

Department of Planning and Environment

Updating BioNet Plant Community Types: Eastern New South Wales PCT Classification Version 1.1 (2022)



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1. Introduction

Plant community types (PCTs) represent the finest level of a hierarchy applied to the classification and description of native vegetation across NSW. The master list of PCTs is managed by the Department of Planning and Environment (DPE). A recent major revision to the classification of native plant assemblages of eastern NSW has established a new framework and typology suitable for inclusion in the NSW PCT schema (DPE 2022a, b). The work has identified a set of 1,067 vegetation groups for the coast and tablelands bioregions, based on explicitly defined classification methods applied to over 50,000 standard floristic survey plots. These vegetation groups provide a basis for the replacement and refinement of PCTs in the region. The 'coast and tablelands bioregions' over which the new typology is proposed to replace PCTs comprises the following bioregions (DAWE 2021): Australian Alps, NSW North Coast, New England Tablelands, South East Corner, South Eastern Highlands, South Eastern Queensland and Sydney Basin.

This report outlines the methods and steps undertaken to incorporate the new typology for the coast and tablelands bioregions into the PCT master list. The PCT master list and related data are stored within 2 BioNet applications. Changes to the PCT master list are preceded by an evaluation and documentation of relationships between Approved PCTs and candidate new PCTs, so that these relationships may be accessed by users and recorded over time. A set of essential BioNet attribute fields must be populated for all candidate new PCTs, describing their floristic composition and environmental and spatial attributes. Candidate new PCTs must have clearly defined relationships with the upper levels of the NSW vegetation classification hierarchy, and must address potential relationships with threatened ecological communities (TECs) listed under NSW and Commonwealth legislation.

This report also summarises improvements resulting from incorporation of the new typology. The amendment of the PCT master list results in significant change. This change is based on a single comprehensive analysis of significantly more standard floristic survey plots than any previous classification, replacing the patchwork of separate past projects interpreted into PCTs (2018) (DPE 2022a, b). A total of 623 coast and tableland bioregions Approved PCTs (as at November 2018) are Decommissioned completely, while 328 are retired from coast and tablelands bioregions (but retained as Approved further west) to avoid overlapping PCTs within the coast and tablelands bioregions. In replacement, 1,072 new PCTs are Approved. The revisions remove significant redundancy and duplication from the PCT master list, with 991 PCTs (2018) in the coast and tablelands mainly replaced by 925 related new PCTs. The comprehensiveness of the master list is improved by the inclusion of 147 new PCTs representing types not previously recognised in the 2018 list.

2. Background

2.1 NSW Integrated BioNet Vegetation Data

The NSW Integrated BioNet Vegetation Data (IBVD) program is a major program within the Department of Planning and Environment (DPE) Remote Sensing and Landscape Science Branch Strategy. This program coordinates the development and management of native vegetation classification data and maps for NSW. The program is recognition of the need to provide consistent statewide vegetation data to support the implementation of NSW legislation, regulations and policies. It moves from a previously fragmented, regionalised and patchy history of investment to a centrally managed program underpinned by scientific standards and methods. IBVD includes:

- the 3-tiered NSW vegetation classification hierarchy (vegetation formations, vegetation classes and PCTs)
- the State Vegetation Type Map (SVTM) (including extant and 1750 PCT maps)
- threatened species, population and ecological community to PCT association data
- estimates of clearing loss (%) for PCTs
- condition benchmark data
- the BioNet systems that store and deliver data content.

2.2 What are PCTs?

PCTs are the finest level of classification in the NSW vegetation classification hierarchy. They identify and describe recurring patterns of native plant species assemblages in relation to environmental conditions; that is, sets of species that commonly occur together in association with particular combinations of soil, temperature, moisture and other factors. PCTs fit within broader units known as vegetation classes. There are 99 vegetation classes representing broader-scale vegetation patterns across NSW. These in turn are nested into 12 vegetation formations at the top of the hierarchy. The 2 upper levels of the hierarchy are drawn from the independently constructed schema of Keith (2004).

The PCT master list is defined in BioNet, the biodiversity data repository administered by DPE. Each PCT is assigned a 'PCT definition status' of Approved, Draft-Working, Decommissioned or Withdrawn (there are also other statuses not relevant to this report). Approved PCTs represent the master set of native vegetation communities recognised for NSW and applied in a number of NSW legislative planning and assessment tools, and in vegetation mapping programs.

In this report we use a November 2018 export of Approved PCT data from the BioNet Vegetation Classification public application as the base data for assessment. We refer to these data as 'Approved PCTs (2018)'. In November 2018 there were 1,391 Approved PCTs on the NSW PCT master list, comprising 991 PCTs assigned to at least one coast and tableland bioregion and 400 PCTs not assigned to any coast and tableland bioregion. In this report we also use a November 2018 export of 'Draft-Working' PCTs from the BioNet Vegetation Classification edit application. We refer to this data as 'Draft-Working PCTs (2018)'. Note that 'Draft-Working' PCTs are not visible to public users of BioNet.

2.3 Why revise the vegetation classification in eastern NSW?

The purpose of the revised classification is to overcome limitations of the Approved PCTs (2018) in eastern NSW (DPE 2022a). Difficulties with PCT diagnosis were highlighted as a significant problem for the implementation of biodiversity assessment protocols (Byron et al. 2014). Practitioners require detailed information defining the compositional, environmental and spatial attributes of individual PCTs, including the identification of elements that distinguish them from related types. A primary objective of the revised classification is to improve PCT identification through improved data quality and identification tools. A new methodological framework is needed to manage changes to the PCT classification as new data become available. Explicit rules governing the approval and decommissioning of PCTs will add to the stability and rigour of the classification hierarchy.

The eastern NSW classification project is the first comprehensive plot-based classification to be completed across the entire eastern NSW area. The classification analysis has been applied to standard floristic survey plots across 10 bioregions: the Australian Alps, New England Tablelands, NSW North Coast, South East Corner, South Eastern Highlands, South Eastern Queensland, Sydney Basin, Brigalow Belt South, Nandewar and NSW South Western Slopes. The first 7 of these bioregions together represent coastal, escarpment, tableland and alps environments, and are collectively referred to as 'coast and tablelands bioregions'. The latter 3 bioregions are collectively referred to in this document as 'western slopes bioregions'. The inclusion of all 10 bioregions in the review acknowledges that vegetation patterns are likely to cross bioregional boundaries.

The eastern NSW PCT project is based on classification methods that improve consistency and transparency, including quantitative plot membership rules and measures of accuracy and reliability designed to ensure a credible set of vegetation communities (DPE 2022b). It enables new approaches to identifying plant communities using standard floristic survey plots (DPE 2022c). The typology has been guided by the classification efforts that have preceded it, some of which were cited within the Approved PCT (2018) master list. The scale of classification adopted by these legacy classification projects has informed the approach of the new work and most of the legacy classification unit member plots have been included within the revised classification.

2.4 What is the area affected by revision?

The eastern NSW classification project has identified 1,067 resolved coast and tablelands groups (DPE 2022b) that are referred to in this report as 'ENSW v1.1 groups' and are the focus of this document. The coast and tableland bioregions over which the resolved classification applies are referred to as the 'eastern NSW PCT classification v1.1 region' (see Figure 1). Applied to the BioNet Vegetation Classification application, this region encompasses all PCTs with a distribution that includes one or more of 7 bioregions (DAWE 2021): the Australian Alps, New England Tablelands, NSW North Coast, South East Corner, South Eastern Highlands, South Eastern Queensland and Sydney Basin. The classification for the western slopes bioregions is not yet fully resolved so is not included in version 1.1 and will not be considered further in this report.

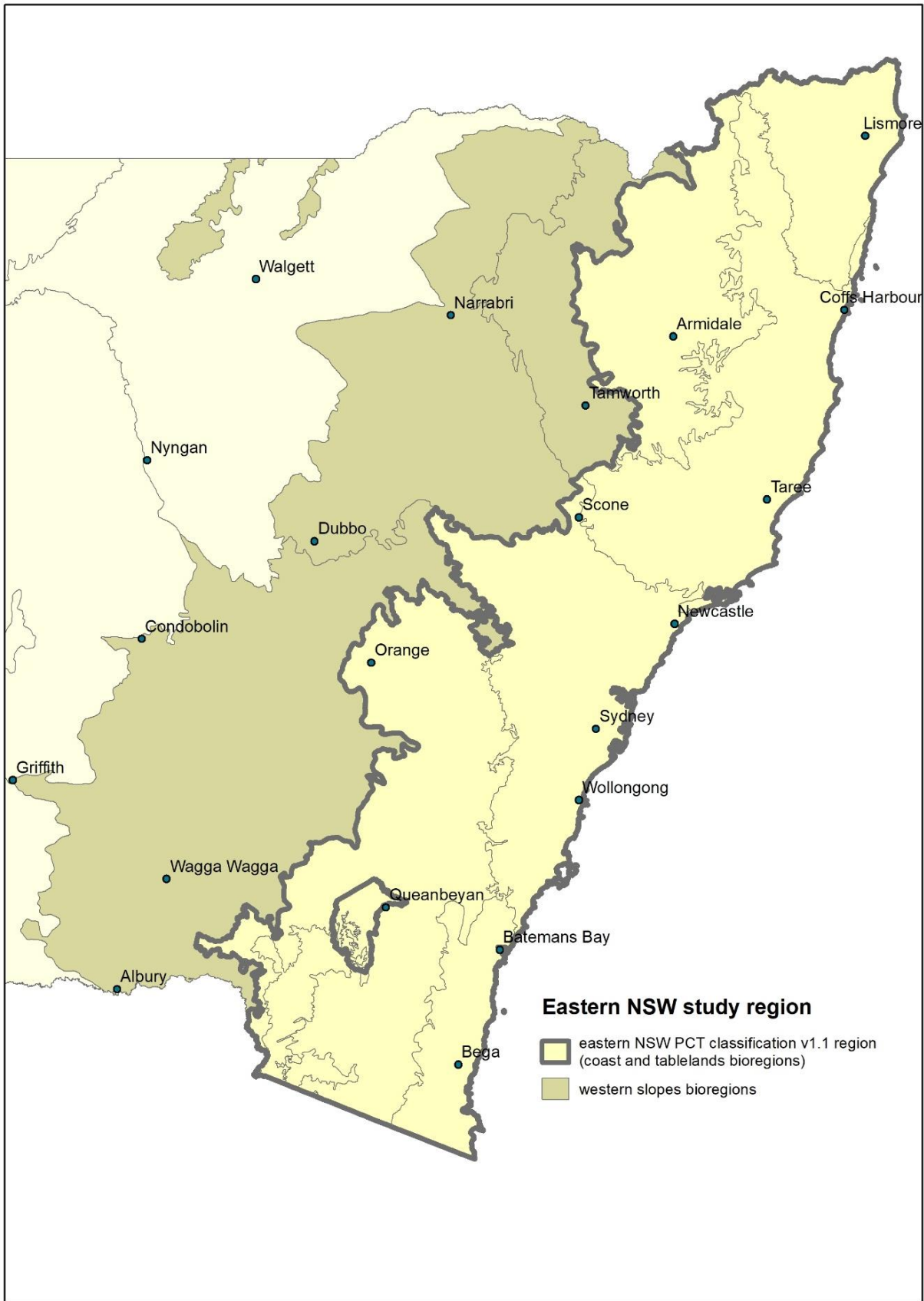


Figure 1 Eastern NSW study region and 'eastern NSW PCT classification v1.1' region

2.5 Project reports

This report is one of a series of 4 describing the context, methods and results, implementation steps and new tools arising from recent vegetation classification work in eastern NSW. Report 1 (DPE 2022a) evaluates the set of Approved PCTs in eastern NSW as at 1 November 2018. It identifies strengths and weaknesses with the PCTs and proposes steps for improvements. Report 2 (DPE 2022b) is a detailed technical document describing the methods applied to the development of a new plot-based classification for eastern NSW and concluding with the identification of 1,067 coast and tablelands groups (ENSW v1.1 groups) and 138 western slopes groups. Report 3 (this report) describes the assessment and adoption of the ENSW v1.1 groups into the PCT master list. Report 4 (DPE 2022c) describes a new online identification tool that enables users to identify PCTs in the coast and tablelands bioregions using standard floristic survey plots.



Figure 2 Project reports in this series

2.6 Where to get help

For questions and help contact bonet@environment.nsw.gov.au.

3. Review of the NSW PCT master list

3.1 Introduction

The PCT master list is an accumulated set of types defined in BioNet, the NSW biodiversity data repository. Any changes to Approved PCTs require a formal set of procedures to be followed and managed. Where an Approved PCT is proposed to be replaced, lineage relationships must be established between the PCT and its replacement(s).

This section outlines methods used to assess Approved and Draft-Working PCTs (2018) against the ENSW v1.1 groups identified in the revised classification of the coast and tablelands (DPE 2022b). The process identified those PCTs (2018) related to ENSW v1.1 groups, those PCTs (2018) that are not related to any ENSW v1.1 groups, and those ENSW v1.1 groups that are not related to any PCTs (2018). Through this comparative assessment we demonstrate that the ENSW v1.1 groups are of a suitable scale and completeness to replace the Approved and Draft-Working PCTs (2018) in all but 7 cases.

3.2 Classification comparison

3.2.1 Approved PCTs (2018)

Each PCT cites one or more classification projects as the source(s) on which its recognition is based and from which its defining attributes are drawn. We refer to these cited classification projects as legacy classifications, and the units they identified as legacy units. Legacy classification methods ranged from quantitative analysis of field survey plot data to expert-interpreted mapping projects and broad compilation exercises.

There were 991 Approved PCTs (2018) assigned to one or more coast and tablelands bioregions in the BioNet Vegetation Classification public application as at 1 November 2018. The legacy classifications cited as sources by these Approved PCTs (2018) are summarised by DPE (2022a).

