

NSW Vegetation Class

Resolving differences between versions - issue analysis and resolution

Introduction

The master NSW vegetation classification is maintained and delivered to business systems via the NSW BioNet Vegetation Classification application. As at 27.07.2020, the upper two levels in this master vegetation classification hierarchy are represented by NSW Vegetation Formations and NSW Vegetation Classes based on the original work of Keith (2004), hence referred to in this document as the “master list”.

A new map of NSW vegetation Classes and Formations was made publicly available on the SEED Data Portal in c2012: [“Vegetation Formations and Classes of NSW \(version 3.03 - 200m Raster\) - David A. Keith and Christopher C. Simpson. VIS ID 3848”](#). In developing this map, additional vegetation Classes were introduced by Keith and Simpson, creating a misalignment between this Class map and master list maintained within BioNet.

This classification misalignment is causing confusion amongst users, especially the Rural Fire Service, which uses these data in fire modelling and planning tools.

This paper summarises an analysis of this data discrepancy issue and provides a simple relate table between the version 3.03 map and current master list

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Who’s been consulted?

Christopher Simpson (co-author of the Vegetation Class and Formation data, reports and maps, including the v3.03 map).

Version 3.03 map vs master list - analysis and interpretation

A detailed comparison was made between the list of vegetation Classes included in the version 3.03 map downloaded from SEED and the list of vegetation classes exported from the <Keith Class (2004)> look-up table in BioNet Vegetation Classification (the master list). A small number of changes are evident in the version 3.03 map classification:

- 1) New vegetation class created by split from existing class; remainder of class redefined
- 2) New vegetation class created by split from existing class; remainder of class renamed and redefined
- 3) Existing vegetation class renamed for clarity (no definition change)

Table 1 documents all vegetation class changes present in the version 3.03 map and how these relate to existing classes in the master list. These have been checked and verified by Chris Simpson.

Recommendation: apply the information in Table 1 to prepare a vegetation class map consistent with the master list classification from the version 3.03 map.

Table 1: Vegetation Class differences present in the [version 3.03 map](#), with cross-referencing back to the master list based on (Keith 2004). Advice is also provided on how to create a map layer representing the master list from the version 3.03 map.

*The Vegetation Class Code is consistent throughout all versions of the vegetation formation and class classifications. See References section for version information.

*Vegetation Class Code	Vegetation Class	Vegetation Formation	Present in master list?	Present in v3.03 map?	Information re change from master list	Advice on resolution to create master list map (Keith 2004 list)
120	Temperate Swamp Forests	Forested wetlands	No	Yes	Segregated from Southern Tableland Wet Sclerophyll Forests (Class Number 11) in master list. See Appendix 1 for descriptive notes.	Combine as Class Number 11 (Southern Tableland Wet Sclerophyll Forests)
11	Southern Tableland Wet Sclerophyll Forests	Wet sclerophyll forests (Grassy subformation)	Yes	Yes	Retain existing class description.	
124	Southern Riverina Grasslands	Grasslands	No	Yes	Segregated from Riverine Plain Grasslands (Class Number 91) in master list, based on McDougall's work. A portion of this portion of the Riverina grasslands are recognised as native (not derived). See Appendix 1 for descriptive notes.	Combine as Class Number 91 (Riverine Plain Grasslands)
91	Riverine Plain Grasslands	Grasslands	Yes	Yes	Retain existing class description.	
70	Coastal Headland and Foredune Scrubs	Heathlands	Yes (different name)	Yes	Name change only, to make it clear that this group occurs on foredunes as well as headlands. Previous name was 'Coastal Headland Heaths'. Retain existing class description.	Rename as Class Number 70 (Coastal Headland Heaths)

