 18 of the 25 prioritised TECs being assessed as indicated in Table 2.

| Abbreviated NSW TEC Name | IFOA Area | Priority | Assessed |
|---|---|---|---|
| Riverflat Eucalypt Forest on Floodplains | Southern, UNE, LNE | High | Y |
| Subtropical coastal floodplain forest | UNE, LNE | High | Y |
| Swamp Sclerophyll Forest on coastal Floodplains | Southern, UNE, LNE | High | Y |
| Lowland Rainforest on Floodplain | UNE, LNE | High | Y |
| Lowland Rainforest | UNE, LNE | High | Y |
| Lower Hunter Spotted Gum Ironbark forest | LNE | High | N review |

| | | | |
|---|---|---|---|
| Grey Box - Grey Gum wet sclerophyll forest | UNE, LNE | High | Y |
| Lowland Grassy Woodland | Eden, Southern | High | Y |
| White Gum Moist Forest | UNE, LNE | High | Y |
| Montane Peats and Swamps | Southern, Eden, UNE, LNE | High | Y |
| Tablelands Snow Gum, Black Sallee, Candlebark and Ribbon Gum Grassy Woodland | Southern and Eden and Non-IFOA areas | Moderate | Y |
| Ribbon Gum-Mountain Gum-Snow Gum Grassy Woodland | UNE, LNE | Moderate | N Tablelands group |
| White box yellow box Blakely's red gum woodland | Southern, UNE, LNE and Non-IFOA areas | Moderate | N Tablelands group |
| Bangalay Sand Forest | Eden, Southern | Moderate | Y |
| New England Peppermint Woodland on basalts and sediments | UNE, LNE | Moderate | N Tablelands group |
| McKies Stringybark/Blackbutt Open Forest | UNE, LNE | Moderate | Y |
| Brogo Wet Vine Forest | Eden, Southern | Moderate | Y |
| Swamp Oak Floodplain Forest | Southern, Eden, UNE, LNE | Moderate | Y |
| Littoral Rainforest | Southern, UNE, LNE | Moderate | Y (north) N (south) |
| Coastal Saltmarsh on floodplains | Southern, Eden, UNE, LNE | Low | Y |
| Milton Ulladulla Subtropical Rainforest | Southern | Low | Y |
| Dry Rainforest of the South East Forests | Eden, Southern | Low | Y |
| Tablelands Basalt Forest | Southern | Low | N Tablelands group |

**Table 2: NSW TECs prioritised for assessment**

## 3.2 Commonwealth EPBC Act Listings

Forestry operations undertaken in accordance with a Regional Forest Agreement (RFA) are exempt from part 3 of the *Environment Protection and Biodiversity Conservation (EPBC) Act 1999*.

The Federally listed TECs shown in Table 3 were included as separate priority entities, as they relate to prioritised State listed TECs, and are likely to occur outside of gazetted RFA regions (North East, Eden, Southern), but within the previously defined Project Study Area. Although included in the priority TEC assessment list, these tableland TECs were not among the 18 TECs we mapped during the project term.

There are other federally listed TECs that relate in whole or part to the priority State listed TECs in Table 2, however, we did not specifically consider the relevant federal determinations and listing criteria due to the part 3 exemption.

| Commonwealth TEC Name | IFOA Area | Priority |
|---|---|---|
| Upland Basalt Eucalypt Forest of the Sydney Basin | Non IFOA areas | Low |
| White box yellow box Blakely's red gum woodland | Southern, UNE, LNE and Non IFOA areas | Moderate |

**Table 3: Commonwealth TECs prioritised for assessment**

### 3.3 Additional listed TECs

Since the commencement of the TEC Mapping Project in 2014, the NSW and Commonwealth Scientific Committees have listed new TECs and made amendments to existing final determinations. When an amendment to an assessed TEC determination occurs, the EPA will review the regulatory interpretation and consider potential revisions to operational maps and field based identification tools. The timing of any map reviews will be influenced by EPA resourcing and corporate priorities.

# 4 Defining TECs

## 4.1 The final determinations of the NSW Scientific Committee

The final determinations of the NSW Scientific Committee are the primary source of information underpinning interpretations of each threatened entity assessed under this project.

Under the NSW TSC Act, TECs are defined as an assemblage of species in an area. The NSW Scientific Committee uses IBRA bioregions as the primary spatial unit to define an area. Determinations contain a range of descriptors, lists and statements that define the floristic, structural, environmental and distributional attributes of a TEC.

Guided by a set of interpretation principles, uncertainty around the meaning or intent of particular statements in any determination was resolved by the TEC Project Reference Panel.

## 4.2 TEC Project Reference Panel Interpretations

The TEC Project Reference Panel provided technical advice on the defining attributes of a TEC that satisfy the criteria described in the final determination. Resolutions of this Panel informed operational interpretations of each of the assessed TECs for the purpose of mapping and/or guiding field identification for forestry operations.

The Panel considered a range of different factors that define each TEC. These included, but were not limited to:

- Defined biophysical areas including bioregional boundaries
- Species lists and floristic composition
- Habitat descriptors
- Structural descriptors
- References to existing vegetation classification sources developed using traceable quantitative data
- Precise wording of location descriptors and administrative boundaries

The TEC Panel also provided guidance on the classification sources underpinning TEC determinations, and whether alternate interpretation and/or mapping methods were appropriate for individual TECs.