Approved PCTs (2018) could be categorised as one of 3 types based on their cited sources:

- 508 PCTs (51%) cite a single plot-based legacy classification unit with traceable plot membership
- 67 PCTs (7%) cite multiple plot-based legacy classification units (from one or more cited sources) with traceable plot membership
- 416 PCTs (42%) cite single or multiple sources with no traceable plot membership, including expert opinion, expert-interpreted combinations of other quantitative and qualitative source units, units constructed from non-standard floristic data, and interpretations of mapping data.

These categories are relevant to the assessment of relationships between Approved PCTs (2018) and ENSW v1.1 groups, and lead to the application of 2 different methods for determining lineage relationships. PCTs (2018) citing plot-based legacy classification units with traceable plot membership were compared to ENSW v1.1 groups using the shared plot membership between the cited legacy units and the ENSW v1.1 groups. PCTs (2018) based on other sources were compared to ENSW v1.1 groups using interpretation of available descriptive and floristic data exported from the BioNet Vegetation Classification public application.

Table 1 describes the 5 categories used to indicate the strength of relationship between Approved PCTs (2018) and one or more ENSW v1.1 groups. The category definitions combine the 2 different methods used in the comparative assessment into one common measure.

Table 1 Categories indicating the strength of relationship from Approved PCTs (2018) to ENSW v1.1 groups

Relationship strength category	Definition
Very Strong	>70% of the member plots of the Approved PCT (2018) are included in one ENSW v1.1 group
Strong	Two ENSW v1.1 groups collectively account for >70% of the member plots of the Approved PCT (2018); OR, interpreted to relate to a single ENSW v1.1 group based on available data
Moderate	Three ENSW v1.1 groups collectively account for >70% of the member plots of the Approved PCT (2018); OR, interpreted to relate to 2 ENSW v1.1 groups
Weak	More than 3 ENSW v1.1 groups collectively account for >70% of the member plots of the Approved PCT (2018); OR, interpreted to relate to 3 or more ENSW v1.1 groups
Not Related	No relationships via plot assignments, OR, qualitative assessment of species assemblage and habitat together with the absence of sampling in related environments suggests no relationship with any ENSW v1.1 group

Of the 991 Approved PCTs (2018) in the coast and tablelands bioregions, 942 were found to have a relationship to one or more ENSW v1.1 groups. These 942 Approved PCTs (2018) together relate to a total of 916 groups from the ENSW v1.1 classification.

The breakdown of Approved PCTs (2018) across relationship strength categories is shown in Table 2 and indicates that 520 Approved PCTs (52%) show strong to very strong relationships with one or 2 ENSW v1.1 groups. Some 239 Approved PCTs (24%) were found to be weakly related. Relationships between Approved PCTs (2018) and ENSW v1.1 groups were obscured where units from more than one plot-based legacy classification were cited by the Approved PCT (2018), or where a PCT cited some combination of plot-based units and units defined by alternative classification methods. The circumscription of such PCTs had clearly required an interpretative step by the classifier, which was not defined or recorded. As a result, the assessment of the strength of relationship from these PCTs to ENSW v1.1 groups was less objective.

Table 2 Number and percentage of Approved PCTs (2018) in each category of relationship strength to ENSW v1.1 groups

Relationship strength category	Number of Approved PCTs (2018)	Percentage of Approved PCTs (2018)
Very Strong	178	18
Strong	342	35
Moderate	183	18
Weak	239	24
Total Approved PCTs (2018) related to ENSW v1.1 groups	942	95

Of the 991 Approved PCTs (2018) assigned to one or more of the coast and tablelands bioregions, 4 Approved PCTs (2018) were found to represent vegetation communities not described by any of the ENSW v1.1 groups. All of these occur in areas where no standard

floristic survey plots have yet been sampled, meaning no standard floristic survey plots in these communities were available for the revised eastern NSW classification (DPE 2022b). These are as follows:

- Two PCTs (PCT 715 (Blue-leaved Stringybark – Blackbutt open forest of the NSW North Coast Bioregion) and PCT 904 (Large-fruited Blackbutt shrubby open forest of the Broken Bago Range of the NSW North Coast Bioregion)) were found to be strongly related to Draft-Working PCTs (2018) 2250 and 2247 respectively. These Draft-Working PCTs are addressed in Section 3.2.2 below and were considered candidates for **addition** to the Approval PCT master list alongside the ENSW v1.1 groups.
- Two PCTs represent distinctive plant assemblages found on unique substrates. PCT 611 (Grass Tree tall shrubland on shallow basalt soil and talus on the Liverpool Range, Brigalow Belt South Bioregion) occurs in unsampled parts of Towarri National Park. PCT 774 (Coast Banksia scrub on sand in the Elderslie area, Sydney Basin Bioregion) is equivalent to the Elderslie Banksia Scrub Forest TEC. These 2 Approved PCTs (2018) were considered candidates for **retention** in the Approved PCT master list alongside the ENSW v1.1 groups.

Of the 991 Approved PCTs (2018) assigned to one or more of the coast and tablelands bioregions, a subset of 367 PCTs were also assigned to one or more other bioregions further west. Our review of PCT data concluded the following for this subset of PCTs:

- 328 PCTs were confirmed to occur in both the coast and tablelands bioregions and further west AND are related to ENSW v1.1 group(s). These PCTs are addressed in Section 4.4 below
- one PCT was confirmed to occur in both the coast and tablelands bioregions and further west but is not related to ENSW v1.1 group(s) (PCT 611 above)
- for 36 PCTs, tracing of legacy classification unit member plots found no plot-based evidence of their occurrence in any coast and tablelands bioregion, but only evidence of their occurrence further west
- for 2 PCTs there was only evidence of their occurrence in coast and tablelands bioregions and no evidence of occurrence further west.

Data remediations were undertaken for these latter 38 PCTs in the BioNet Vegetation Classification applications between April and September 2021 to correct their bioregion assignments.

Appendix A summarises the outcomes for the remainder of the 991 Approved PCTs (2018).

3.2.2 Draft-Working PCTs (2018)

PCTs with Draft-Working status are accessed in the BioNet Vegetation Classification edit application, and are not visible to public users of BioNet. Although not Approved PCTs, they represent a significant past investment of classification effort and thus warrant a similar comparative assessment against the 1,067 ENSW v1.1 groups. Some 394 Draft-Working PCTs (2018) were assessed, including 342 types based on units of the Northern Rivers catchment classification project (OEH 2012), 34 on units of the coastal heath classification project (Griffith et al. 2003), 15 from the greater Hunter region classification (Sivertsen et al. 2011) and 3 from an unpublished draft classification in the South Eastern Highlands bioregion (Benson undated).

The comparative assessment methods described in Section 3.2.1 were used to assess the relationship between these Draft-Working PCTs (2018) and ENSW v1.1 groups. The majority of the Draft-Working PCTs (2018) cited a single plot-based legacy classification unit.

The Northern Rivers classification (OEH 2012) included a large number of units defined by small plot membership, as well as some units defined by non-standard floristic samples that

were not included in the eastern NSW analysis dataset of DPE (2022b). Our assessment found that 56% of the Draft-Working PCTs (2018) citing Northern Rivers units were very strongly related to one NSW v1.1 group, 41% had a moderate to strong relationship and 2% were only weakly associated. The comparative assessment also identified 5 (<1%) Draft-Working PCTs (2018) that were not related to any NSW v1.1 group. These PCTs described plant assemblages that are not sampled by any standard floristic survey plots and are not described by the NSW v1.1 classification project (see Table 3). These 5 Draft-Working PCTs (2018) were considered candidates for **addition** to the Approved PCT master list alongside the NSW v1.1 groups.

Table 3 Draft-Working PCTs (2018) that are not related to any NSW v1.1 group

PCT ID	PCT name
2068	Moreton Bay Fig - Myrtle Ebony dry vine rainforest on sandstone at Pillar Rock, east of Grafton, South Eastern Queensland Bioregion
2079	Blakes Wattle - Wilga - Wild Quince - Kurrajong thickets, NSW North Coast Bioregion and New England Tablelands Bioregion
2101	Black Wattle - Hill Kanuka - Coachwood - Mountain Banksia - Soft Corkwood low closed forest on shallow soils of the Dorrigo Escarpment, NSW North Coast Bioregion
2247	Large-fruited Blackbutt shrubby open forest on conglomerates of the Broken Bago Range near Wauchope on the Mid North Coast, NSW North Coast Bioregion
2250	Blue-leaved Stringybark open forest on exposed sites in the Macleay-Hastings region, NSW North Coast Bioregion

The subset of Draft-Working PCTs (2018) based on units of the coastal heath project of Griffith et al. (2003) were very strongly related to NSW v1.1 groups. There are 77% of these Draft-Working PCTs with a very strong relationship to just one NSW v1.1 group, while 33% were strongly related. The coastal heath project units are generally defined by small plot memberships, which tends to skew the relationship assessment to the stronger strength classes. No Draft-Working PCTs citing the coastal heath project were identified as having no relationship to NSW v1.1 group(s). Similarly, all 15 Draft-Working PCTs citing units of the greater Hunter region classification by Sivertsen et al. (2011) were found to be related to NSW v1.1 groups using traceable plot memberships. All 3 Draft-Working PCTs from Benson (undated) were found to be related to NSW v1.1 groups by qualitative comparison.

3.2.3 Eastern NSW v1.1 groups not related to PCTs (2018)

The comparative assessments described in Sections 3.2.1 and 3.2.2 were applied in the inverse to examine whether any of the 1,067 NSW v1.1 groups had no traceable relationship with any Approved PCTs (2018) or Draft-Working PCTs (2018). This assessment identified 144 NSW v1.1 groups that represent plant assemblages not described in the PCT master list in 2018. These groups are constructed from recently collected standard floristic survey plots that were not available to the legacy classification projects cited by Approved or Draft-Working PCTs (2018). They primarily occur in regions and environments that were poorly sampled prior to the commencement of the eastern NSW classification project.

4. Amendment of the NSW PCT master list

4.1 Introduction

This section outlines the steps undertaken to adopt the revised classification for the coast and tablelands bioregions into the BioNet applications. PCTs (2018) impacted by adoption of the revised classification are identified, including those retained, modified and decommissioned. These actions resulted in the production of a revised master list of Approved PCTs (2022).

4.2 Changes to PCT (2018) definition status

The assessments described in Section 3 above led to recommendations on the definition status of every Approved PCT (2018) occurring in one or more coast and tablelands bioregion as well as relevant Draft-Working PCTs. After approval to change the PCT definition statuses was received, the following actions were applied:

- 2 Approved PCTs (2018) retained as Approved, with no change
- 624 Approved PCTs (2018) changed to Decommissioned
- 5 Draft-Working PCTs (2018) changed to Approved
- 389 Draft-Working PCTs (2018) changed to Withdrawn.

4.3 Addition of ENSW v1.1 groups to the PCT master list

After approval was received, all 1,067 ENSW v1.1 groups were published to the BioNet Vegetation Classification public application and BioNet Web Services (Appendix C). The way in which PCT data is stored in BioNet is described in Section 5.

4.4 Modification of Approved PCT (2018) bioregions

The review described in Section 3.2.1 confirmed 328 Approved PCTs (2018) occur in both the eastern NSW PCT classification v1.1 region (coast and tablelands bioregions) and further west, as at November 2018, and are related to ENSW v1.1 groups. In the eastern NSW PCT classification v1.1 region (i.e. the 7 coast and tablelands bioregions), the floristic assemblages and habitats of these PCTs are now adequately described – and replaced – by the ENSW v1.1 groups (now converted to Approved PCTs (2022)). To prevent PCT duplication within the eastern NSW classification v1.1 region, it was necessary to remove these 328 PCTs from coast and tablelands bioregions. Appendix A lists the Approved PCTs (2018) that had coast and tablelands bioregions removed from their BioNet distributions, effectively replaced by newly Approved PCTs (2022). These PCTs remain Approved for the western slopes bioregions and further west.

4.5 2022 NSW PCT master list

Following the above revisions, as at June 2022 there are a total of 1,841 Approved PCTs in the BioNet Vegetation Classification public application. This represents a temporary increase of roughly 30% in the total number of Approved PCTs in NSW. The increase arises from duplication and overlap in PCTs between the new revisions of the coast and tablelands bioregions and those of the western slopes bioregions. Including duplication avoids any impacts to the current PCTs that are Approved in the western bioregions while classification

revisions are completed in those bioregions. Duplicated PCTs will be addressed when the next update to the eastern NSW PCT classification (v1.2) is introduced into BioNet.

The number of Approved PCTs now includes:

- 1,074 Approved PCTs (2022) that occur in one or more coast and tablelands bioregions, including 1,067 'quantitative PCTs' and 7 'qualitative PCTs'
- 767 Approved PCTs (2022) that don't occur in any coast and tablelands bioregion.

5. PCT data in BioNet applications

5.1 Introduction

PCT data is held in the BioNet biodiversity data repository and available to the public in 2 applications: the Flora surveys module of the BioNet Atlas application and the BioNet Vegetation Classification public application. These applications are important assets that provide information used in the definition of Approved PCTs. PCT data is also accessible in machine readable form via the BioNet Web Services.

In BioNet, PCTs have one of 2 distinct classification types, qualitative or quantitative. The 1,067 ENSW v1.1 groups have become quantitative Approved PCTs (2022) in BioNet. This section of this report outlines the data held in BioNet for quantitative PCTs, focusing on those that are new or have been revised to support the eastern NSW PCT classification. It summarises the methods and definitions used to populate particular BioNet Vegetation Classification fields for quantitative Approved PCTs (2022).

PCT data for the 7 qualitative Approved PCTs (2022) in the coast and tablelands bioregions had already been populated from the sources cited for each PCT in the Vegetation Classification application. PCT data was not edited for these qualitative PCTs as part of this project, however TEC associations were assessed (see Section 5.3.9).