Vegetation Class Code	Vegetation Class	Vegetation Formation	Present in master list?	Present in v3.03 map?	Information	Advice on resolution to create master list map (Keith 2004 list)
56	Coastal Freshwater Lagoons and Floodplain Meadows	Freshwater wetlands	Yes (different name)	Yes	Name change only, to make it clear that the unit included periodically inundated grasslands/sedgeland as well as open-water lagoons. Previous name was 'Coastal Freshwater Lagoons'. Retain existing class description.	Rename as Class Number 56 (Coastal Freshwater Lagoons)
126	Floodplain-Estuarine Transition Forests	Forested wetlands	No	Yes	Segregated from Coastal Floodplain Wetlands (Class Number 50) in master list. See Appendix 1 for descriptive notes.	Combine as Class Number 50 (Coastal Floodplain Wetlands)
50	Coastal Floodplain Forests	Forested wetlands	Yes (different name)	Yes	Remainder of Coastal Floodplain Wetlands (Class Number 50) renamed after segregation of Floodplain-Estuarine Transition Forests. See Appendix 1 for descriptive notes.	
125	Wadi Woodlands	Semi-arid woodlands (Grassy subformation)	No	Yes	Segregated from Inland Floodplain Woodlands (Class Number 53) in master list. See Appendix 1 for descriptive notes.	Combine as Class Number 53 (Inland Floodplain Woodlands)
53	Inland Floodplain Woodlands	Semi-arid woodlands (Grassy subformation)	Yes	Yes	Retain existing class description.	

RFS vegetation class list vs DPIE master list comparison - analysis and resolution

RFS provided a list of vegetation classes and codes that they are using in their GUARDIAN planning system. This was compared with the master list of NSW Vegetation Classes maintained in the BioNet Vegetation Classification database. It was also compared with the classes in Keith (2004), to verify the results obtained.

Two key differences exist between the list of vegetation classes used by RFS and those in the BioNet master list:

- 1) Master list uses Title Case vegetation class names (as is used in Keith (2004) table of contents)
 - a. RFS uses Sentence case
- 2) Master list uses vegetation class Codes from Keith and Simpson data sources
 - a. RFS uses the 'book order'

Recommendation: that RFS adopt the naming convention and codes as per the master list of NSW Vegetation Classes from BioNet Vegetation Classification. As well as maintaining consistency with the master list and the Keith and Simpson source products at the current point in time, it will facilitate ongoing synchronisation of names and especially codes. Any future vegetation class codes will be sequentially higher (the latest code used in version 3.03 is 126). If the 'book order' continues to be used by RFS, the addition of new vegetation classes is likely to necessitate that they renumber numerous established classes with each new classification update.

References

Vegetation Class versions and references.

Version	Date	Reference	url
1	2002	Keith, D. 2002. A compilation map of native vegetation for New South Wales. Published by the NSW NPWS Sydney as part of the NSW Biodiversity Strategy. NSW National Parks and Wildlife Service, Hurstville. Note: Accompanied by booklet: A compilation map of native vegetation for New South Wales. Version 1.1 / David Keith. Hurstville, N.S.W.: NSW National Parks and Wildlife Service, 2002.	https://trove.nla.gov.au/work/17650667
2.1	2004	Keith D.A. 2004. Ocean shores to desert dunes: the native vegetation of New South Wales and the ACT. NSW Department of Environment and Conservation, Sydney. SEED data portal reference: Vegetation Formations and Classes of NSW (version 2.1) - David A. Keith & Christopher C. Simpson. VIS_ID 3846. VIS_ID 3847.	SEED data portal: https://datasets.seed.nsw.gov.au/dataset/vegetation-formations-and-classes-of-nsw-version-2-david-a-keith-christopher-c-simpson-b0fef
3.03	2012 (updated in 2017)	Keith D.A. and Simpson C. 2010. Vegetation Formations of NSW (version 3.0) A seamless map for modelling fire spread and behaviour. Final Report to the Rural Fire Service. NSW Department of Environment & Climate Change, Hurstville. SEED data portal reference: Vegetation Formations and Classes of NSW (version 3.03 - 200m Raster) - David A. Keith and Christopher C. Simpson. VIS_ID 3848. Updated in 2017 as version 3.1.	SEED data portal: https://datasets.seed.nsw.gov.au/dataset/vegetation-classes-of-nsw-version-3-03-200m-raster-david-a-keith-and-christopher-c-simpc0917

Appendix 1:

Supplementary descriptive notes for Vegetation Classes

To accompany the NSW vegetation map version 3.03

David Keith and Chris Simpson, May 2016

Introduction

Version 3.03 of the compilation of NSW vegetation maps included revisions to a small number of vegetation classes described and mapped in version 2.1 (Keith 2004). These supplementary notes describe the additional classes introduced in version 3.03 and their relationships to the classification (v2.1) published in Keith (2004).