The assessed TECs were grouped by broad assessment class, see Table 4.

**Table 4: TEC broad assessment class**

| Broad TEC assessment class | Defining TEC characteristics |
|---|---|
| **Canopy driven** | The determination contains absolute statements describing the dominance of a species or combination of species in the upper stratum (eg White gum moist forest) |

| | |
|---|---|
| **Structural** | The determination contains a complex aggregation of plant assemblages each of which are united by shared structural attributes. These structural attributes occupy distinctive habitats that can readily be distinguished from other assemblages both in the field and using remotely sensed imagery. Mapping of the structural patterns encompasses all relevant species compositional attributes of TECs. (eg Bogs and Saltmarshes) |
| **Assemblage driven** | TECs derived from classification sources using plot based classification methods. Traceable plot assignments form the basis of defining interpretation of TECs |

All existing data relevant to the development of an operational definition of each TEC was identified, compiled and assessed by the project team. The type of data includes (but is not limited to):

- vegetation classifications cited in TEC final determinations and any primary systematic data used to define them
- vegetation map units cited in TEC final determinations and their mapped distribution
- species locality records cited as characteristic or indicative of a TEC
- environmental data that may prescribe or indicate the distribution of a TEC
- existing interpretation of TEC and plant community type relationships held by OEH vegetation information databases for regulatory applications.

In consideration of Panel advice, relevant case law and after consultation with project partners, the EPA endorsed each interpretation, allowing mapping to proceed.

# 5 Project products

## 5.1 Outputs

The broad outputs of this Project are:

- TEC Certified Map(s): High resolution operational maps of priority TEC extent on Crown Forestry lands (as described in 5.3)
- TEC Indicative Maps(s): Maps of priority TEC distribution on public and some private tenure lands (as described in 5.4)
- TEC field guidelines: Guidance to support identification of a subset of priority unmapped TECs (as described in 5.5)
- Technical reports: A full description of the assessment undertaken for each TEC

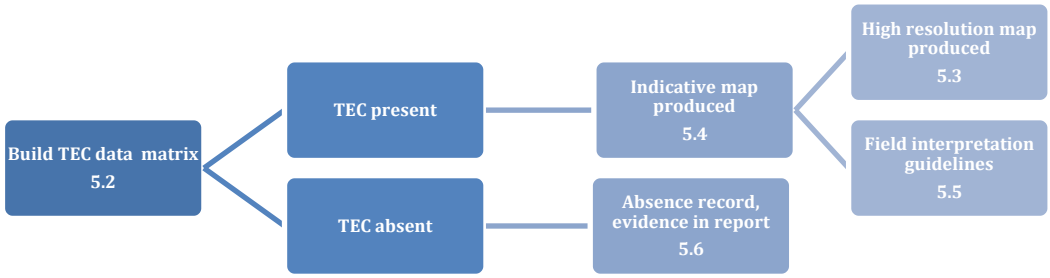


**Figure 4: TEC assessment pathway**

## 5.2 NSW state forest-TEC Data Matrix

The TEC-Forest data matrix identifies the presence or absence of each mapped and/or assessed TEC, for each state forest across the Study Area.

The matrix forms the primary information source that identifies which TECs apply to each individual state forest. The data used to generate the matrix has been drawn from the approved mapped outputs and interpretations developed by this project with reference to final determinations. This process and decision pathway is documented in the technical reports.

## 5.3 Operational Mapping

A set of 13 high-resolution digital maps, have been developed that describe the distribution of each assessed TEC as it occurs on the state forest estate.

Operational maps identify native vegetation cover that meets the agreed EPA interpretation of current TEC final determinations. The maps have been produced at a scale, appropriate for use in harvest planning and forest management operations (typically 1:4000). Harvest planning maps are typically drafted at a scale of 1:15 000.

These maps represent the application of mapping methods including aerial photograph interpretation, field observations including systematically collected plot data and predictive statistical models applied in various combinations depending on the TEC.

## 5.4 Indicative TEC Mapping

Indicative maps were generated from statistical models that predicted TEC distributions. Individual TEC models were constructed using a large plot-based dataset with individual plots assigned to one of two classes, TEC or non-TEC. These plots were used to discriminate which parts of the landscape were likely to be occupied by the TEC and which were not, with values describing the probability of occurrence assigned to the landscape in its entirety. Predictions are limited by the scale of the environmental data used in the models. As a result, some models offer insights into distribution trends rather than resolving local scale patterns with certainty. Indicative maps were adopted where alternate mapping methods were unable to achieve levels of reliability suitable for operational applications.

Two of the assessed TECs are presented solely as indicative maps, and a third TEC has a portion of its distribution remaining as indicative pending further investigation. Indicative maps trigger the application of a field guide key (see 5.5). This process and decision pathway is documented and included in the technical reports.

## 5.5 Field Guide Interpretation guidelines

Field interpretation guidelines have been produced for some TECs to support the delineation of TECs for on ground operations, where an operational map has not been produced. The guidelines draw on systematically collected field data and analysis to identify characteristic species, vegetation structure and landform elements. Key attributes that can be used to separate TECs from related plant community types have also be provided. Where developed, the field guide keys are included in the technical reports.