5.2 BioNet Atlas

For all PCTs, BioNet Atlas stores PCT identification number ('PCT ID'), 'PCT name', 'vegetation class', 'authority' and 'classification type'. Importantly, for quantitative PCTs BioNet Atlas also stores and makes accessible the plot (site and replicate) membership for every quantitative PCT. Quantitative PCT member plots are then used in BioNet to summarise the floristic, environmental and geospatial characteristics of each quantitative PCT. Member plots are also the basis for descriptions of PCT vegetation structure including stratum height and foliage cover.

5.2.1 Authority

BioNet requires each PCT to have a single 'authority'. The authority is the project from which the PCT was obtained. All 1,067 ENSW v1.1 quantitative Approved PCTs have the authority Eastern NSW PCT Classification.

5.2.2 Classification type

This field provides the 'classification type' for each PCT, being either quantitative or qualitative.

5.2.3 PCT plot membership

All standard floristic survey plot data used to define the 1,067 NSW v1.1 quantitative Approved PCTs (2022) is accessed using the 'Flora surveys' module of the BioNet Atlas application. The large majority of plot data are publicly accessible, though a small proportion are restricted. A plot here refers to a specific combination of 'survey name', 'site number' and 'replicate number' in the Flora surveys module, also referred to as a 'census' (OEH 2019). A total of 41,340 plots are assigned to 1,067 NSW v1.1 quantitative Approved PCTs. The Flora surveys module stores the plot to PCT classification by assigning each unique survey name / site number / replicate number combination to a single PCT.

Each classified plot (site and replicate combination) is assigned to a single quantitative PCT with a 'PCT assignment category' of Primary or Secondary. Plots with a Primary assignment are used in the definition of floristic, structural, environmental and spatial characteristics of quantitative PCTs. Plots with a Secondary assignment are only used in the definition of environmental and spatial characteristics of quantitative PCTs. In the eastern NSW PCT classification v1.1, approximately 84% of plot to PCT assignments are Primary assignments.

5.2.4 PCT identification number and PCT name

All of the 1,067 NSW v1.1 quantitative Approved PCTs have a unique PCT identification number ('PCT ID') above 3000. This distinguishes them from qualitative PCTs, which have unique PCT identification numbers below 3000. PCTs with a PCT ID above 3000 have different floristic and environmental information in BioNet to that available for qualitative PCTs, and are suitable for assessment against new standard field survey plot data with the online Plot to PCT Assignment Tool (DPE 2022c).

Quantitative PCT names have a short label convention, generally less than 50 characters. Where a quantitative PCT has a very strong relationship to a legacy classification unit, the legacy name was used for the quantitative PCT name, provided it met the name length constraint. For example, formerly Approved qualitative PCT (2018) 849 (Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion) was replaced by quantitative Approved PCT (2022) 3320 (Cumberland Shale Plains Woodland) based on the very strong relationship between PCT 3320 and the cited legacy source unit for PCT 849, which was *Cumberland Shale Plains Woodland* of Tozer et al. (2010). Where a quantitative PCT does not have a very strong relationship to a legacy classification unit with a suitably short name, PCT names were created using a combination of consistent regional or location identifiers, topographic or substrate descriptors, frequent species in the tallest stratum, and vegetation structure. PCT names are descriptive not diagnostic.

5.2.5 Vegetation class and formation

The NSW vegetation classification hierarchy requires each PCT to be allocated to a single 'vegetation class', and each vegetation class then nests within a single 'vegetation formation' at the upper level of the hierarchy. Each of the 1,067 NSW v1.1 quantitative Approved PCTs (2022) was assessed against the 99 vegetation classes and 12 vegetation formations defined by Keith (2004). This assessment compared attributes of each Approved PCT (2022) against the qualitative descriptions of vegetation classes and formations, and maps of their distributions, in Keith (2004), following a sequential process:

1. identify the most plausible vegetation formation using the dominant or most frequent structural characteristics of the PCT
2. of those vegetation classes within the chosen vegetation formation, discount vegetation classes that are by definition (Keith 2004) outside eastern NSW
3. identify the vegetation class assignments of the most strongly related legacy classification units

4. evaluate classes for fit, by comparing elevation, rainfall and substrate characteristics and distributions of the PCT (using member plot locations) against descriptions and maps of the candidate vegetation classes (using Keith (2004) and Keith and Simpson (2008))
5. resolve the final vegetation class choice by comparing floristic composition of the PCT with the characteristic species of the candidate vegetation class (Keith 2004)
6. verify the choice against vegetation class and vegetation formation assignments of related quantitative PCTs (2022) and related previously Approved qualitative PCTs (2018) and cited source legacy classification units.

The final assignment of each quantitative PCT to a vegetation class (and hence a vegetation formation) is stored in BioNet Atlas.

Appendix C provides a summary of the differences in the total numbers of PCTs assigned to each vegetation class between Approved PCTs (2018) and Approved PCTs (2022) that occur in at least one of the coast and tablelands bioregions. The magnitude of change in PCT tallies across the vegetation formations and vegetation classes is variable. Rainforests, for example, have almost twice as many PCTs in 2022 as 2018, with the largest increases in the Dry Rainforest, Littoral Rainforest and Subtropical Rainforest vegetation classes. This reflects a combination of the comparatively coarse classification of rainforests in the PCT master list in 2018, the investment in standard floristic survey plot data collection in rainforests during the eastern NSW classification project (DPE 2022b), and consequently a more comprehensive classification of rainforests in the 2022 PCT master list.

Changes to the number of PCTs within the Wet Sclerophyll Forests formation are less pronounced, particularly those within the shrubby sub-formation where the overall number of PCTs has not changed significantly. Within the Wet Sclerophyll Forests shrubby sub-formation there are some changes in regional patterns, with the number of PCTs increased on the south coast but stable for the north coast.

Other changes include several vegetation classes that are restricted to western NSW by definition (Keith 2004) but had been assigned to Approved PCTs (2018) in coast and tablelands bioregions; these classes are not assigned to Approved PCTs (2022) in coast and tablelands bioregions.

5.3 BioNet Vegetation Classification

For all PCTs, the BioNet Vegetation Classification public application provides summary information that defines the floristic, environmental and distribution characteristics of each PCT. It also provides: lineage relationship information that relates Approved PCTs (2018) to Approved PCTs (2022); information summarising any associations that exist between PCTs and TECs; reference information; and benchmark data that is used in the Biodiversity Assessment Method (BAM).

5.3.1 References and profile source

The references fields are populated with the reference source for information on the PCT. For quantitative PCTs, member plots are the basis of the PCT; hence for the 1,067 quantitative Approved PCTs (2022) the 'full references' field is populated with the eastern NSW classification project in which the plots were classified. The 'profile source' field is populated with the ENSW v1.1 group code used in that classification project (see Appendix B).

5.3.2 Vegetation description

Each quantitative Approved PCT (2022) has a 'vegetation description' that summarises the main floristic, structural and environmental attributes. The vegetation descriptions combine information held in multiple other fields for qualitative PCTs, including 'landscape position',

'lithology', 'landform patterns', 'landform elements' and community structure fields. Sets of standard and consistent terms are used in the vegetation descriptions for quantitative PCTs, as follows.

Structural features of the PCT are described using the structural formation classes of Walker and Hopkins (1990, Table 14a), such as open forest, woodland, closed heath and so on. Height terms also follow Walker and Hopkins (1990, Table 15), as do cover terms (Walker and Hopkins 1990, Table 16).

Composition attributes are summarised for each primary vegetation stratum using a set of terms indicating the frequency with which individual plant species are recorded in plots assigned to the PCT, which are: almost always (>90% of plots), very frequent (71–90% of plots), common (51–70% of plots), occasional (31–50% of plots), or rare (≤30% of plots). Some descriptions include additional statements on the relative abundance of species or groups of related species.

Common geographic reference names are used to locate the PCT in NSW and to describe the bounds of its known extent. The locations of PCT member plots were used as the basis for geographic distribution descriptions. Summary environmental data including topographic, climatic and substrate characteristics are also sourced from member plot locations, using intersects with geographic information system spatial layers.

Vegetation descriptions may also include statements describing the floristic or geographic relationships between PCTs and identify combinations of species or environmental attributes to help distinguish them.

Vegetation descriptions are enhanced by identifying those species that not only characterise the type but are useful in discriminating between types. To identify such species we used a model-based method that models group membership against floristic composition, and identifies species for which group membership is a strong predictor for the occurrence of that species. This analysis was performed in R using the `get_characteristic` function within the `optimus` package.

Vegetation descriptions for quantitative Approved PCTs (2022) in the coast and tablelands bioregions are more comprehensive and consistent than they had been for previous qualitative Approved PCTs (2018), with the mean length of descriptions doubling from 109 words in Approved PCTs (2018) to 225 words in Approved PCTs (2022).

5.3.3 Species summary data

Quantitative PCTs (2022) do not have 'species by stratum' lists in the Vegetation Classification public application. Instead, they have 'species by growth form group' lists, which list all species recorded in plots with a Primary assignment to the PCT, together with the species growth form group (as held in the BioNet Atlas application). Species lists are sourced from BioNet Atlas and annotated with 'frequency' (% of PCT Primary member plots in which the species is recorded) and 'median cover score' (median 1–6 Braun Blanquet cover–abundance scale for that species in PCT Primary member plots). Species are sorted by growth form group and presented in descending order of frequency. All quantitative Approved PCTs (2022) use a standardised taxonomic treatment for species scientific names.

Species lists for Approved PCTs (2022) in the coast and tablelands bioregions are significantly more comprehensive than Approved PCTs (2018), with the mean inventory length rising from 26 species in 2018 to 180 in 2022. The species by stratum lists of Approved PCTs (2018) contained no information about species frequency or cover–abundance, and the data sources and derivation process for these lists were unclear.

5.3.4 Median native species richness per plot

For each quantitative PCT (2022) the 'median native species richness per plot' is sourced from BioNet Atlas. The value is the median number of native species recorded in each PCT's Primary member plots (after application of the standardised taxonomic treatment).

The median native species richness per plot across all 1,067 quantitative Approved PCTs (2022) is 32 species. PCT 3980 Southern Lacustrine Herbfield has the lowest median native species richness per plot, at 2 species. The highest median native species richness per plot value is 70 species, which is obtained for 2 rainforest PCTs on the far north coast, PCT 3011 Far North Lowland Subtropical Rainforest and PCT 3064 Far North Hoop Pine Dry Rainforest.

5.3.5 Environmental summary data

Every quantitative PCT (2022) has environmental summary statistics sourced from values in BioNet Atlas for PCT member plots (Primary and Secondary). The values provided are minimum, median and maximum for elevation (metres above sea level), average annual rainfall (millimetres) and annual mean temperature (°C).

The values are useful to understand the broad climatic and topographic conditions in which a PCT occurs. Maximum and minimum values bound the known limits from PCT plot membership data. These values differ slightly from those used in the environmental thresholds analysis in the Plot to PCT Assignment Tool (DPE 2022c), which uses upper (90th) and lower (10th) percentile values to indicate typical environmental range.

5.3.6 Spatial summary data

Every quantitative PCT (2022) has spatial summary data sourced from BioNet Atlas using PCT member plots (Primary and Secondary). This includes: a list of every 'IBRA bioregion' in which a PCT member plot occurs; a list of every 'IBRA sub-bioregion' in which a PCT member plot occurs; a list of every 'local government area' in which a PCT member plot occurs (as at the time summary data was exported from the Flora surveys module of the BioNet Atlas application (January 2021)). In this way spatial summary data for quantitative Approved PCTs (2022) is comprehensive and consistent.

5.3.7 Number of replicates

Every quantitative PCT (2022) has a simple tally of the number of plots (survey name, site number and replicate number combination) defining the PCT. Again, this is sourced directly from BioNet Atlas. The tally is presented as a total count as well as a breakdown of Primary and Secondary assignments ('total number of replicates', 'number of Primary replicates', 'number of Secondary replicates').

5.3.8 Classification confidence level

A 'classification confidence level' is assigned to every PCT in the PCT master list. A 5-class categorisation (Very High, High, Moderate, Low, Very Low) is used for both qualitative and quantitative PCTs. However, quantitative PCTs (2022) have different definitions for the classes, based on the number of PCT member plots and metrics indicating the robustness and diagnostic stability of the PCT (Appendix D). The metrics are taken from the analytical work completed during the development of the eastern NSW classification (DPE 2022b). The classification confidence level class definitions for quantitative PCTs are shown in Table 4.

Table 4 Definition of ‘classification confidence level’ classes for quantitative Approved PCTs (2022)

Classification confidence level	≥15 PCT member plots	5–14 PCT member plots	<5 PCT member plots
Very High	High sampling effort. PCT is very reliably diagnosed. Very high accuracy and reliability metrics.	Not applicable	Not applicable
High	High sampling effort. PCT is reliably diagnosed. High accuracy and very high reliability metrics.	Moderate sampling effort. PCT is reliably diagnosed. Very low floristic overlap with other PCTs.	Not applicable
Moderate	High sampling effort. PCT is reliably diagnosed. Moderately high accuracy and reliability metrics.	Moderate sampling effort. PCT is reliably diagnosed. Low floristic overlap with other PCTs.	Low sampling effort. PCT is reliably diagnosed. Floristic assemblage distinct from all other PCTs and is very strongly correlated with unique environmental features that are highly restricted. Sampling effort is likely to describe floristic variation across its range.
Low	High sampling effort. PCT is diagnoseable but may frequently require the addition of environmental data to assist diagnosis. Moderate accuracy and reliability metrics. May include PCTs that are very disturbed across their range. Target for additional survey using standard floristic survey methods.	Moderate sampling effort. PCT is reliably diagnosed. Moderately low floristic overlap with other PCTs. May frequently require the addition of environmental data to assist diagnosis. Target for additional survey using standard floristic survey methods.	Not applicable
Very Low	Not applicable	Not applicable	Placeholders. Very low sampling effort, low level of statistical reliability, may result in false diagnosis. Compositional and environmental characteristics appear distinct based on available data. Target for additional survey using standard floristic survey methods.