Temperate swamp forests (NSW120)

Temperate swamp forests were grouped with Southern Tableland Wet Sclerophyll Forests in version 2.1 of the vegetation classes of NSW (Keith 2004). They are locally restricted within a distribution that extends from the central to southern tablelands and into East Gippsland, Victoria (Tozer et al. 2010). In far southeast NSW and Victoria, they extend to the coastal lowlands. Plant communities potentially referable to this class on the New England Tableland (e.g. Henderson & Keith 2002) are poorly mapped and require further examination to resolve their affinities.

Temperate swamp forests occur in regions where mean annual rainfall varies from 750 to 1200 mm. They are found on a range of geological substrates including fine-grained sediments, igneous intrusives and acid volcanics in relatively flat open gullies or 'dells', typically in the headwaters of streams. Their soils are deeper than on surrounding slopes and vary from damp to periodically waterlogged.

Vegetation structure varies from forest to woodland with eucalypts 20 to 35 m tall, sometimes shorter in lower rainfall areas. Scattered Acacias sometimes form a sub-canopy, and more usually a stratum of scattered or clumped shrubs, usually in family Myrtaceae. The ground layer is continuous and perennial with forbs scattered amongst large tussock grasses, matrushes and sedges.

Principal threats include small-scale clearing, overgrazing by livestock and rabbits, soil disturbance by feral pigs, eutrophication from fertilised pastures or crops upslope and weed invasion by exotic perennial grasses and herbs.

Temperate Swamp Forests occur within low-lying parts of the landscape in a mosaic of wet and dry sclerophyll forests. The most similar vegetation class is Southern Tableland Wet Sclerophyll Forests, which may occur adjacent to open gullies or dells on a wider range of landform elements including upper slopes and summits. Compared to that class, Temperate Swamp Forests are: more likely to include *Eucalyptus ovata* or *E. macarthurii* in the canopy and *Leptospermum*, *Callistemon* or *Melaleuca* in the shrub layer; are likely to have a denser groundlayer that includes sedges, rushes and hydrophilic herbs (cf. grasses and forbs in Southern Tableland Wet Sclerophyll Forests); and typically occur on less freely draining soils with a greater organic content and grey-black coloration. In the wettest sites, Temperate Swamp Forests may adjoin Montane Bogs and Fens, which are

generally treeless with a dense cover of hydrophilic sedges, forbs, and in some cases, *Sphagnum cristatum*.

Indicative species

Trees: *Eucalyptus ovata* and *Eucalyptus viminalis* are typical canopy trees, with *Acacia melanoxylon* in the sub-canopy. Other trees include *Angophora floribunda*, *Eucalyptus cypellocarpa*, *E. radiata*, while *E. macarthuri* occurs on the central tablelands.

Shrubs: *Leptospermum continentale*, *L. polygalifolium*, occasionally *Melaleuca squarrosa* in the south.

Groundcover: *Acaena novae-zelandiae*, *Asperula scoparia*, *Blechnum nudum*, *Carex appressa*, *Centella asiatica*, *Dichondra* spp., *Euchiton gymnocephalus*, *Geranium potentilloides*, *Glycine clandestina*, *Gonocarpus tetragynus*, *Gratiola peruviana*, *Hydrocotyle peduncularis*, *Lagenifera stipitata*, *Lomandra longifolia*, *Microlaena stipoides*, *Poa meionectes*, *Poa labillardierei* var. *labillardierei*, *Poa sieberiana*, *Pteridium esculentum*, *Ranunculus plebeius*, *Senecio prenanthoides*, *Stellaria pungens*, *Themeda australis*, *Viola hederacea*.