## 5.6 Technical Reports

Technical reports have been produced for each assessed TEC that address the following:

- TEC Panel interpretation
- survey design and data collection
- data analysis and diagnostic information
- mapping methods and results
- primary sample data assigned to the TEC
- mapping accuracy
- field interpretation guidelines (where relevant)
- TEC Project reference panel review

## 5.7 Floristic data (systematic, non-systematic)

The derivation of TEC maps has relied heavily on quantitative evidence collected in the field as well as existing data stored in the OEH NSW Vegetation Information System. The adequacy of existing survey effort across all state forests was assessed for each TEC prior to any new work commencing.

Field survey data was collected using OEH survey standards for systematic flora survey (Sivertsen, 2009) and has been entered and stored in the OEH NSW Vegetation Information System (VIS). This reference data provides traceable evidence of the presence of TECs on state forest estate and offers a basis for interpretation of TEC final determinations.

Systematic field data was supplemented by rapid field observations to assist the mapping process. Rapid observations recorded a subset of the OEH survey standards in order to facilitate a greater coverage of area within resource constraints.

Systematically collected data was subject to objective and transparent analytical techniques to understand relationships between a TEC, sample data and existing vegetation community classifications. These analyses and field data were used to construct predictive maps, undertake aerial photograph interpretation and to build field identification keys.

The TEC assessments were guided by over 9000 observation points in state forest, including 845 additional full floristic plots collected specifically for this project, (a 30% increase in available systematic data on state forest)

# 6 Results

Notwithstanding the inherent difficulties in interpreting TECs and defining operational boundaries, we believe the adoption of a precautionary approach has resulted in inclusive operational definitions that minimise the risk that candidate TECs have been overlooked on state forest. The Project has reduced uncertainty around the identification of the assessed TECs, and provided a comprehensive evaluation, that has generated a significant body of evidence that will support the EPA to administer the objects of the *TSC Act* concerning these entities. Final areas mapped for each TEC assessed are summarised in table 5. Please refer to individual technical reports for further detail.

**Table 5: Final areas mapped for assessed TECs**

| Threatened Ecological Community | Operational map | Indicative map | Key | Area (Ha) |
|---|---|---|---|---|
| River flat eucalypt forest (south) | Y | | Y | 3819 |
| River flat eucalypt forest (north) | | | N | 198 |
| Swamp sclerophyll forest (south) | Y | | Y | 32 |
| Swamp sclerophyll forest (north) | Y | | N | 1099 |
| Swamp oak floodplain forest (south) | Y | | N | 80 |
| Swamp oak floodplain forest (north) | Y | | N | 204 |
| Tablelands Snow Gum, Black Sallee, Candlebark and Ribbon Gum Grassy Woodland | Y | | Y | 902 |
| Montane peatlands and swamps | Y | | N | |
| Coastal saltmarsh | Y | | N | 99 |
| Bangalay sand forest | Confirm absent | | N | |
| Subtropical coastal floodplain forest | Y | | Y | 11050 |
| Grey box grey gum wet sclerophyll forest | Y | Y | Y | 2936 |
| Lowland rainforest on floodplain | Y | | N | 683 |
| Lowland rainforest | Y | | N | 14036 |
| Littoral rainforest | Confirm absent* | | N | |
| Lowland grassy woodland | NA | Y | Y | 1535 |
| Brogo wet vine forest | | | N | 17 |
| Dry rainforest of the south east forests | | | N | 0.5 |
| McKies Stringybark/Blackbutt Open Forest | | | N | 201 |
| White gum moist forest | NA | Y | Y | 980 |
| Milton Ulladulla subtropical rainforest | | | N | 0 |

*confirmed absent from northern study area, southern rainforest mapping underway in southern study area

# 7 Information Management

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Mapping and reports are be available through the EPA website www.epa.nsw.gov.au/vegetation/nativeforestry. Please contact the EPA Forestry Branch forestry@epa.nsw.gov.au, for further information on any of the project materials.

# 8 Certification of products

I certify the mapping arising out of the TEC Mapping Project for public release and for use by the EPA Forestry Branch in supporting the regulation of specified forestry activities from the assigned date.

……
Mark Gifford
Chief Environmental Regulator, Environment Protection Authority

Date:

## Appendix A: List of state forests assessed under the TEC mapping project (Area in Ha)

| Eden IFOA | 164146 |
|---|---|
| Bermagui State Forest | 1863 |
| Bombala State Forest | 339 |
| Bondi State Forest | 6437 |
| Broadwater State Forest | 168 |
| Bruces Creek State Forest | 793 |
| Cathcart State Forest | 1739 |
| Coolangubra State Forest | 1870 |
| East Boyd State Forest | 21070 |
| Glen Allen State Forest | 1467 |
| Glenbog State Forest | 8780 |
| Gnupa State Forest | 1321 |
| Mumbulla State Forest | 6147 |
| Murrah State Forest | 4221 |
| Nadgee State Forest | 20603 |
| Nalbaugh State Forest | 2275 |
| Nullica State Forest | 18344 |
| Nungatta State Forest | 889 |
| Tanja State Forest | 868 |
| Tantawangalo State Forest | 3404 |
| Timbillica State Forest | 9173 |
| Towamba State Forest | 1435 |
| Wandella State Forest | 0 |
| Yambulla State Forest | 46883 |
| Yurammie State Forest | 4059 |
| **Lower North East IFOA** | 472381 |
| Aberdare State Forest | 6 |
| Avon River State Forest | 5094 |
| Awaba State Forest | 1784 |
| Bachelor State Forest | 2642 |
| Ballengarra State Forest | 6310 |
| Barrington Tops State Forest | 12588 |
| Bellangry State Forest | 6411 |
| Ben Halls Gap State Forest | 351 |
| Boonanghi State Forest | 3817 |
| Bowman State Forest | 3187 |
| Brassey State Forest | 745 |
| Bril Bril State Forest | 2364 |
| Broken Bago State Forest | 4042 |
| Buckra Bendinni State Forest | 1766 |
| Bulahdelah State Forest | 8468 |
| Bulga State Forest | 14679 |
| Bulls Ground State Forest | 2217 |
| Burrawan State Forest | 2322 |
| Cairncross State Forest | 5875 |
| Carrai State Forest | 3028 |
| Chichester State Forest | 21387 |
| Cochrane State Forest | 231 |
| Collombatti State Forest | 4136 |
| Comboyne State Forest | 3080 |
| Comleroy State Forest | 2904 |
| Coneac State Forest | 777 |
| Coopernook State Forest | 874 |
| Coricudgy State Forest | 0 |
| Corrabare State Forest | 5197 |
| Cowarra State Forest | 1687 |
| Diehappy State Forest | 1275 |
| Dingo State Forest | 3874 |
| Dorrigo State Forest | 0 |
| Doyles River State Forest | 7795 |
| Dyke State Forest | 6 |
| Enfield State Forest | 13105 |
| Enmore State Forest | 169 |
| Fosterton State Forest | 851 |
| Giro State Forest | 9934 |
| Gladstone State Forest | 6781 |
| Heaton State Forest | 2426 |
| Ingalba State Forest | 6894 |
| Irishman State Forest | 2733 |
| Johns River State Forest | 1265 |
| Kalateenee State Forest | 1346 |
| Kendall State Forest | 354 |
| Kerewong State Forest | 4021 |
| Kew State Forest | 909 |
| Kippara State Forest | 5632 |
| Kiwarrak State Forest | 6707 |

| | |
|---|---|
| Knorrit State Forest | 5175 |
| Lansdowne State Forest | 4610 |
| Little Newry State Forest | 194 |
| Lorne State Forest | 4062 |
| Lower Creek State Forest | 1270 |
| Maria River State Forest | 2097 |
| Masseys Creek State Forest | 3237 |
| Mcpherson State Forest | 6488 |
| Medowie State Forest | 50 |
| Mernot State Forest | 4338 |
| Middle Brother State Forest | 2188 |
| Mistake State Forest | 5638 |
| Moonpar State Forest | 2 |
| Mount Boss State Forest | 17165 |
| Mount Seaview State Forest | 1 |
| Muldiva State Forest | 515 |
| Muswellbrook State Forest | 2 |
| Myall River State Forest | 13713 |
| Nambucca State Forest | 1677 |
| Nerong State Forest | 2173 |
| Never Never State Forest | 100 |
| Newry State Forest | 3926 |
| North Branch State Forest | 863 |
| Nowendoc State Forest | 3810 |
| Nulla-five Day State Forest | 3370 |
| Nundle State Forest | 6811 |
| Oakes State Forest | 7639 |
| Old Station State Forest | 230 |
| Olney State Forest | 18741 |
| Orara West State Forest | 0 |
| Ourimbah State Forest | 3571 |
| Pappinbarra State Forest | 1181 |
| Pee Dee State Forest | 62 |
| Pine Creek State Forest | 2105 |
| Pokolbin State Forest | 14030 |
| Putty State Forest | 22252 |
| Queens Lake State Forest | 627 |
| Ravensworth State Forest | 901 |
| Riamukka State Forest | 12520 |
| Roses Creek State Forest | 1790 |
| Scotchman State Forest | 4230 |
| Skillion Flat State Forest | 5 |
| Stewarts Brook State Forest | 2417 |
| Strickland State Forest | 485 |
| Styx River State Forest | 17427 |
| Tamban State Forest | 7681 |
| Tarkeeth State Forest | 1423 |
| Terrible Billy State Forest | 1090 |
| Thumb Creek State Forest | 3944 |
| Tomalla State Forest | 2107 |
| Tuckers Nob State Forest | 3635 |
| Tuggolo State Forest | 14065 |
| Uffington State Forest | 325 |
| Upsalls Creek State Forest | 978 |
| Viewmont State Forest | 890 |
| Wallaroo State Forest | 3595 |
| Wallingat State Forest | 1240 |
| Wang Wauk State Forest | 8356 |
| Watagan State Forest | 3890 |
| Way Way State Forest | 1307 |
| Wild Cattle Creek State Forest | 4440 |
| Wyong State Forest | 726 |
| Yango State Forest | 684 |
| Yarratt State Forest | 2381 |
| Yessabah State Forest | 1887 |
| **Non-IFOA Bathurst/Mudgee** | 70561 |
| Airly State Forest | 632 |
| Ben Bullen State Forest | 8252 |
| Bylong State Forest | 621 |
| Canobolas State Forest | 514 |
| Clandulla State Forest | 1561 |
| Coricudgy State Forest | 7581 |
| Cumberland State Forest | 40 |
| Dungeree State Forest | 370 |
| Falnash State Forest | 398 |
| Gurnang State Forest | 961 |
| Hampton State Forest | 2518 |
| Jellore State Forest | 1 |
| Kandos State Forest | 1396 |
| Lidsdale State Forest | 849 |
| Mount David State Forest | 871 |
| Mullions Range State Forest | 1528 |