More than 77% of quantitative Approved PCTs (2022) in coast and tablelands bioregions are assigned to Very High or High classification confidence level classes. PCTs with Very High or High classification confidence level are likely to be robust, with low levels of floristic variation and strong floristic separation from all other quantitative PCTs. These PCTs are likely to be readily diagnosable using standard floristic survey plots and quantitative identification tools (DPE 2022c).

Classification confidence level cannot be directly compared between quantitative and qualitative PCTs; however, available data suggests that fewer than 50% of qualitative Approved PCTs (2018) in the coast and tablelands bioregions had Very High or High classification confidence level classes.

5.3.9 Associations with NSW and Commonwealth TECs

The BioNet Vegetation Classification data collection holds data on associations between Approved PCTs and TECs listed under the NSW *Biodiversity Conservation Act 2016* (BC Act) and Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The TEC associations available in the Vegetation Classification public application are source data for the BioNet Atlas Threatened Biodiversity Data Collection and the Biodiversity Assessment Method Calculator (BAM-C) that underpins components of the Biodiversity Offsets Scheme.

As at 30 June 2021 a total of 89 NSW-listed TECs and 31 Commonwealth-listed TECs were relevant to the non-marine native vegetation of the 7 coast and tablelands bioregions of eastern NSW. All of these TECs were systematically assessed against newly Approved PCTs (2022).

The TEC assessments identified the diagnostic and qualifying attributes of each TEC and applied them against Approved PCTs (2022) using a standardised set of principles (Appendix E). Each TEC was first compared against all 1,072 newly Approved PCTs (2022) using a set of quantitative floristic comparison metrics (Appendix F). These metrics were used to identify those PCTs with species composition most closely matching each TEC's characteristic species list. Candidate matched PCTs were then further assessed against the identified diagnostic and qualifying attributes of the TEC including evaluation of plot locations and supporting environmental data, in accordance with the guiding principles.

A total of 324 Approved PCTs (2022) in the coast and tablelands bioregions relate to one or more NSW TEC. This is a reduction from the 385 previous Approved PCTs (2018) assigned to NSW TECs in the coast and tablelands bioregions. Sixty-five Approved PCTs (2022) relate to more than one NSW TEC. For example, areas of PCT 3339 may relate to the TEC 'New England Peppermint (*Eucalyptus nova-anglica*) Woodland on Basalts and Sediments in the New England Tableland Bioregion' where a site is dominated by *Eucalyptus nova-anglica* and meets other conditions, or elsewhere may relate to the TEC 'Ribbon Gum - Mountain Gum - Snow Gum Grassy Forest/Woodland of the New England Tableland Bioregion'. Approved PCTs (2022) are related to TEC(s) either in the PCT's entirety or in part; where only part is related, qualifying statements have been written to constrain the PCT-TEC match in accordance with diagnostic attributes defined by the TEC final determination, such as bioregions. These qualifying statements are located in the TEC Comments field in the BioNet Vegetation Classification public application and are important to consider when using the Approved PCT (2022) to TEC association data.

The review of Approved PCT-TEC relationships in the eastern NSW PCT classification v1.1 region highlighted the wide variation in scale at which TECs are defined and in quality of data underpinning TEC descriptions including characteristic species lists. Of the TECs listed under NSW legislation in this region we identified 15 that circumscribe assemblages and/or environment patterns that are subsets of a single or combined set of Approved PCTs (2022). Examples of these TECs include 'Low woodland with heathland on indurated sand at Norah

Head', 'Kurnell Dune Forest', 'Kincumber Scribbly Gum Forest' and 'Pittwater-Wagstaff Spotted Gum Forest'. In contrast, 10 TECs have broad circumscriptions that cover assemblages extending across multiple bioregions and are associated with a large number of Approved PCTs (2022). The most complex of these TECs is 'Lowland Rainforest', which has relationships to 60 Approved PCTs (2022) of the NSW North Coast, South Eastern Queensland and Sydney Basin bioregions. Other examples, including 'River-flat Eucalypt Forest', 'Swamp Sclerophyll Forest' and 'White Box-Yellow Box-Blakely's Red Gum Woodland' are related to between 10 and 30 Approved PCTs (2022).

A total of 199 Approved PCTs (2022) in the coast and tablelands bioregions relate to one or more Commonwealth-listed TECs, including 15 PCTs that relate to 2 different Commonwealth TECs. This compares to 154 PCTs that were associated with one or more Commonwealth-listed TEC in the BioNet Vegetation Classification application in 2018, including 12 PCTs that are associated with multiple EPBC Act TECs. As with NSW-listed TECs, Commonwealth-listed TECs may not relate to the entirety of a PCT. Qualifying statements have been written to constrain the PCT–TEC match in accordance with diagnostic attributes contained within the TEC listing advice or conservation advice. These qualifying statements are stored within the TEC Comments field in the BioNet Vegetation Classification public application.

Table 5 and Table 6 summarise the number of Approved PCTs (2018) and Approved PCTs (2022) that relate to each NSW and Commonwealth-listed TEC occurring in the coast and tablelands bioregions (eastern NSW PCT classification v1.1 region).

Table 5 NSW BC Act TECs (as at June 2021) relevant to the non-marine native vegetation of the coast and tablelands bioregions and tally of associated Approved PCTs in the coast and tablelands bioregions in BioNet in 2018 and 2022

BC Act TEC	No. of associated Approved PCTs (2018) in the coast and tablelands bioregions	No. of associated Approved PCTs (2022) in the coast and tablelands bioregions
Agnes Banks Woodland	1	1
Araluen Scarp Grassy Forest	1	1
Bangalay Sand Forest	2	4
Ben Halls Gap National Park Sphagnum Moss Cool Temperate Rainforest	3	1
Blue Gum High Forest	1	1
Blue Mountains Basalt Forest	0	2
Blue Mountains Shale Cap Forest	3	4
Blue Mountains Swamps	4	3
Brogo Wet Vine Forest	3	1
Byron Bay Dwarf Graminoid Clay Heath Community	1	1
Carex Sedgeland	5	1
Castlereagh Scribbly Gum Woodland	1	1
Castlereagh Swamp Woodland	2	2
Central Hunter Grey Box-Ironbark Woodland	4	3

BC Act TEC	No. of associated Approved PCTs (2018) in the coast and tablelands bioregions	No. of associated Approved PCTs (2022) in the coast and tablelands bioregions
Central Hunter Ironbark-Spotted Gum-Grey Box Forest	3	1
Coastal Cypress Pine Forest	1	2
Coastal Saltmarsh	10	8
Coastal Upland Swamp	7	5
Cooks River/Castlereagh Ironbark Forest	2	1
Coolac-Tumut Serpentine Shrubby Woodland	0	0
Cumberland Plain Woodland	4	2
Dry Rainforest of the South East Forests	1	2
Duffys Forest Ecological Community	1	2
Eastern Suburbs Banksia Scrub	2	2
Elderslie Banksia Scrub Forest	1	1
Freshwater Wetlands on Coastal Floodplains	14	9
Genowlan Point Allocasuarina nana Heathland	2	1
Grey Box-Grey Gum Wet Sclerophyll Forest	2	1
Howell Shrublands	6	2
Hunter Floodplain Red Gum Woodland	2	1
Hunter Lowland Redgum Forest	8	3
Hunter Valley Foothills Slaty Gum Woodland	2	1
Hunter Valley Vine Thicket	2	3
Hunter Valley Weeping Myall Woodland	1	1
Hygrocybeae Community of Lane Cove Bushland Park	2	4
Illawarra Lowlands Grassy Woodland	2	4
Illawarra Subtropical Rainforest	2	3
Kincumber Scribbly Gum Forest	3	2
Kurnell Dune Forest	2	3
Kurri Sand Swamp Woodland	3	2
Littoral Rainforest	8	21
Low woodland with heathland on indurated sand at Norah Head	0	1
Lower Hunter Spotted Gum-Ironbark Forest	5	4
Lower Hunter Valley Dry Rainforest	3	2
Lowland Grassy Woodland	6	5
Lowland Rainforest	18	58
Lowland Rainforest on Floodplain	10	33

BC Act TEC	No. of associated Approved PCTs (2018) in the coast and tablelands bioregions	No. of associated Approved PCTs (2022) in the coast and tablelands bioregions
Maroota Sands Swamp Forest	1	1
McKies Stringybark/Blackbutt Open Forest	9	1
Melaleuca armillaris Tall Shrubland	1	1
Milton Ulladulla Subtropical Rainforest	2	2
Moist Shale Woodland	2	1
Monaro Tableland Cool Temperate Grassy Woodland	Not listed in 2018	2
Montane Peatlands and Swamps	17	15
Mount Gibraltar Forest	2	2
Mt Canobolas Xanthoparmelia Lichen Community	7	4
Native Vegetation on Cracking Clay Soils of the Liverpool Plains	0	1
New England Peppermint (<i>Eucalyptus nova-anglica</i>) Woodland on Basalts and Sediments	15	3
Newnes Plateau Shrub Swamp	3	1
O'Hares Creek Shale Forest	2	1
Pittwater and Wagstaffe Spotted Gum Forest	2	2
Quorrobolong Scribbly Gum Woodland	1	1
Ribbon Gum-Mountain Gum-Snow Gum Grassy Forest/Woodland	15	2
River-Flat Eucalypt Forest on Coastal Floodplains	25	13
Robertson Basalt Tall Open-forest	5	1
Robertson Rainforest	2	2
Shale Gravel Transition Forest	2	2
Shale Sandstone Transition Forest	3	1
Snowpatch Feldmark	0	1
Snowpatch Herbfield	0	1
Southern Highlands Shale Woodlands	3	3
Southern Sydney sheltered forest on transitional sandstone soils	1	1
Subtropical Coastal Floodplain Forest	19	15
Sun Valley Cabbage Gum Forest	1	1
Swamp Oak Floodplain Forest	18	18
Swamp Sclerophyll Forest on Coastal Floodplains	24	23
Sydney Freshwater Wetlands	8	12
Sydney Turpentine-Ironbark Forest	3	1
Tableland Basalt Forest	18	3

BC Act TEC	No. of associated Approved PCTs (2018) in the coast and tablelands bioregions	No. of associated Approved PCTs (2022) in the coast and tablelands bioregions
Tablelands Snow Gum, Black Sallee, Candlebark and Ribbon Gum Grassy Woodland	25	Not listed in 2022
The Shorebird Community occurring on the relict tidal delta sands at Taren Point	3	2
Themeda grassland on seacliffs and coastal headlands	4	3
Umina Coastal Sandplain Woodland	1	1
Upland Wetlands of the Drainage Divide	5	1
Warkworth Sands Woodland	1	1
Werriwa Tablelands Cool Temperate Grassy Woodland	Not listed in 2018	2
Western Sydney Dry Rainforest	1	2
White Box Yellow Box Blakely's Red Gum Grassy Woodland	79	19
White Gum Moist Forest	1	1
Windswept Feldmark	0	1

Table 6 Commonwealth EPBC Act TECs (as at June 2021) relevant to the non-marine native vegetation of the coast and tablelands bioregions and tally of associated Approved PCTs in the coast and tablelands bioregions in BioNet in 2018 and 2022

EPBC Act TEC	No. of associated Approved PCTs (2018) in the coast and tablelands bioregions	No. of associated Approved PCTs (2022) in the coast and tablelands bioregions
Alpine Sphagnum Bogs and Associated Fens	5	6
Blue Gum High Forest	1	1
Castlereagh Scribbly Gum and Agnes Banks Woodlands	1	2
Central Hunter Valley eucalypt forest and woodland	1	8
Coastal Swamp Oak (<i>Casuarina glauca</i>) Forest	0	16
Coastal Upland Swamps	5	5
Cooks River/Castlereagh Ironbark Forest	2	1
Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest	4	3
Eastern Suburbs Banksia Scrub	2	2
Elderslie Banksia Scrub Forest	Not listed in 2018	1
Hunter Valley Weeping Myall (<i>Acacia pendula</i>) Woodland	1	1

EPBC Act TEC	No. of associated Approved PCTs (2018) in the coast and tablelands bioregions	No. of associated Approved PCTs (2022) in the coast and tablelands bioregions
Illawarra and South Coast Lowland Forest and Woodland ecological community	0	4
Illawarra-Shoalhaven Subtropical Rainforest	Not listed in 2018	4
Littoral Rainforest and Coastal Vine Thickets	6	26
Lowland Grassy Woodland	0	3
Lowland Rainforest of Subtropical Australia	9	41
Natural grasslands on basalt and fine-textured alluvial plains	0	1
Natural Temperate Grassland of the South Eastern Highlands*	19	6
New England Peppermint (<i>Eucalyptus nova-anglica</i>) Grassy Woodlands	1	3
River-flat eucalypt forest on coastal floodplains	Not listed in 2018	15
Robertson Rainforest	Not listed in 2018	2
Shale Sandstone Transition Forest	2	1
Southern Highlands Shale Forest and Woodland	3	3
Subtropical and Temperate Coastal Saltmarsh	3	8
Temperate Highland Peat Swamps on Sandstone	6	11
Turpentine-Ironbark Forest	4	5
Upland Basalt Eucalypt Forests	7	6
Upland Wetlands	5	2
Warkworth Sands Woodland	0	1
Western Sydney Dry Rainforest and Moist Woodland on Shale	2	3
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	78	19

5.3.10 Percent cleared data

The proportion of pre-clearing area for each PCT was calculated from the NSW state vegetation type maps (DPE in prep.). The maps produce 2 estimates of area for each PCT: the present day extent, and the 1750 distribution to represent the likely pre-clearing extent at the time of European arrival.