Candidate vegetation on the New England Tableland that may belong in this class includes forests in similar topographic and edaphic niches, is commonly dominated by *Eucalyptus brunnea*, *E. dorrigoensis*, *E. dalrympleana* or *E. amplifolia* subsp. *sessiliflora* with a number of other eucalypts, an open shrub layer and a grassy ground layer including *Lomandra longifolia*, *Poa* spp., *Microlaena stipoides* and various other grasses and forbs (Henderson & Keith 2002). However, the New England dells have a drier character than those on the southern and central tablelands, and their assignment to this class needs further evaluation when more survey data become available.

Floodplain-estuarine transition forests (NSW126)

Floodplain-estuarine transition forests were grouped with Coastal Floodplain Wetlands in version 2.1 of the vegetation classes of NSW (Keith 2004). Coastal Floodplain Wetlands included a mosaic of woody vegetation types related to subtle variation in inundation regime and ground water. In v3.03, the broader class recognised in v2.1 has been split into two new classes: Coastal Floodplain Forests (retained in code NSW50) characteristic of the upper floodplains; and Floodplain-estuarine transition forests (now NSW126) characteristic of lower floodplains and estuarine fringes. The latter are locally restricted to small patches that are scattered along the entire NSW coast, extending into southeast Queensland and East Gippsland, Victoria (Keith & Scott 2005; Tozer et al. 2010; Sherringham et al. 2008).

Floodplain-estuarine transition forests are closely associated with depositional soils of alluvial or in some cases marine origin. The soils are typically grey with organic matter and have varying components of mineral clay and sand. Their soils are deeper than on surrounding slopes and vary from damp to periodically waterlogged. Floodplain-estuarine transition forests extend from the fringes of estuaries, often bordering coastal saltmarsh, inland along the alluvial flats of major rivers and small coastal streams, where subsoils are influenced by sub-saline or brackish ground water. The source of brackish influence may be tidal seepage or infrequent tidal inundation. In some cases, in situ groundwater may be a source of brackish influence, as suggested by occurrences of Floodplain-estuarine transition forests well beyond the tidal zone (e.g. along tributaries of the Hawkesbury-Nepean River, Cumberland Plain, western Sydney).

Vegetation structure varies from forest to scrub with oaks and paperbarks typically 5 to 20 m tall. There may be a few broad-leaved shrubs in the understorey but, other than recruits of the dominant species, shrubs are generally sparse. The ground layer is continuous and perennial with forbs, tussock grasses, rushes and sedges that vary according the level of saline influence.

Coastal floodplain forests were extensively depleted by agricultural clearing, and are now listed as a threatened ecological community: Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and South East Corner Bioregions. Principal threats include small-scale clearing, eutrophication from fertilised pastures or crops upslope, weed invasion by exotic perennial grasses and herbs overgrazing and trampling by livestock, and soil disturbance by feral pigs. Abandoned pastures and floodplain drains are sometimes characterised by regrowth stands of *Casuarina glauca*, which may occur in high densities. The diversity of these regrowth stands is initially less diverse in plant species than primary stands. Further work is needed to determine the rate at which regrowth stands develop the structural and floristic attributes of primary Floodplain-estuarine transition forests.

Indicative species

Trees: *Casuarina glauca* is commonly dominant north from Bermagui. Occurrences of this class further south are dominated by *Melaleuca ericifolia*, which also occurs in pure and mixed stands with *C. glauca* further north. Eucalypts may occur sporadically in the tree layer, particularly around floodplain margins. North from the Shoalhaven River, *Melaleuca styphelioides* may be an important co-dominant, especially on heavier-textured soils.

Climbers: *Parsonsia straminea*, *Stephania japonica* var. *discolor*.

Shrubs: *Myoporum australis*.