| | |
|---|---|
| Newnes State Forest | 22401 |
| Nullo Mountain State Forest | 5370 |
| Pennsylvania State Forest | 2752 |
| Roseberg State Forest | 958 |
| Sunny Corner State Forest | 7635 |
| Tongo State Forest | 270 |
| Turon State Forest | 1878 |
| Wolgan State Forest | 1205 |
| **Southern IFOA** | 281907 |
| Badja State Forest | 7695 |
| Bago State Forest | 34426 |
| Bateman State Forest | 1 |
| Belanglo State Forest | 2822 |
| Benandarah State Forest | 2760 |
| Bodalla State Forest | 24098 |
| Bolaro State Forest | 1779 |
| Bondo State Forest | 16200 |
| Boyne State Forest | 6160 |
| Buckenbowra State Forest | 5192 |
| Bungongo State Forest | 2696 |
| Carabost State Forest | 2478 |
| Clyde State Forest | 3586 |
| Corunna State Forest | 184 |
| Currambene State Forest | 1693 |
| Currowan State Forest | 11974 |
| Dampier State Forest | 33766 |
| Flat Rock State Forest | 4893 |
| Green Hills State Forest | 858 |
| Ingebirah State Forest | 2653 |
| Jellore State Forest | 1407 |
| Jerrawangala State Forest | 268 |
| Kioloa State Forest | 171 |
| Mannus State Forest | 396 |
| Maragle State Forest | 13991 |
| Mcdonald State Forest | 3681 |
| Meryla State Forest | 4232 |
| Micalong State Forest | 3175 |
| Mogo State Forest | 15499 |
| Moruya State Forest | 4060 |
| Mowamba State Forest | 162 |
| Mundaroo State Forest | 0 |
| North Brooman State Forest | 3630 |
| Nowra State Forest | 520 |
| Shallow Crossing State Forest | 3854 |
| Shoalhaven State Forest | 104 |
| South Brooman State Forest | 5585 |
| Tallaganda State Forest | 23910 |
| Termeil State Forest | 697 |
| Tomerong State Forest | 212 |
| Wandella State Forest | 5497 |
| Wandera State Forest | 5199 |
| Wingello State Forest | 2211 |
| Woodburn State Forest | 10 |
| Yadboro State Forest | 10745 |
| Yarrawa State Forest | 179 |
| Yerriyong State Forest | 6598 |
| **Upper North East IFOA** | 414570 |
| Bagawa State Forest | 5384 |
| Bald Knob State Forest | 1695 |
| Banyabba State Forest | 2682 |
| Barcoongere State Forest | 822 |
| Beaury State Forest | 7709 |
| Billilimbra State Forest | 3853 |
| Boambee State Forest | 873 |
| Bom State Forest | 872 |
| Bonalbo State Forest | 2675 |
| Bookookoorara State Forest | 915 |
| Boonoo State Forest | 4293 |
| Boorabee State Forest | 1090 |
| Boorook State Forest | 2990 |
| Boundary Creek State Forest | 2539 |
| Braemar State Forest | 2002 |
| Brother State Forest | 6539 |
| Bungabbee State Forest | 1097 |
| Bungawalbin State Forest | 1204 |
| Butterleaf State Forest | 1748 |
| Camira State Forest | 4007 |
| Candole State Forest | 6574 |
| Carwong State Forest | 603 |
| Chaelundi State Forest | 18238 |
| Cherry Tree State Forest | 1636 |
| Cherry Tree West State Forest | 321 |