5.3.11 Benchmarks

The quantitative Approved PCTs (2022) have default benchmarks that are auto-assigned based on the vegetation class and bioregions assigned to the PCT. These data are displayed in the Vegetation Classification public application in the 'community conditions benchmarks' section of the 'threatened biodiversity, TECs and benchmarks' tab. Benchmarks are important fields in the BAM.

5.3.12 Lineage from Approved PCTs (2018) to Approved PCTs (2022)

As described in Section 3.2.1, all Approved PCTs (2018) assigned to one or more coast and tablelands bioregion (as at November 2018) were compared to ENSW v1.1 groups that are now Approved PCTs (2022). The results of this analysis have been used to define relationships from Approved PCTs (2018) to Approved PCTs (2022). In the BioNet Vegetation Classification public application almost all Approved PCTs (2018) that are now either wholly Decommissioned, or retired from the coast and tablelands bioregions (but retained in the west), have lineage data that describes the relationship to Approved PCTs (2022). The lineage data is comprised of:

- a 'transformation details' lineage statement that provides a short summary to indicate whether the Approved PCT (2018) (the 'legacy PCT' or 'parent PCT') is constructed from a plot-based legacy classification unit(s) from a single classification, plot-based legacy classification units from multiple classifications, or other sources. In the case of the first 2, the lineage statement refers to the measured relationships to the new PCT via traceable plot data. It expresses the strength of the relationship between the legacy PCT and new PCT(s) through the number of new PCTs that account for >70% of the plots comprising the legacy PCT. Where a complex combination of sources was used in Approved PCT (2018) definitions and/or there are no traceable plot data, the lineage statements represent a qualitative interpretation of the floristic and environmental PCT attributes provided in the BioNet Vegetation Classification public application. Here the statement refers to the strongest associated PCTs. The lineage statement lists the PCT ID and PCT name for related Approved PCTs (2022) in order of relationship strength
- a separate row for each Approved PCT (2022) ('offspring PCT') to which the parent PCT is related
- the date the lineage information was entered into BioNet.

Lineage data to Approved PCTs (2022) is not populated for 9 formerly Approved PCTs (2018) that are either wholly Decommissioned or retired from coast and tablelands bioregions (but retained in the west). There are 2 reasons for this: the legacy PCT is marine, and marine communities are not included in the PCT master list (2022) (one PCT); the legacy PCT is a derived community and no clear lineage to any single Approved PCT (2022) could be established, but the PCT is addressed by the Approved PCT (2022) master list (derived communities are not included as separate types in the PCT master list (2022) for the coast and tablelands) (8 PCTs) (Appendix A).

Lineage data is not populated for 144 (13%) of quantitative Approved PCTs (2022). These PCTs mainly occur in distinct environments that were either unsampled or sparsely sampled by standard survey plots when past classifications cited by Approved PCTs (2018) were undertaken. The ENSW v1.1 classification project included a gap filling survey program that specifically aimed to increase the number of standard plots in poorly sampled environments. These poorly sampled environments range from heavily cleared landscapes to steep, inaccessible terrain across all land tenures. This included resampling of north coast rainforest communities and targeted sampling in central and northern tablelands, rain-shadow valleys of the north coast, and south coast littoral rainforests.

6. Glossary

Term	Definition
BioNet	The NSW biodiversity data repository administered by DPE
BioNet Vegetation Classification public application	The application (user interface) where public users can access the PCT master list and PCT summary data
BioNet Vegetation Classification edit application	The application (user interface) where DPE staff undertake edits to the PCT master list and PCT data. PCT data is published from the edit application to the public application
Flora surveys module of the BioNet Atlas application	The application (user interface) where users can access and edit flora survey data in the Systematic Surveys data collection
PCT	Plant community type. The finest level of classification in the NSW vegetation classification hierarchy
PCT master list	The cumulative set of PCTs in the BioNet Vegetation Classification applications, including 'PCT definition status' of Approved, Draft-Working, Decommissioned
Approved PCT (2018)	An Approved PCT in the BioNet Vegetation Classification public application on 1 November 2018
Draft-Working PCT (2018)	A Draft-Working PCT in the BioNet Vegetation Classification edit application on 7 November 2018
Approved PCT (2022)	An Approved PCT in the BioNet Vegetation Classification public application (on publication of eastern NSW PCT classification v1.1 in June 2022)
Decommissioned PCT (2022)	A Decommissioned PCT in the BioNet Vegetation Classification public application (on publication of eastern NSW PCT classification v1.1 in June 2022)
quantitative Approved PCT	A quantitative Approved PCT in the BioNet Vegetation Classification public application. A quantitative PCT has its plot membership defined in the Flora surveys module of the BioNet Atlas application. PCT profile data is based on the data of member plots. Quantitative PCTs are distinguished by having a PCT ID above 3000
qualitative Approved PCT	A qualitative Approved PCT in the BioNet Vegetation Classification public application. Qualitative PCTs have been determined from a wide range of sources and methods, but do not have plot membership defined in the Flora surveys module of the BioNet Atlas application. Qualitative PCTs are distinguished by having a PCT ID below 3000
legacy classification project	Any previous classification effort, some of which have been cited by Approved PCTs (2018)
legacy classification unit	A unit (type) defined by a legacy classification project. Unit(s) may be cited by Approved PCTs (2018). Units may be plot-based or qualitative
cited classification project	A classification project cited by PCT(s) in the BioNet Vegetation Classification application fields 'classification source', 'profile source', and 'full reference details'
cited classification unit	The individual classification units in the original classification project cited by the PCT

Term	Definition
standard floristic survey plot	A plot that represents a search of a bounded area, usually in the range of 400–1,000 m ² , within which all vascular plants are identified to the finest taxonomic level possible, with standardised estimates made of the abundance and projected foliage cover of each taxon present, and where those estimates can be reliably converted to a common cover–abundance scale of modified Braun-Blanquet (BB) cover–abundance 1–6. This includes plots that follow the survey standards defined by Sivertsen (2009)
group	A set of plots that comprise the defined membership of a plant assemblage pattern following cluster analysis and/or assessment of environmental factors
western slopes group	A group that does not have any plots located within the coast and tablelands bioregions, as at 1 May 2021
member plot	A plot that is part of the defined membership of a legacy classification unit, group or quantitative PCT
Primary member plot	A plot that has a distance to centroid value to its member group of 0.695 or less. These plots are entered into BioNet with a 'PCT assignment category' of Primary. An exception is non-woody freshwater wetland groups, some of which include some Primary member plots that have greater than 0.695 distance to centroid value to their member group
Secondary member plot	A plot that has a distance to centroid value to its member group of greater than 0.695. These plots are entered into BioNet with a 'PCT assignment category' of Secondary
eastern NSW	Parts of NSW that fall within one of the following 10 IBRA v7 bioregions (DAWE 2021): the Australian Alps, New England Tablelands, NSW North Coast, South East Corner, South Eastern Highlands, South Eastern Queensland, Sydney Basin, Brigalow Belt South, Nandewar and NSW South Western Slopes. 'Eastern NSW' is comprised of the 'coast and tablelands bioregions' and the 'western slopes bioregions'. Note that although plot data from the Australian Capital Territory was included and classified, the PCT classification does not apply under ACT legislation
coast and tablelands bioregions	Parts of NSW that fall within one of the following 7 IBRA v7 bioregions (DAWE 2021): the Australian Alps, New England Tablelands, NSW North Coast, South East Corner, South Eastern Highlands, South Eastern Queensland, Sydney Basin
western slopes bioregions	Parts of NSW that fall within one of the following 3 IBRA v7 bioregions (DAWE 2021): Brigalow Belt South, Nandewar and NSW South Western Slopes
eastern NSW PCT classification v1.1	The new PCT classification for the coast and tablelands bioregions, published in BioNet in June 2022
eastern NSW PCT classification v1.1 region	The area over which the eastern NSW PCT classification v1.1 applies, being the coast and tablelands bioregions
ENSW v1.1 groups	The set of 1,067 groups, representing native plant assemblages, defined by plots within the eastern NSW PCT classification v1.1 region
eastern NSW PCT classification v1.2	Future version of the quantitative PCT classification that will include types in the western slopes bioregions (i.e. will cover all 10 bioregions in eastern NSW)

7. References

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8. More information

- [BioNet](#)
- [NSW Integrated BioNet Vegetation Data program](#)

Appendix A: Approved PCTs (2018) in the coast and tablelands bioregions

A full list of Approved PCTs (2018) in the coast and tablelands bioregions, their strength of relationship to Approved PCTs (2022) and their PCT definition status on publication of eastern NSW PCT classification v1.1 in June 2022 is provided as an Excel file that can be downloaded from [Appendix A - Updating BioNet Plant Community Types: Eastern NSW PCT Classification Version 1.1 \(XLS 94KB\)](#).

Below is a summary list of PCT IDs Decommissioned in June 2022, or retired from coast and tablelands bioregions in June 2022.

PCTs Decommissioned in June 2022

116, 500, 507, 518, 522, 524, 526, 548, 583, 600, 605, 608, 632, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 655, 656, 657, 658, 659, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 688, 690, 692, 693, 694, 695, 696, 697, 698, 699, 706, 707, 708, 709, 715, 716, 717, 718, 719, 720, 721, 723, 724, 725, 728, 729, 732, 735, 736, 738, 740, 741, 742, 743, 744, 745, 747, 748, 749, 750, 751, 752, 755, 757, 760, 761, 762, 765, 767, 769, 770, 771, 772, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 788, 790, 792, 802, 803, 804, 806, 807, 808, 809, 811, 812, 814, 816, 817, 819, 821, 822, 826, 827, 828, 829, 830, 832, 834, 835, 837, 838, 839, 840, 841, 842, 843, 844, 846, 848, 849, 850, 852, 855, 857, 858, 859, 860, 861, 862, 867, 868, 870, 871, 872, 873, 875, 877, 878, 879, 880, 881, 882, 883, 886, 887, 888, 891, 892, 893, 897, 898, 899, 900, 901, 903, 904, 905, 906, 907, 908, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 922, 923, 926, 927, 929, 932, 934, 935, 938, 939, 941, 943, 944, 946, 947, 948, 949, 951, 952, 953, 954, 958, 963, 964, 966, 967, 968, 969, 971, 972, 974, 975, 976, 977, 978, 979, 980, 981, 986, 988, 990, 992, 993, 995, 996, 997, 999, 1061, 1062, 1064, 1067, 1068, 1070, 1071, 1072, 1073, 1074, 1077, 1078, 1079, 1080, 1081, 1082, 1083, 1084, 1086, 1087, 1091, 1092, 1096, 1097, 1100, 1101, 1102, 1103, 1104, 1105, 1106, 1107, 1108, 1109, 1119, 1121, 1122, 1123, 1125, 1126, 1128, 1129, 1130, 1131, 1134, 1135, 1136, 1138, 1141, 1142, 1143, 1144, 1145, 1146, 1147, 1148, 1149, 1150, 1151, 1152, 1153, 1154, 1155, 1156, 1157, 1158, 1159, 1160, 1161, 1162, 1164, 1167, 1168, 1169, 1174, 1178, 1181, 1183, 1184, 1186, 1187, 1188, 1190, 1192, 1194, 1198, 1199, 1200, 1201, 1204, 1205, 1206, 1208, 1209, 1210, 1211, 1212, 1214, 1215, 1217, 1219, 1220, 1221, 1222, 1223, 1224, 1225, 1226, 1227, 1228, 1229, 1230, 1231, 1232, 1234, 1235, 1236, 1237, 1239, 1243, 1244, 1245, 1246, 1247, 1248, 1249, 1250, 1252, 1253, 1254, 1255, 1256, 1257, 1259, 1260, 1261, 1262, 1263, 1265, 1266, 1267, 1268, 1271, 1272, 1273, 1275, 1281, 1282, 1283, 1284, 1285, 1287, 1290, 1292, 1293, 1295, 1297, 1298, 1299, 1300, 1301, 1302, 1309, 1318, 1319, 1320, 1321, 1322, 1323, 1326, 1327, 1328, 1331, 1333, 1334, 1336, 1337, 1338, 1339, 1340, 1385, 1386, 1395, 1398, 1401, 1501, 1504, 1512, 1519, 1520, 1522, 1525, 1526, 1527, 1528, 1530, 1533, 1534, 1535, 1536, 1537, 1538, 1541, 1545, 1548, 1549, 1550, 1556, 1557, 1558, 1560, 1561, 1562, 1564, 1565, 1566, 1567, 1568, 1569, 1570, 1571, 1572, 1573, 1576, 1578, 1579, 1580, 1581, 1582, 1583, 1584, 1585, 1588, 1589, 1590, 1591, 1592, 1593, 1594, 1595, 1598, 1600, 1601, 1602, 1615, 1616, 1618, 1619, 1620, 1621, 1622, 1623, 1624, 1625, 1626, 1627, 1628, 1629, 1632, 1633, 1634, 1635, 1636, 1637, 1638, 1639, 1640, 1641, 1642, 1643, 1644, 1645, 1646, 1647, 1648, 1649, 1650, 1651, 1652, 1653, 1657, 1658, 1664, 1665, 1677, 1678, 1680, 1687, 1688, 1689, 1697, 1699, 1700, 1701, 1702, 1703, 1704, 1705, 1706, 1707, 1710, 1715, 1716, 1717, 1718, 1719, 1720, 1721, 1722, 1723, 1724, 1725, 1726, 1727, 1728, 1729, 1730, 1734, 1735, 1736, 1737, 1739, 1740, 1741, 1742, 1743, 1744, 1745, 1746, 1747,

1748, 1749, 1775, 1776, 1777, 1778, 1780, 1782, 1783, 1785, 1786, 1787, 1789, 1790, 1793, 1794, 1795, 1798, 1800, 1803, 1804, 1808, 1809, 1810, 1817, 1822, 1823, 1824, 1826, 1828, 1832, 1833, 1841, 1843, 1845, 1846, 1847, 1911, 1912, 1913, 1914, 1915