Groundcover: *Commelina cyanea*, *Phragmites australis*, *Alternanthera denticulata*, *Carex appressa*, *Centella asiatica*, *Cynodon dactylon*, *Juncus kraussii* subsp. *australiensis*. The latter also occurs on more saline soils with *Samolus repens*, *Sarcocornia quinqueflora*, *Suaeda australis*, *Baumea juncea*, *Cynodon dactylon*.

Coastal Floodplain Forests (NSW50)

Coastal Floodplain Forests include the remaining plant communities that were grouped within Coastal Floodplain Wetlands in version 2.1 of the vegetation classes of NSW (Keith 2004), prior to separation of Floodplain-estuarine transition forests. Coastal Floodplain Wetlands included a mosaic of woody vegetation types related to subtle variation in inundation regime and ground water. In v3.03, the broader class recognised in v2.1 has been split into two new classes: Coastal Floodplain Forests (retained in code NSW50) characteristic of the upper floodplains; and Floodplain-estuarine transition forests (now NSW126) characteristic of lower floodplains and estuarine fringes. The former are restricted to remnant patches of vegetation that are scattered along the entire NSW coast, extending into southeast Queensland and East Gippsland, Victoria (Keith & Scott 2005; Tozer et al. 2010; Sherringham et al. 2008).

Coastal floodplain forests are closely associated with depositional soils of alluvial or in situ origin on mid- and upper-reaches of open coastal floodplains, elevated levee banks, riparian flats and corridors that extend into forested hills and local depressions that collect moisture, nutrients and small amounts of sediment from elevated surrounds. The soils are periodically inundated but not waterlogged for prolonged periods. Typically, they are grey with organic matter and have varying

components of silt and sand, depending on their catchment. Their soils are deeper than on slopes surrounding the depositional landforms. Unlike Floodplain-estuarine transition forests, the soils exhibit little influence from sub-saline or brackish ground water.

Vegetation structure varies from tall open forest to open eucalypt forest, varying from 20 to 50 m tall, but may be shorter in regrowth stands. The understorey may include broad-leaved, mostly mesphyllous shrubs, grasses and ferns or may be open and characterised by a continuous ground layer of perennial forbs, tussock grasses and sedges.

Coastal floodplain forests were extensively depleted by agricultural clearing, and are now listed as two threatened ecological communities: River-Flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions; and Subtropical Coastal Floodplain Forest of the NSW North Coast bioregion. Principal threats include small-scale clearing, eutrophication from urban or industrial areas and fertilised pastures or crops upslope, weed invasion by exotic perennial grasses and herbs overgrazing and trampling by livestock, and soil disturbance by feral pigs.

Indicative species

Trees: *Eucalyptus amplifolia* subsp. *amplifolia*, *E. tereticornis*, *Angophora floribunda*, *A. subvelutina* are widespread. Common species on the north coast include *Eucalyptus resinifera* subsp. *hemilampra*, *E. siderophora*, *Coymbia intermedia* and *Lophostemon suaveolens*. Common species on the south coast include *Eucalyptus viminalis*, *E. elata* and *E. ovata*. Numerous other eucalypt species may be present as local occurrences. *Casuarina cunninghamii*, *C. glauca*, *Acmena smithii*, *Acacia* spp. and, *Melaleuca* spp. may occur in the sub-canopy.

Climbers: *Eustrephus latifolius*, *Geitonoplesium cymosum*, *Glycine* spp., *Stephania japonica* var. *discolor*.

Shrubs: *Breynia oblongifolia*, *Bursaria spinosa*, *Phyllanthus gunnii*.

Groundcover: *Oplismenus* spp., *Imperata cylindrical*, *Dichelachne* spp, *Echinopogon* spp., *Microlaena stipoides*, *Themeda australis*, *Dichondra repens*, *Oxalis perennans*, *Viola hederacea*, *Veronica plebeia*, *Hypolepis muelleri*, *Pteridium esculentum*.