| | |
|---|---|
| Clouds Creek State Forest | 10793 |
| Coffs Harbour State Forest | 3 |
| Conglomerate State Forest | 5685 |
| Curramore State Forest | 84 |
| Dalmorton State Forest | 27937 |
| Devils Pulpit State Forest | 1484 |
| Divines State Forest | 1524 |
| Donaldson State Forest | 2331 |
| Donnybrook State Forest | 2926 |
| Doubleduke State Forest | 5824 |
| Eden Creek State Forest | 1175 |
| Edinburgh Castle State Forest | 949 |
| Ellangowan State Forest | 1179 |
| Ellis State Forest | 9736 |
| Ewingar State Forest | 18433 |
| Forest Land State Forest | 8159 |
| Fullers State Forest | 1053 |
| Gibberagee State Forest | 10539 |
| Gibraltar Range State Forest | 3024 |
| Gilgurry State Forest | 9531 |
| Girard State Forest | 18851 |
| Glen Elgin State Forest | 683 |
| Glenugie State Forest | 4952 |
| Grange State Forest | 10608 |
| Gundar State Forest | 119 |
| Hyland State Forest | 4936 |
| Kangaroo River State Forest | 11423 |
| Keybarbin State Forest | 3707 |
| Koreelah State Forest | 1231 |
| Legume State Forest | 2 |
| Little Spirabo State Forest | 15 |
| London Bridge State Forest | 118 |
| Lower Bucca State Forest | 2828 |
| Malara State Forest | 3352 |
| Marara State Forest | 5351 |
| Marengo State Forest | 10128 |
| Moogem State Forest | 1284 |
| Moonpar State Forest | 2472 |
| Mororo State Forest | 379 |
| Mount Belmore State Forest | 9181 |
| Mount Lindesay State Forest | 3046 |
| Mount Marsh State Forest | 3636 |
| Mount Mitchell State Forest | 2304 |
| Mount Pikapene State Forest | 504 |
| Mount Topper State Forest | 261 |
| Muldiva State Forest | 172 |
| Myrtle State Forest | 4298 |
| Nana Creek State Forest | 1793 |
| New Valley State Forest | 317 |
| Newfoundland State Forest | 6025 |
| Nymboida State Forest | 6400 |
| Oakwood State Forest | 3774 |
| Orara East State Forest | 4463 |
| Orara West State Forest | 4808 |
| Paddys Land State Forest | 907 |
| Pine Brush State Forest | 3966 |
| Pine Creek State Forest | 866 |
| Ramornie State Forest | 6175 |
| Richmond Range State Forest | 6406 |
| Royal Camp State Forest | 2203 |
| Sheas Nob State Forest | 4333 |
| South Toonumbar State Forest | 410 |
| Southgate State Forest | 628 |
| Spirabo State Forest | 4256 |
| Sugarloaf State Forest | 6501 |
| Tabbimoble State Forest | 2628 |
| Toonumbar State Forest | 1381 |
| Torrington State Forest | 1672 |
| Tuckers Nob State Forest | 738 |
| Unumgar State Forest | 3632 |
| Urbenville State Forest | 3 |
| Warra State Forest | 886 |
| Washpool State Forest | 2961 |
| Wedding Bells State Forest | 5057 |
| Whiporie State Forest | 1110 |
| Wild Cattle Creek State Forest | 8771 |
| Willsons Downfall State Forest | 317 |
| Woodenbong State Forest | 306 |
| Woodford North State Forest | 219 |
| Yabbra State Forest | 10089 |
| **Grand Total** | 1403565 |

## Appendix B TEC Prioritisation Matrix

### *Conservation Status*

Scores were assigned based on the conservation status of individual communities as listed in the schedules of the *Threatened Species Conservation Act 1995* (TSC Act) and the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

### *Known extent*

The occurrence of each TEC was considered in relation to the state forest estate boundaries. A range of vegetation mapping resources and the final determination for each community was utilised during this process.

Where polygons of vegetation types consistent with TECs intersected with parcels of state forest, the 'known extent' field was scored as 'known or probable'. Where polygons of vegetation types consistent with TECs occurred within close proximity to state forest boundaries, or, where a range of key diagnostic features influencing occurrence are present in an area, the 'known extent' field was scored as 'possible'. Otherwise, the community is not known to occur in state forest and was scored 0.

The assessment of known extent in state forest is conservative. Where there is uncertainty surrounding extent, the TEC was recorded as possible. In some cases, the TEC in question may occur in state forest but not in the Net Harvest Area (NHA).

### *Management/ Existing Protection*

The degree to which the community is protected by existing measures such as IFOA prescriptions or Forests NSW Forest Management Zones (FMZs) was considered. Exclusion zones were identified and overlaid with known distributions and the final determinations for TECs consulted to determine likelihood of occurrence in the NHA. Scoring was applied based on likelihood of impact from harvest activities on TECs in operational areas.

### *Potential impact/threat*

As per final determination, if forestry activities are listed, known or predicted to be a primary or contributing threat to a TEC, a score was applied in accordance with the table below. Similarly, if forestry activities were implied to cause indirect impacts such as fragmentation, removal of debris or loss of hollows and these impacts are noted in the final determination for the TEC, an alternate score of one was applied.

| Field | Description | Score |
|---|---|---|
| **Conservation Status (TSC Act)** | The community is listed in the schedules of the Threatened Species Conservation Act (TSC Act) as Critically Endangered (CE) | 2 |
| | The community is listed in the schedules of the Threatened Species Conservation Act (TSC Act) as Endangered (E) | 1 |
| | The community is listed in the schedules of the Threatened Species Conservation Act (TSC Act) as Vulnerable (V) | 0 |
| **Conservation Status (EPBC Act)** | The community is listed in the schedules of the Environment Protection And Conservation Act (EPBC Act) as Critically Endangered (CE) | 2 |
| | The community is listed in the schedules of the Environment Protection And Conservation Act (EPBC Act) Endangered (E) | 1 |
| | The community is not listed in the schedules of the Environment Protection And Conservation Act (EPBC Act) | 0 |

| | | |
|---|---|---|
| **Known Extent** | Occurrence of the community in State Forest is known or probable | 2 |
| | Occurrence of the community in State Forest is possible | 1 |
| | The community is not known to occur in State Forest | 0 |
| **Management/ Existing Protection** | The community occurs in State Forest or Net Harvest Area (NHA) and is likely to be impacted by forestry activities | 1 |
| | The community does not occur in State Forest or NHA and/or is unlikely to be impacted by forestry activities | 0 |
| **Potential Impact/Threat** | Logging or firewood collection is listed as a threat in the final determination for the community | 2 |
| | Fragmentation, removal of debris, loss of hollows are listed as threats in the final determination for the community | 1 |
| | No specific mention of the threats above in the final determination for the community | 0 |