PCTs retired from coast and tablelands bioregions in June 2022 (remain Approved for western bioregions)

42, 78, 79, 84, 85, 147, 266, 268, 270, 272, 273, 274, 275, 277, 278, 280, 281, 282, 283, 284, 285, 286, 287, 289, 290, 293, 294, 295, 296, 297, 298, 299, 300, 302, 303, 304, 305, 306, 307, 309, 310, 311, 312, 314, 316, 320, 321, 322, 323, 324, 325, 326, 332, 333, 335, 338, 339, 341, 342, 344, 345, 347, 348, 349, 350, 351, 352, 403, 426, 434, 437, 446, 458, 461, 476, 477, 478, 479, 480, 481, 482, 485, 486, 487, 488, 491, 492, 493, 494, 495, 496, 497, 498, 499, 501, 502, 503, 504, 505, 508, 509, 510, 511, 512, 513, 514, 516, 517, 519, 523, 527, 528, 529, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 544, 545, 547, 549, 551, 552, 554, 555, 556, 557, 558, 559, 561, 562, 563, 564, 565, 566, 567, 568, 569, 571, 573, 574, 575, 576, 577, 578, 579, 582, 584, 585, 586, 588, 589, 590, 591, 593, 594, 596, 597, 598, 599, 606, 607, 609, 612, 613, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 636, 652, 653, 654, 673, 674, 675, 676, 700, 701, 704, 705, 711, 722, 727, 730, 731, 734, 759, 766, 796, 797, 845, 847, 853, 856, 863, 884, 889, 894, 895, 896, 921, 931, 956, 957, 965, 970, 983, 991, 1076, 1088, 1089, 1093, 1094, 1095, 1099, 1110, 1116, 1118, 1124, 1127, 1171, 1176, 1177, 1185, 1191, 1196, 1197, 1202, 1270, 1288, 1289, 1296, 1303, 1308, 1314, 1316, 1317, 1329, 1330, 1332, 1341, 1382, 1383, 1394, 1396, 1521, 1523, 1529, 1531, 1532, 1539, 1540, 1543, 1546, 1547, 1551, 1552, 1553, 1554, 1555, 1559, 1563, 1574, 1575, 1577, 1586, 1587, 1599, 1603, 1604, 1605, 1606, 1607, 1608, 1609, 1610, 1611, 1612, 1613, 1614, 1617, 1630, 1631, 1654, 1655, 1656, 1660, 1661, 1663, 1666, 1667, 1668, 1669, 1671, 1672, 1674, 1675, 1676, 1679, 1681, 1683, 1684, 1685, 1686, 1691, 1692, 1693, 1695, 1696, 1708, 1709, 1711, 1714, 1731, 1738, 1766, 1767, 1770

Appendix B: Approved PCTs (2022) in the coast and tablelands bioregions (Eastern NSW PCT Classification v1.1 region)

A full list of Approved PCTs (2022) in the coast and tablelands bioregions is provided as an Excel file that can be downloaded from [Appendix B - Updating BioNet Plant Community Types: Eastern NSW PCT Classification Version 1.1 \(XLS 65KB\)](#)

Below is a summary list of all Approved PCT IDs in the coast and tablelands bioregions on publication of eastern NSW PCT classification v1.1 in June 2022.

Quantitative Approved PCTs (2022)

3001, 3002, 3003, 3004, 3005, 3006, 3007, 3008, 3009, 3010, 3011, 3012, 3013, 3015, 3016, 3017, 3019, 3020, 3021, 3022, 3024, 3025, 3026, 3027, 3028, 3029, 3030, 3031, 3032, 3033, 3034, 3035, 3036, 3037, 3038, 3039, 3040, 3041, 3042, 3043, 3044, 3045, 3046, 3047, 3048, 3049, 3050, 3051, 3052, 3053, 3054, 3055, 3056, 3057, 3058, 3059, 3060, 3061, 3062, 3063, 3064, 3065, 3066, 3067, 3068, 3069, 3070, 3072, 3073, 3074, 3075, 3076, 3077, 3078, 3079, 3080, 3081, 3082, 3083, 3084, 3086, 3087, 3088, 3089, 3091, 3092, 3093, 3094, 3095, 3096, 3097, 3098, 3099, 3100, 3101, 3102, 3103, 3104, 3105, 3106, 3107, 3108, 3109, 3110, 3111, 3112, 3113, 3114, 3115, 3116, 3117, 3118, 3119, 3120, 3121, 3122, 3123, 3124, 3125, 3127, 3128, 3129, 3130, 3131, 3132, 3133, 3134, 3135, 3136, 3137, 3138, 3139, 3140, 3141, 3142, 3144, 3145, 3146, 3147, 3148, 3149, 3150, 3151, 3152, 3153, 3154, 3155, 3156, 3157, 3158, 3160, 3161, 3162, 3163, 3164, 3165, 3166, 3167, 3168, 3169, 3170, 3171, 3172, 3173, 3174, 3176, 3177, 3178, 3179, 3180, 3181, 3182, 3183, 3184, 3185, 3186, 3187, 3188, 3189, 3190, 3191, 3192, 3193, 3194, 3196, 3197, 3198, 3199, 3200, 3201, 3202, 3203, 3204, 3205, 3206, 3207, 3208, 3209, 3210, 3211, 3212, 3213, 3214, 3215, 3216, 3217, 3218, 3219, 3220, 3221, 3222, 3223, 3224, 3225, 3226, 3227, 3228, 3229, 3230, 3231, 3232, 3233, 3234, 3235, 3236, 3237, 3238, 3239, 3240, 3241, 3242, 3243, 3244, 3245, 3246, 3247, 3248, 3249, 3250, 3251, 3252, 3253, 3254, 3255, 3256, 3257, 3258, 3259, 3260, 3261, 3262, 3263, 3264, 3266, 3267, 3268, 3269, 3270, 3271, 3272, 3273, 3274, 3275, 3276, 3277, 3278, 3279, 3280, 3281, 3282, 3283, 3284, 3285, 3286, 3287, 3288, 3289, 3290, 3291, 3292, 3293, 3294, 3295, 3296, 3297, 3298, 3299, 3300, 3301, 3302, 3303, 3304, 3305, 3306, 3307, 3309, 3310, 3311, 3312, 3313, 3314, 3315, 3316, 3317, 3318, 3319, 3320, 3321, 3322, 3323, 3324, 3325, 3326, 3327, 3328, 3329, 3330, 3331, 3332, 3334, 3336, 3337, 3338, 3339, 3341, 3344, 3345, 3346, 3347, 3348, 3350, 3351, 3352, 3353, 3354, 3355, 3356, 3357, 3358, 3359, 3361, 3363, 3365, 3366, 3367, 3368, 3369, 3370, 3372, 3373, 3374, 3375, 3376, 3377, 3378, 3379, 3380, 3381, 3382, 3383, 3384, 3385, 3387, 3388, 3391, 3394, 3395, 3396, 3397, 3398, 3399, 3401, 3402, 3403, 3404, 3405, 3406, 3407, 3408, 3409, 3410, 3411, 3412, 3413, 3414, 3415, 3416, 3417, 3418, 3420, 3421, 3422, 3424, 3425, 3426, 3427, 3428, 3431, 3432, 3433, 3434, 3435, 3436, 3437, 3438, 3439, 3441, 3442, 3443, 3444, 3445, 3446, 3447, 3448, 3449, 3450, 3451, 3452, 3453, 3454, 3455, 3456, 3457, 3458, 3459, 3460, 3461, 3462, 3463, 3464, 3465, 3466, 3467, 3468, 3469, 3470, 3471, 3472, 3473, 3474, 3475, 3476, 3477, 3478, 3479, 3480, 3481, 3482, 3483, 3484, 3485, 3486, 3487, 3488, 3489, 3490, 3491, 3492, 3493, 3494, 3495, 3496, 3497, 3498, 3499, 3500, 3501, 3502, 3503, 3504, 3505, 3506, 3507, 3508, 3509, 3510, 3511, 3512, 3514, 3515, 3517, 3518, 3519, 3521, 3522, 3523, 3525, 3527, 3528, 3529, 3530, 3531, 3532, 3533, 3534, 3535, 3536, 3537, 3538, 3540, 3541, 3542, 3543, 3544, 3545, 3546,

3547, 3548, 3549, 3550, 3551, 3552, 3553, 3554, 3555, 3556, 3557, 3558, 3559, 3560, 3561, 3563, 3564, 3565, 3566, 3567, 3568, 3569, 3570, 3571, 3572, 3573, 3574, 3575, 3576, 3577, 3578, 3579, 3580, 3581, 3582, 3583, 3584, 3585, 3586, 3587, 3588, 3589, 3590, 3591, 3592, 3593, 3594, 3595, 3596, 3597, 3598, 3599, 3600, 3601, 3602, 3603, 3604, 3605, 3606, 3607, 3608, 3609, 3610, 3611, 3612, 3613, 3614, 3615, 3616, 3617, 3618, 3619, 3620, 3621, 3622, 3623, 3625, 3626, 3627, 3628, 3629, 3630, 3631, 3632, 3633, 3634, 3635, 3636, 3638, 3639, 3640, 3641, 3642, 3643, 3644, 3645, 3646, 3648, 3649, 3650, 3651, 3652, 3653, 3654, 3655, 3656, 3657, 3658, 3659, 3660, 3661, 3662, 3663, 3664, 3665, 3666, 3667, 3668, 3669, 3670, 3671, 3672, 3673, 3674, 3675, 3677, 3678, 3679, 3680, 3681, 3683, 3684, 3685, 3686, 3687, 3688, 3689, 3690, 3691, 3692, 3693, 3694, 3695, 3696, 3698, 3699, 3700, 3701, 3702, 3703, 3704, 3705, 3706, 3707, 3708, 3709, 3710, 3711, 3713, 3714, 3715, 3716, 3717, 3718, 3720, 3722, 3723, 3724, 3725, 3726, 3727, 3728, 3729, 3730, 3731, 3732, 3734, 3735, 3736, 3737, 3738, 3739, 3741, 3742, 3743, 3744, 3745, 3746, 3747, 3749, 3753, 3754, 3756, 3757, 3758, 3759, 3760, 3761, 3762, 3763, 3766, 3767, 3768, 3769, 3770, 3771, 3772, 3773, 3774, 3775, 3776, 3777, 3778, 3780, 3781, 3782, 3783, 3784, 3785, 3786, 3787, 3788, 3789, 3791, 3792, 3793, 3794, 3795, 3796, 3797, 3798, 3799, 3800, 3801, 3802, 3803, 3804, 3805, 3806, 3807, 3808, 3809, 3810, 3811, 3812, 3813, 3814, 3815, 3816, 3817, 3818, 3819, 3821, 3822, 3823, 3824, 3825, 3827, 3828, 3829, 3830, 3832, 3833, 3834, 3835, 3836, 3837, 3840, 3841, 3842, 3843, 3844, 3845, 3846, 3847, 3848, 3850, 3851, 3852, 3854, 3855, 3856, 3857, 3858, 3859, 3860, 3861, 3862, 3863, 3865, 3866, 3867, 3868, 3869, 3870, 3871, 3872, 3873, 3874, 3875, 3876, 3877, 3878, 3879, 3880, 3881, 3882, 3883, 3884, 3885, 3886, 3887, 3888, 3889, 3890, 3891, 3892, 3894, 3895, 3896, 3897, 3898, 3899, 3900, 3901, 3902, 3903, 3904, 3905, 3906, 3907, 3908, 3909, 3911, 3912, 3913, 3914, 3915, 3916, 3917, 3919, 3920, 3921, 3922, 3923, 3924, 3925, 3926, 3927, 3928, 3929, 3930, 3931, 3932, 3933, 3934, 3935, 3936, 3937, 3939, 3940, 3941, 3942, 3943, 3944, 3945, 3946, 3947, 3948, 3949, 3950, 3951, 3952, 3953, 3954, 3955, 3956, 3957, 3958, 3959, 3960, 3961, 3962, 3963, 3964, 3965, 3966, 3967, 3968, 3969, 3970, 3971, 3972, 3973, 3974, 3975, 3976, 3977, 3978, 3979, 3980, 3981, 3983, 3984, 3985, 3986, 3987, 3988, 3989, 3990, 3991, 3992, 3993, 3995, 3996, 3997, 3998, 4000, 4001, 4002, 4003, 4004, 4005, 4006, 4007, 4008, 4009, 4010, 4012, 4013, 4015, 4016, 4019, 4020, 4021, 4023, 4024, 4025, 4026, 4027, 4028, 4029, 4030, 4031, 4032, 4033, 4034, 4035, 4036, 4037, 4038, 4039, 4040, 4041, 4042, 4043, 4044, 4045, 4046, 4047, 4048, 4049, 4050, 4051, 4052, 4054, 4055, 4056, 4057, 4058, 4059, 4060, 4061, 4063, 4064, 4065, 4066, 4067, 4068, 4069, 4070, 4071, 4072, 4073, 4075, 4076, 4077, 4078, 4079, 4080, 4081, 4083, 4084, 4085, 4086, 4087, 4088, 4089, 4090, 4091, 4092, 4094, 4095, 4096, 4097, 4098, 4101, 4102, 4103, 4104, 4105, 4106, 4107, 4108, 4109, 4110, 4111, 4112, 4113, 4114, 4115, 4116, 4117, 4118, 4120, 4121, 4122, 4123, 4124, 4125, 4126, 4127, 4128, 4129, 4130, 4131, 4132, 4133, 4134, 4135, 4136, 4137, 4138, 4139, 4140, 4141, 4142, 4143, 4144, 4145, 4146, 4147, 4148, 4149, 4150, 4151, 4152, 4153, 4154, 4155, 4156