Southern Riverina Grasslands (NSW124)

Southern Riverina Grasslands were grouped with Riverine Plains Grasslands (NSW91) in version 2.1 of the vegetation classes of NSW (Keith 2004). An analysis of available data and interpretation of historical literature by McDougall (2008) enables these natural or 'primary' native grasslands to be distinguished from 'secondary' native grasslands apparently derived from clearing and overgrazing of Riverine Plains Woodlands (NSW90) characterised by *Acacia pendula*. Southern Riverina Grasslands are found in the Jerilderie – Urana area, to the south and east of the main occurrences of Riverine Plains grasslands, although the distributions of the two types overlap. McDougall (2008) shows that the two types of grassland are floristically distinct, with Southern Riverina Grasslands more closely related to grasslands south and west of Echuca in Victoria. Table 1 in McDougall (2008) lists species that distinguish Southern Riverina Grasslands (labelled as Group 2 by McDougall 2008) from derived grasslands, including a number of grassland forbs that are scarce or absent in Riverine Plains Grasslands (corresponding to Group 1 in McDougall 2008). The marginally overlapping distributions of the two grassland classes suggest subtle edaphic and rainfall differences, with

Southern Riverina Grasslands apparently occupying heavier clay soils and areas with slightly higher rainfall than Riverine Plains Grasslands.

Southern Riverina Grasslands occur in regions where mean annual rainfall varies from 350 to 450 mm. They are found on old alluvial plains, now rarely inundated, with heavy-textured grey clay soils.

Vegetation structure is typically a closed to open tussock grassland, with a diversity of interstitial broad-leaf and lilioid forbs. Chenopod shrubs may occur sparsely at some sites.

Principal threats include clearing, overgrazing by livestock and rabbits, eutrophication from fertilised pastures or crops nearby and weed invasion by exotic grasses and herbs.

Indicative species

Grasses and graminoids: *Austrodanthonia* spp., *Austrostipa nodosa*, *Chloris truncata*, *Enteropogon acicularis*, *Juncus subsecundus*.

Forbs: *Arthropodium fimbriatum*, *Asperula conferta*, *Bulbine bulbosa*, *Calocephalus citreus*, *Calotis scabiosifolia*, *Crassula decumbens*, *Chrysocephalum apiculatum*, *Convolvulus* spp., *Daucus glochidiatus*, *Goodenia pusilliflora*, *Leiocarpa panaetioides*, *Leptorhynchus squamatus*, *Maireana enchylaenoides*, *Maireana excavata*, *Maireana pentagona*, *Oxalis perennans*, *Ptilotus exaltatus*, *Rhodanthe corymbiflora*, *Sida corrugata*, *Swainsona plagiotropis*, *Triptilodiscus pygmaeus*, *Wurmbea dioica*, *Wurmbea latifolia*.

Wadi Woodlands (NSW125)

Wadi Woodlands were grouped with Semi-arid Floodplain Woodlands in version 2.1 of the vegetation classes of NSW (Keith 2004). These woodlands line ephemeral stream channels in far north-western New South Wales (Pickard & Norris 1994; Capon et al. 2016) and extend into South Australia, Queensland and the Northern Territory.

Wadi Woodlands occur in regions where mean annual rainfall is less than 250 mm. They are found on streams with sandy beds that run off sedimentary peneplains and ranges, and through adjacent red sandplains.

Vegetation structure varies is open woodland with eucalypts generally less than 10 to 15 m tall. Acacias make up a sub-canopy of varying density, depending on flooding history. The ground layer includes perennial and ephemeral tussock grasses, and ephemeral herbs.

Principal threats include overgrazing and trampling by livestock, feral goats and rabbits, and weed invasion by exotic perennial grasses.

Indicative species

Trees: *Eucalyptus camaldulensis*, *Eucalyptus largiflorens*, *E. coolabah* subsp. *arida*.

Shrubs: *Acacia stenophylla*, *Atalaya hemiglaucula*, *Chenopodium nitrariaceum*, *Duma florulenta*, *Rhagodia spinescens*.

Groundcover: *Astrebla* spp., *Eragrostis* spp., *Paspalidium jubiflorum*, *Cyperus* spp., *Marsilea* spp.

References for Appendix 1

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