**Scoring Fields**

### *Additional considerations (non-scoring)*

### *Harvest Priority*

Communities containing species identified by Forestry Corporation NSW as a priority for timber supply purposes, (available, accessible and suitable for timber production) or a commercial value forest type were assigned as ‘high’. Conversely, TECs where marketable timber product is limited or silvicultural type/intensity of operations would limit viability were assigned a ‘low’ classification.

### *Mappability*

A high/low classification was assigned to reflect ease of interpretability via aerial photography analysis. TECs or phototypes that are known to have a distinct signature or be readily distinguishable from adjacent types were assigned a ‘high’ classification and those that were predicted or known to present difficulties in identification, particularly where they occur with/transition to similar types were recorded as ‘low’.

***NOTE:*** *Some lower scoring TECs have been included in this mapping project due to regulatory history and/or close association with a suite of priority TECs and subsequent ease of mapping*

| EEC name | TSC status | EPBC status | Gazettal date Gazettal date | Notes | Priority score | | | | | | Priority for FCNSW Hardwoods Forest Division | Mappability |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Known | Mgmt. | Threat | National | State | Total | | |
| White Box Yellow Box Blakely's Red Gum Woodland | E | CE | 15-Mar-02 | Widespread, especially in Western Region; | 2 | 1 | 2 | 2 | 1 | 8 | Low. Covered by TSL condition in Western IFOAs. Unlikely in NHA in coastal IFOA areas. | Candidate TEC for a field guide |
| Lowland Grassy Woodland in the South East Corner Bioregion | E | CE | 10-Aug-07 | Probably small patches in a number of SFs, eg Towamba, Mumbulla, Dampier | 2 | 1 | 2 | 2 | 1 | 8 | Medium. Probably limited extent in SF but extent uncertain; low timber potential. | Moderate on SF estate |
| Grey Box—Grey Gum Wet Sclerophyll Forest in the NSW North Coast Bioregion | E | | 31-Jul-09 | Defined on an o/s type but described on u/s for which there is limited quantitative data. Bald Knob, Donaldson, Edinburgh Castle, Mount Lindesay, Unumgar SFs | 2 | 1 | 2 | 0 | 1 | 6 | High. Relatively extensive in SF. High timber potential. | Low-moderate |
| McKies Stringybark/Blackbutt Open Forest in the Nandewar and New England Tableland Bioregions | E | | 9-Feb-01 | Probable, but only near Inverell, eg Clive SF | 2 | 1 | 2 | 0 | 1 | 6 | Low. Likely to occur to a limited extent in SF, low to moderate timber potential. | Determine granite vs lateritic soils. Moderate to high |
| White Gum Moist Forest in the NSW North Coast Bioregion | E | | 4-Jul-08 | North from Dorrigo only | 2 | 1 | 2 | 0 | 1 | 6 | Medium. Relatively extensive in SF and high timber potential. Community is relatively well defined by the final determination. | High |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions | E | | 22-Dec-06 | Mostly covered by rainforest exclusion, but overlaps with brush box forest | 2 | 1 | 1 | 1 | 1 | 6 | Medium. Mostly covered by IFOA rainforest condition, but the final determination is ambiguous and it may occur in areas of high timber potential | High |
| Lowland Rainforest on Floodplain in the New South Wales North Coast Bioregion | E | | 13-Aug-99 | Mostly covered by rainforest exclusion, but may overlap with brush box forest | 2 | 1 | 1 | 1 | 1 | 6 | Nil as a separate community; medium if mapped with Lowland Rainforest EEC. Very limited extent, if any, in SF. | High |
| Montane Peatlands and Swamps of the New England Tableland, NSW North Coast, Sydney Basin, South East Corner, South Eastern Highlands and Australian Alps bioregions | E | E | 17-Dec-10 | Mostly covered by IFOA/TSL wetland exclusions | 2 | 1 | 1 | 1 | 1 | 6 | Medium. Nil timber potential but relatively extensive in SF and requires consideration for planned burning and grazing. | Agree on structural limits and map. |
| New England Peppermint (Eucalyptus nova-anglica) Woodland on Basalts and Sediments in the New England Tableland Bioregion | CE | | 7-Nov-03 | Possible in Walcha MA and Marengo and Chaelundi SFs; very restricted extent if present. consider assemblage not just New England Peppermint | 1 | 1 | 1 | 1 | 2 | 6 | Low. Very limited occurrence, if any, in SF, but currently mapped areas need field checking; low timber potential. | Unknown |
| Bangalay Sand Forest of the Sydney Basin and South East Corner Bioregions | E | | 21-Oct-05 | Probably small patches in Bermagui, Mogo, Nullica SFs; south from Bundeena only. | 2 | 1 | 1 | 0 | 1 | 5 | Medium. Limited extent in SF but moderate timber potential. | Low. Challenges distinguishing *E botryoides* from *C maculata* |