Qualitative Approved PCTs (2022)

611, 774, 2068, 2079, 2101, 2247, 2250

Appendix C: Vegetation class and formation PCT tally comparison between 2018 and 2022

Vegetation formation	Vegetation class	No. of Approved PCTs (2018) in coast and tablelands bioregions	No. of Approved PCTs (2022) in coast and tablelands bioregions	% change
Alpine Complex	Alpine Bogs and Fens	1	3	200
	Alpine Fjaeldmarks	1	2	100
	Alpine Heaths	1	4	300
	Alpine Herbfields	2	7	250
	Alpine Complex; Total	5	16	220
Dry Sclerophyll Forests (Shrub/grass sub-formation)	Central Gorge Dry Sclerophyll Forests	9	28	211.1
	Clarence Dry Sclerophyll Forests	13	11	-15.4
	Cumberland Dry Sclerophyll Forests	3	1	-66.7
	Hunter-Macleay Dry Sclerophyll Forests	18	16	-11.1
	New England Dry Sclerophyll Forests	28	10	-64.3
	Northern Gorge Dry Sclerophyll Forests	16	18	12.5
	North-west Slopes Dry Sclerophyll Woodlands	27	22	-18.5
	Pilliga Outwash Dry Sclerophyll Forests	1	0	-100
	Southern Hinterland Dry Sclerophyll Forests	6	5	-16.7
	Upper Riverina Dry Sclerophyll Forests	22	12	-45.5
	Dry Sclerophyll Forests (Shrub/grass sub-formation); Total	143	123	-14
Dry Sclerophyll Forests (Shrubby sub-formation)	Coastal Dune Dry Sclerophyll Forests	11	13	18.2
	North Coast Dry Sclerophyll Forests	13	22	69.2
	Northern Escarpment Dry Sclerophyll Forests	10	11	10
	Northern Tableland Dry Sclerophyll Forests	34	33	-2.9
	South Coast Sands Dry Sclerophyll Forests	6	4	-33.3

Vegetation formation	Vegetation class	No. of Approved PCTs (2018) in coast and tablelands bioregions	No. of Approved PCTs (2022) in coast and tablelands bioregions	% change
	South East Dry Sclerophyll Forests	25	28	12
	Southern Tableland Dry Sclerophyll Forests	24	18	-25
	Southern Wattle Dry Sclerophyll Forests	2	4	100
	Sydney Coastal Dry Sclerophyll Forests	29	21	-27.6
	Sydney Hinterland Dry Sclerophyll Forests	23	28	21.7
	Sydney Montane Dry Sclerophyll Forests	7	11	57.1
	Sydney Sand Flats Dry Sclerophyll Forests	10	11	10
	Western Slopes Dry Sclerophyll Forests	68	31	-54.4
	Yetman Dry Sclerophyll Forests	1	0	-100
	Dry Sclerophyll Forests (Shrubby sub-formation); Total	263	235	-10.6
Forested Wetlands	Coastal Floodplain Wetlands	19	40	110.5
	Coastal Swamp Forests	24	29	20.8
	Eastern Riverine Forests	17	26	52.9
	Inland Riverine Forests	1	2	100
	Forested Wetlands; Total	61	97	59
Freshwater Wetlands	Coastal Freshwater Lagoons	14	24	71.4
	Coastal Heath Swamps	14	30	114.3
	Inland Floodplain Swamps	3	0	-100
	Montane Bogs and Fens	15	31	106.7
	Montane Lakes	5	4	-20
	Freshwater Wetlands; Total	51	89	74.5
Grasslands	Maritime Grasslands	6	7	16.7
	Temperate Montane Grasslands	20	6	-70
	Western Slopes Grasslands	7	0	-100
	(blank)	2	0	-100
	Grasslands; Total	35	13	-62.9

Vegetation formation	Vegetation class	No. of Approved PCTs (2018) in coast and tablelands bioregions	No. of Approved PCTs (2022) in coast and tablelands bioregions	% change
Grassy Woodlands	Coastal Valley Grassy Woodlands	23	25	8.7
	Floodplain Transition Woodlands	1	0	-100
	New England Grassy Woodlands	25	12	-52
	Southern Tableland Grassy Woodlands	13	12	-7.7
	Subalpine Woodlands	10	7	-30
	Tableland Clay Grassy Woodlands	19	9	-52.6
	Western Slopes Grassy Woodlands	45	16	-64.4
	Grassy Woodlands; Total	136	81	-40.4
Heathlands	Coastal Headland Heaths	10	10	0
	Northern Montane Heaths	14	38	171.4
	South Coast Heaths	2	3	50
	Southern Montane Heaths	8	12	50
	Sydney Coastal Heaths	10	9	-10
	Sydney Montane Heaths	8	10	25
	Wallum Sand Heaths	7	8	14.3
	Heathlands; Total	59	90	52.5
Rainforests	Cool Temperate Rainforests	6	9	50
	Dry Rainforests	15	55	266.7
	Littoral Rainforests	7	15	114.3
	Northern Warm Temperate Rainforests	16	22	37.5
	Southern Warm Temperate Rainforests	5	3	-40
	Subtropical Rainforests	11	23	109.1
	Western Vine Thickets	2	2	0
	Rainforests; Total	62	129	108.1
Saline Wetlands	Mangrove Swamps	7	3	-57.1
	Saltmarshes	3	10	233.3
	Seagrass Meadows	1	0	-100
	Saline Wetlands; Total	11	13	18.2

Vegetation formation	Vegetation class	No. of Approved PCTs (2018) in coast and tablelands bioregions	No. of Approved PCTs (2022) in coast and tablelands bioregions	% change
Semi-arid Woodlands (Grassy sub-formation)	Riverine Plain Woodlands	1	1	0
	Semi-arid Woodlands (Grassy sub-formation); Total	1	1	0
Semi-arid Woodlands (Shrubby sub-formation)	Inland Rocky Hill Woodlands	4	0	-100
	Semi-arid Woodlands (Shrubby sub-formation); Total	4	1	-75
Wet Sclerophyll Forests (Grassy sub-formation)	Montane Wet Sclerophyll Forests	2	5	150
	Northern Hinterland Wet Sclerophyll Forests	26	47	80.8
	Northern Tableland Wet Sclerophyll Forests	15	14	-6.7
	Southern Lowland Wet Sclerophyll forests	7	10	42.9
	Southern Tableland Wet Sclerophyll Forests	12	15	25
	Wet Sclerophyll Forests (Grassy sub-formation); Total	62	91	46.8
Wet Sclerophyll Forests (Shrubby sub-formation)	North Coast Wet Sclerophyll Forests	47	46	-2.1
	Northern Escarpment Wet Sclerophyll Forests	27	11	-59.3
	South Coast Wet Sclerophyll Forests	8	18	125
	Southern Escarpment Wet Sclerophyll Forests	16	21	31.3
	Wet Sclerophyll Forests (Shrubby sub-formation); Total	98	96	-2
Total Approved PCTs		991	1,074	8.4

Appendix D: Definition of classification confidence level for quantitative PCTs

Methods applied to ‘classification confidence level’ categories

The ‘classification confidence level’ definitions for quantitative Approved PCTs (2022) adopt a set of metrics developed to evaluate the performance of clustering results during the eastern NSW classification analysis (DPE 2022b). These metrics measure the performance of the cluster in terms of errors of omission and commission from all other PCTs. For users it gives a useful guide to the robustness of the PCT and the level of certainty that applies to diagnosis using floristic data alone.

Classification confidence levels use several different metrics and thresholds based on the number of plots used to define an individual PCT:

- For PCTs with a plot membership of 15 or more standard floristic survey plots, algorithms are used to measure the strength of the derived cluster of samples that describe the floristic composition. Accuracy scores describe the degree of floristic variation in the floristic composition among plots defining the PCT. The higher the accuracy score the less internal variation there is among the floristic composition. Reliability scores measure the degree to which plots defining the PCT may plausibly be more strongly associated with an alternative PCT. The higher the reliability score, the more likely plots defining the PCT have itself as the strongest match. We apply greater weight to the reliability score in our definition of classification confidence as it gives some insight into the reliability users will experience in assigning new plots to the PCT.
- For PCTs that are defined by 5–14 standard floristic survey plots an alternative algorithm is applied that measures the degree of floristic relationship with all other PCTs in eastern NSW. Higher measures of floristic overlap suggest that the floristic composition is shared with another PCT(s) and may be more difficult to distinguish using floristic data alone.
- PCTs with fewer than 5 member plots are termed ‘placeholders’ unless they describe unique and spatially restricted landscape features for which a small number of samples is adequate to describe the floristic attributes, and in combination with physiographic elements are unlikely to be confused with any other PCT in eastern NSW.

Very High

PCT plot membership comprises 15 or more standard samples. PCTs have reliability scores above the 95th percentile for all PCTs and accuracy scores above the 90th percentile. A Very High classification confidence level implies that the PCT retains internally consistent floristic composition and is unlikely to be confused with other PCTs when assigning new plot samples to the eastern NSW PCT classification v1.1 typology using the online Plot to PCT Assignment Tool (DPE 2022c).

High

This level includes confidence level metrics from both sampling effort classes (>15 standard samples; 5–14 standard samples).

For PCTs with 15 or more member plots, High classification confidence applies to PCTs with reliability and accuracy scores that fall between the 90th and 95th percentile of all PCTs.

For PCTs that have a plot membership of between 5 and 14 standard samples, High classification confidence applies to those with low floristic overlap with any other PCT in eastern NSW.

Taken collectively the High classification confidence level implies that the PCT is unlikely to be confused with other PCTs in eastern NSW when using standard survey methods and identification tools. However, sampling effort may be lower, or the internal variation of the type may be higher than those PCTs in the Very High category.

Moderate

This level includes confidence level metrics from both sampling effort classes (>15 member plots; 5–14 member plots).

For PCTs that have 15 or more member plots, Moderate classification confidence is defined as PCTs with reliability scores between the 90th and 95th percentile of all PCTs but with a lower accuracy score that falls below the 90th percentile. Alternatively the reliability score is low (<90th percentile) but the accuracy score is very high (>95th percentile).

For PCTs with a plot membership between 5 and 14 standard samples, Moderate classification confidence is defined as PCTs with moderate to high floristic overlap with any other PCT in eastern NSW.

Taken collectively the Moderate classification confidence level implies that the PCT supports a less internally consistent plant assemblage and performed less strongly in separating from other related PCTs. Users may have difficulty discriminating a target PCT from related PCTs on the basis of floristic information alone because of the gentle gradation between types, or because factors such as disturbance are inherent in samples that are used to define it. May also be more common in types that are subject to seasonal variation in floristic composition, which results in higher levels of variation in floristic composition among samples.

A small proportion of PCTs with very low plot membership are included in this category because they define a distinctive plant assemblage associated with a highly restricted environmental attribute, such as localised outcropping. The sampling effort is considered to adequately define the likely floristic variation across the PCT's range, and additional effort is unlikely to improve the diagnostic performance.

Low

This level includes confidence level metrics from both sampling effort classes (>15 standard samples; 5–14 standard samples).

For PCTs with 15 or more member plots, Low classification confidence is defined as PCTs with reliability scores below the 90th percentile of all PCTs and accuracy scores below the 95th percentile.

For PCTs with a plot membership between 5 and 14 standard samples, Low classification confidence is defined as PCTs with either high floristic overlap with any other PCT in eastern NSW, or low measures of internal reliability.

Taken collectively the Low classification confidence level implies that the PCT may have low levels of reliability when compared to other types. Users may have difficulty discriminating a target PCT from related PCTs on the basis of floristic information alone because of the gentle gradation between types, or because factors such as disturbance are inherent in samples that are used to define it. May also be more common in types that are subject to seasonal variation in floristic composition, which results in higher levels of variation in floristic composition among samples.

Very Low

PCTs with fewer than 5 member plots. Known colloquially as ‘placeholders’ they describe plant assemblages which suggest different compositional attributes to all other PCTs using the ecological dissimilarity metric thresholds, but evidence is limited to only a few standard floristic survey plots. The floristic composition is supported by the locations of the plots that suggest that they occupy poorly surveyed areas, or a discrete environmental condition such as a geological or topographic feature. The available floristic data is unlikely to fully characterise the assemblage of plants likely to occur or the relationships to other related PCTs. The data is also unlikely to describe the spatial distribution with any confidence. They are targets for additional survey using standard floristic survey techniques.

Appendix E: Guiding principles applied to the process of identifying relationships between PCTs of eastern NSW and TECs

A Preamble

1. A Final Determination (FD) made by the NSW Threatened Species Scientific Committee constitutes the legal definition of a threatened ecological community (TEC), and is not superseded by any advice, publication or opinion (other than a revised Determination or a judgement of the courts). Applied interpretations of a TEC do not influence its definition unless confirmed through legal processes.
2. A TEC is an assemblage of species in an area. A site cannot be diagnosed as representing an example of a TEC unless it occurs within the geographic boundaries stated in the Final Determination, and some component of the species assemblage listed in the Determination is found to be present.
3. The principles outlined in this document are relevant to the interpretation of Final Determinations for the purposes of the Department of Planning and Environment (DPE) operational needs to relate Approved plant community types (PCTs) included in the PCT master list. Other interpretations may exist elsewhere that may result in independent and alternative outcomes. Additional information in the form of published TEC interpretations and mapping may be considered but does not supersede the FD or constrain the interpretations of DPE.

B The assemblage of species

1. *Be guided by the characteristic species list presented in the Final Determination, and assess any additional statements regarding characteristics of floristic composition.*

The FD species list represents the characterisation of the TEC assemblage. For those FDs in the current 4-part format, species included in 'Part 1. Assemblage of Species' will form the basis of PCT–TEC comparative assessments.