| Brogo Wet Vine Forest in the South East Corner Bioregion | E | | 17-Nov-00 | Probable in Mumbulla, Bodalla and possible in Nadgee SF | 2 | 1 | 1 | 0 | 1 | 5 | Medium. Limited extent in SF but moderate timber potential. | Demonstrate absence from SF |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Dry Rainforest of the South East Forests in the South East Corner Bioregion | E | | 17-Nov-00 | Most likley covered by rainforest exclusion; probable in Towamba SF, possible in Nullica SF. | 2 | 1 | 1 | 0 | 1 | 5 | Low. Very limited extent in SF. Covered by IFOA rainforest conditions. | Low |
| Lower Hunter Spotted Gum—Ironbark Forest in the Sydney Basin Bioregion | E | | 18-Feb-05 | Known or probable in Awaba, Corrabare, Heaton, Pokolbin, Watagan SFs; amended 5 Nov 2010 | 2 | 1 | 1 | 0 | 1 | 5 | High. High timber potential; extent in SF uncertain. | Undertake QA of work completed and assign confidence to map product. |
| Milton Ulladulla Subtropical Rainforest in the Sydney Basin Bioregion | E | | 1-Nov-02 | Associated with Milton monzonite; 2 ha mapped in Shallow Crossing SF, but occurrence requires confirmation. | 1 | 1 | 2 | 0 | 1 | 5 | Low. Very limited extent, if any, in SF; Covered by IFOA rainforest conditions. Defined from a single patch of rainforest. | Demonstrate absence from SF |
| Ribbon Gum—Mountain Gum—Snow Gum Grassy Forest/Woodland of the New England Tableland Bioregion | E | | 21-Oct-05 | Known in Walcha MA only. | 2 | 1 | 1 | 0 | 1 | 5 | Moderate. Extent in SF uncertain due to ambiguous final determination; moderate timber potential. | May be difficult to distinguish *E. viminalis* from *E. nobilis* using remote sensing. |
| River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions | E | | 17-Dec-04 | Widespread in all coastal regions south of Taree, but probably mostly covered by riparian and wetland exclusion conditions. Amended 8jul11. | 2 | 1 | 1 | 0 | 1 | 5 | High. Relatively extensive in SF. Moderate to high timber potential. | Many sites may meet environmental but not floristic description of TEC |
| Subtropical Coastal Floodplain Forest of the New South Wales North Coast Bioregion | E | | 17-Dec-10 | Widespread in coastal areas north from Port Stephens | 2 | 1 | 1 | 0 | 1 | 5 | High. Relatively extensive in SF. Moderate to high timber potential. | High |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions | E | | 17-Dec-04 | Widespread in all coastal regions, but probably mostly covered by riparian and wetland exclusion conditions under IFOA. | 2 | 1 | 1 | 0 | 1 | 5 | Low as a separate community, high if mapped as part of a floodplain EEC composite. Mostly not in NHA and usually low timber potential. | High |
| Tablelands Snow Gum, Black Sallee, Candlebark and Ribbon Gum Grassy Woodland in the South Eastern Highlands, Sydney Basin, South East Corner and NSW South Western Slopes Bioregions | E | ? | 15-Apr-11 | | 2 | 1 | 1 | 0 | 1 | 5 | Moderate. Extent in SF uncertain due to ambiguous final determination; negligible to possibly moderate timber potential, depending on interpretation. | Moderate to high; depending on suitable environmental and structural surrogates for u/s composition. |
| Littoral Rainforest in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions | E | CE | 4-Jun-04 | Covered by general exclusion | 1 | 0 | 1 | 2 | 1 | 5 | Low. Unlikely in SF; may overlap with brush box forest in UNE but covered by rainforest exclusion elsewhere. | High |
| Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions | E | | 17-Dec-04 | Requires specific condition. Most occurrences excluded by wetland or rare and non-commercial forest type exclusions under IFOA. | 2 | 1 | 1 | 0 | 1 | 5 | Low as a separate community, high if mapped as part of a floodplain EEC composite. Mostly not in NHA and usually low timber potential. | High |
| Tableland Basalt Forest in the Sydney Basin and South Eastern Highlands Bioregions | E | | 4-Jan-08 | Mapped for Wingello and Belanglo SFs only, not known in FMZ 4. Mt Rae, PNF hotspot | 2 | 0 | 1 | | 1 | 4 | Low. Very limited extent in SF, not in NHA. | Low |
| Coastal Saltmarsh in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions | E | | 4-Jun-04 | Covered by general exclusion. Ease of capture with other floodplain assemblages | 1 | 0 | 0 | 0 | 1 | 2 | Treeless community adequately covered by IFOA/TSL wetland exclusions. Low | High |

## Appendix C Contributors to the TEC Mapping Project

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|---|---|
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