Taxonomic names used in determinations are current to the date of determination, based on cited references and the opinion of the Scientific Committee. For comparative assessments, the FD species list requires interpretation to an agreed taxonomic treatment such that:

- a. any species name that has undergone recent taxonomic revision will be treated following current PlantNET/APNI information
 - b. any genus-only name included in an FD assemblage list will be considered to match any species epithets within that genus
 - c. any species name not recognised by PlantNET/APNI will be treated as erroneous or incomplete and excluded from comparisons
 - d. any species included in an FD assemblage list that is recognised by PlantNET/APNI as exotic (non-native) will be treated as erroneous and excluded from comparisons.
2. *Assess Final Determination references to units of any cited vegetation classification sources, and consider whether the cited units are “included within” or are “part of” or are a “component of” the TEC. Cited classification sources can also be used to provide important information on assemblages or units that are not included in the TEC.*

An FD species list may be augmented by assemblage lists drawn from cited references to strengthen the characterisation of the assemblage across its stated range. Where cited types have traceable sample data and are said to be 'included' or 'equivalent to',

the species assemblages of the member sites of these cited types are treated as strong indications of the TEC species assemblage. Where no such traceable data is available, other accompanying species assemblage material relevant to the published type description may be used as a basis for comparison.

Vegetation classification units developed using traceable quantitative data will be recognised as potential sources of primary data from which to assess floristic, habitat and distributional characteristics.

Where an FD identifies a categorical relationship between a TEC and a referenced vegetation unit (included/not included), the member plots of the relevant included unit/s will be considered to comprise occurrences of the TEC.

Equally, the member-sets of other types described by the same classification source but not included in the FD will be identified as vegetation that does not conform to the TEC. More rarely, FDs make explicit reference to specific units within classification sources that are not included within the TEC circumscription.

Relationships to cited types that indicate the assemblage is ambiguously related, or forms 'part of', have indicative value only and are not considered to be prescriptive or diagnostic.

Where a cited classification source has no traceable standard plots but is represented by mapped areas in an interpretable GIS layer, the indicative distribution of the cited map unit/s will be interrogated against classified plots to identify PCTs that may relate to the TEC. Note that mapping varies in quality, and in some cases PCTs with plots intersecting a map unit may be poorly related to the TEC floristic assemblage and/or habitat.

3. *Metrics that describe the strength of compositional similarity between the TEC assemblage and those from alternative classification typologies are used as the basis for comparison and ranking.*

C Vegetation descriptors

1. *Assess vegetation structure descriptors that may constrain the extent of the assemblage or allow a range of structural forms.*

Descriptions of structure, physiognomy and dominant species specified in the FD are understood to be broadly characteristic of the set of known occurrences of a TEC. Departures from the average or typical state do not preclude the diagnosis of a TEC unless specifically stated in the FD.

2. *A TEC assemblage is not limited by the species dominance of the upper stratum, although information in the FD about dominance may be informative of occurrence.*

Species dominance is interpreted to provide a summary descriptor of the assemblage across its range (rather than at a given site). FDs do not define an assessable area over which species dominance is to be defined. Statements regarding individual species must be interpreted within the context of other species included within the assemblage.

Information on species dominance, where this is explicit and unambiguous, may provide a useful secondary qualifying condition that distinguishes floristic characteristics among related species assemblages. Measures of frequency of occurrence and foliage cover within an assemblage are used to define dominant species.

3. *A TEC assemblage is not limited by any stated relationships to higher order vegetation classifications referred to in the FD.*

Some FDs include reference to higher order vegetation classification typologies to position the assemblage against regional, state or national vegetation patterns. These are interpreted to be indicative only and do not preclude consideration of the assemblage outside the identified hierarchical structure.

D The area

1. *The extent of a TEC applies only to the geographic area defined within the FD.*

Most determinations use biophysical areas known as bioregion(s) to identify the area within which the assemblage occurs. Reference to bioregion(s) may occur in the TEC name or accompanying statements in the determination or both. Additional location descriptors and administration boundaries can be used to increase the certainty in diagnosis of the assemblage. The precise wording of statements in the determination must be considered, including whether the TEC “occurs within” or is “recorded from” or “known from” or has qualifiers that indicate it “may be known from elsewhere in the bioregion”. This may include whether any local government areas are specifically referred to by name.

Where a conflict occurs between stated bioregion(s) and location descriptors then bioregions will assume the primary definition of the area over which the TEC assemblage will occur. However, the interpretation must also consider the resolved extent of the TEC under Principle E1.

A small number of determinations do not refer to bioregions and typically these are highly restricted or location specific TECs. The area in these cases is defined from any statements within the determination that limit its extent, with greatest weight given to those statements that are explicit and prescriptive.

2. *Assess habitat descriptors and whether these constrain or define the limits of the TEC, which otherwise may have a broader distribution.*

Statements in an FD concerning edaphic conditions and climatic and physiographic ranges occupied will be understood to collectively describe some of the known essential features of the habitat that sustain the TEC. However, unless specifically stated in an FD, a TEC may occur outside the ranges stated where it is plausible that other compensatory factors apply.

3. *Assess FD references to units of any cited vegetation classification sources, and consider whether the cited units are “included within” or are “part of” or are a “component of” the TEC.*

Qualifying conditions used to define habitat may be augmented by descriptions and data drawn from cited units to strengthen the characterisation of the TEC’s distribution across its stated range. Where cited types have traceable sample data and are said to be ‘included’ or ‘equivalent to’, the locations and edaphic, climatic and physiographic attributes of the member sites of these cited types are treated as strong indications of TEC habitat and area. Where no such traceable sample data is available, other accompanying descriptive material relevant to the cited type description may be used as a basis for comparison.

Relationships to cited types that indicate the assemblage is ambiguously related, or forms ‘part of’, have indicative value only and are not considered to be prescriptive or diagnostic.

Cited vegetation classification sources may be accompanied by maps or other spatial data that can be useful in evaluating the location and habitat attributes of TECs. They cannot be interpreted to represent categorical relationships between assigned references and the TEC owing to the limitations of map scale, method, coverage of TEC extent, currency and inherent diffuse boundaries between related vegetation assemblages.

E Threat assessment

Threat assessment statements relay important information about the extent, distribution and spatial pattern of the TEC assemblage available to the Scientific Committee at the time of listing. Each determination includes information accessed by the Committee against which the rationale for listing of the assemblage and its assigned conservation status is made (Vulnerable, Endangered or Critical). The recently enacted NSW *Biodiversity Conservation Act 2016* adopts a prescribed set of criteria that follow International Union for Conservation of Nature (IUCN) protocols. Listings made under this legislation make explicit reference to them. Older determinations under the former NSW *Threatened Species Conservation Act 1995* include related information but are presented using less structured documentation of the threat assessment process.

1. *Ensure that interpretations of distribution and area of extent are consistent with the threat assessment, including TEC extant area and documented threatening processes.*

Comparative assessments of species assemblage data must result in interpretations or spatial extrapolations that are consistent with the threat assessment underpinning listing status. This includes area of occupancy, stated extant area, distributional limits by place names or descriptions of extent and habitat. This principle overrides general statements in FDs such as 'may occur elsewhere in a bioregion' or 'covers all transitional vegetation.' This includes principles described under Sections B, C and D of this document.

Where interpretations or extrapolations would significantly exceed the threat assessment data underpinning the rationale for listing, consideration may need to be given to constraining the interpretation based on available statements in the determination following Section D of this document. This includes, but is not limited to, statements relating to habitat or geographic area.

F Determination formats

1. *Interpretations of TECs are applied using consistent principles irrespective of the FD format.*

Recent FDs have partitioned the defining attributes of a TEC into Parts 1 and 2, being the assemblage of species and the area (bioregion/s). Additional information is provided in Part 4, being information that is intended to aid recognition of a TEC in the field, but is not definitional and the community may sometimes occur outside the typical range of variation in the features described.

For older FDs the role of additional attributes is sometimes ambiguous. In some cases, courts have assessed other defining attributes stated in FDs as essential to the TEC's definition; for example, if it is not on a floodplain it cannot be the TEC. Older determinations should be interpreted following the principles described above.

G Concluding interpretation statements

1. *Conclusions about relationships between PCTs and TECs are documented using the legal definition of a TEC and supported by secondary or practical qualifying conditions presented in the FD.*

Principle A2 sets out the rationale for the TEC and PCT alignment. Interpretations should describe the primary legal definition using Principles B, D and/or E in forming a judgement about the inclusion or exclusion of candidate PCTs. Where required, supporting evidence from Principles C or D may be cited to reduce uncertainty in interpretative statements that rely solely on Principles B, D or E.

Additional qualifying conditions may apply to individual PCTs where only part of the area or floristic composition satisfies the FD. These qualifiers should be clearly defined against Principles B and D.

Appendix F: Methods for identifying relationships between Approved quantitative ENSW v1.1 PCTs and TECs

Species comparison metrics

We developed purpose-built algorithms in R to run quantitative comparisons between the characteristic species list for each TEC and floristic data for each of the 1,067 quantitative Approved PCTs (2022). This process began by standardising taxonomy of TEC species lists to the eastern NSW classification analysis treatment developed by DPE (2022b).

For each TEC, we calculated 2 floristic comparison metrics against all 1,067 quantitative Approved PCTs (2022): (i) the median proportion of TEC characteristic species in plots assigned to each PCT and (ii) similarity between TEC characteristic species and PCT diagnostic species. We ranked PCTs on each of these metrics and identified the top 50 PCTs with the strongest floristic relationships to each TEC.

Only plots with a Primary 'PCT assignment category' were used in the analysis. For TEC characteristic species that are listed only at the genus level, 2 options were generated: (1) excluding genus-only records and (2) including all species within the genus that are recorded in the floristic matrix for Primary 'PCT assignment category' plots.

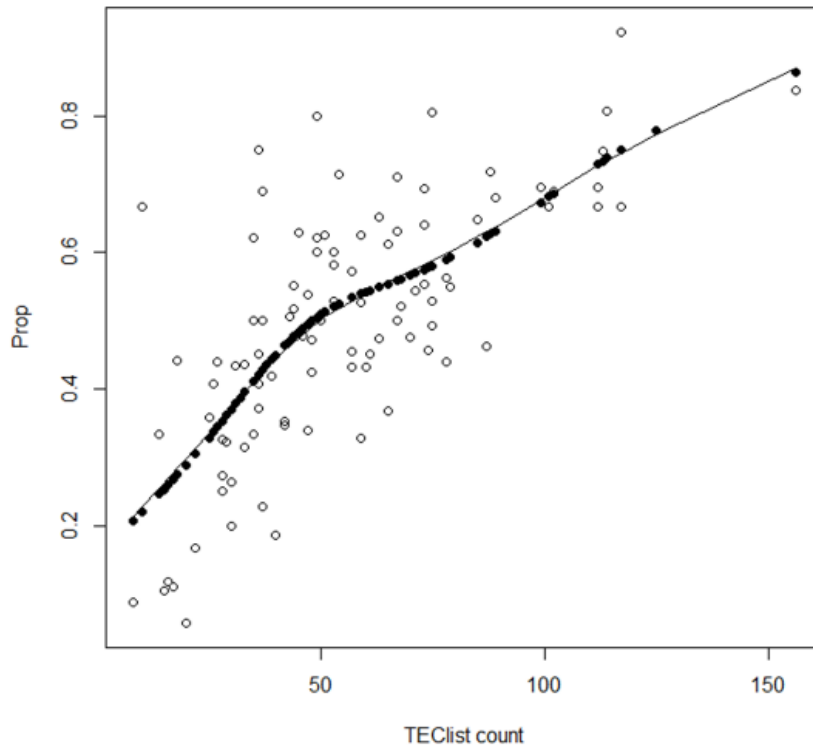
The 2 metrics were calculated as follows.

Median proportion: for each plot, the proportion of characteristic species from each TEC is calculated, using the number of species in the plot as denominator, e.g. 0.6 for a plot x TEC combination means that 60% of the species in the plot are listed in the TEC determination. The median value is then determined across all Primary member plots assigned to each PCT.

Diagnostic similarity: for each PCT, all species recorded from Primary member plots are first sorted in order of decreasing diagnostic value for the group; that is, sorted on decreasing difference in [frequency in group] – [frequency in all other groups], then decreasing frequency in PCT. Then for each TEC, if 'n' is the number of species in the TEC list, this metric is the Bray–Curtis similarity value between the TEC characteristic species list and the n most diagnostic species of each PCT. This metric attempts to compare like-sized lists of diagnostic species and compensate for the widely different list sizes among TECs. This metric was only applied for groups with 5 or more Primary member plots.

Median proportion values are potentially influenced by variations in TEC characteristic species list size and in PCT species richness. To investigate the effect of these on observed proportions, we examined all PCTs with ≥ 15 member plots and plotted the maximum of the median proportions against the TEC list size and the median species richness for each PCT. No relationship was evident for median species richness, but there is an increase in maximum proportion for increasing TEC characteristic species list size. This relationship is plotted below for the option excluding genus-only records from TEC lists.

Due to the interaction with TEC characteristic species list size, the relationship between maximum proportion and TEC list size was modelled using a generalised additive model (gam in R). For each PCT x TEC combination, the ranked observed proportion was accompanied by the calculated deviation of observed from predicted value.



PCT–TEC evaluation templates

A standard PCT–TEC evaluation template was prepared to document the combined results of the interpretation of the Final Determination (FD) (Appendix E) and the highest-ranked PCTs on floristic overlap metrics.

Each candidate PCT was evaluated against each of the identified diagnostic or qualifying conditions. A PCT that satisfied both the assemblage of species and area criteria was accepted as related to the TEC. A PCT that met only part of the diagnostic criteria was accepted but was annotated with qualifying conditions to indicate which part of the PCT met the FD and could be said to be associated. An example is a PCT that spans multiple bioregions for which only one is included within the FD.

The template records PCTs that are accepted as part of the TEC or rejected.