



Government Gazette

OF THE STATE OF
NEW SOUTH WALES

Number 138

Monday, 20 December 2010

Published under authority by Government Advertising

SPECIAL SUPPLEMENT

Other Legislation

THREATENED SPECIES CONSERVATION ACT 1995

Notice of Final Determinations

Erratum

THE following notices of Final Determination Certificates were omitted by error from the Government Gazette No. 135 of the 17 December 2010:

Eucalyptus langleyi

Eucalyptus oblonga

Grevillea ilicifolia

Nothern Corroboree Frog

Also the following three NSW Scientific Committee Determinations which appeared in the Government Gazette No. 135 of the 17 December 2010 on folios 5841 to 5858 were published without the Threatened Species Conservation Act 1995, Certificate "Freshwater Wetlands":

Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin & South East Corner bioregion

Montane Peatlands & Swamps of the New England Tableland, NSW North Coast, Sydney Basin, South East corner, South Eastern Highlands & Australian Alps bioregion

Subtropical Coastal Floodplain Forest of the NSW North Coast Bioregion

This erratum now amends these errors and the notices are published in full.



New South Wales

Notice of Final Determination

under the

Threatened Species Conservation Act 1995

The Scientific Committee established under the *Threatened Species Conservation Act 1995* has made a final determination to insert the following population as an endangered population under that Act and, accordingly, Schedule 1 to that Act is amended by inserting in Part 2 under the heading “Myrtaceae” (under the heading “Plants”):

Eucalyptus langleyi L.A.S. Johnson &
Blaxell

Eucalyptus langleyi population
north of the Shoalhaven River
in the Shoalhaven local
government area

This Notice commences on the day on which it is published in the Gazette.
Dated, this 7th day of December 2010.

Dr Richard Major
Chairperson of the Scientific Committee

Copies of final determination and reasons

Copies of the final determination and the reasons for it are available to members of the public (free of charge) as follows:

- (a) on the Internet at www.environment.nsw.gov.au,
- (b) by contacting the Scientific Committee Unit, by post C/- Department of Environment, Climate Change and Water, PO Box 1967, Hurstville BC NSW 1481, by telephone (02) 9585 6940 or by facsimile (02) 9585 6989,
- (c) in person at the Department of Environment, Climate Change and Water Information Centre, Level 14, 59–61 Goulburn St, Sydney.



New South Wales

Notice of Final Determination

under the

Threatened Species Conservation Act 1995

The Scientific Committee established under the *Threatened Species Conservation Act 1995* has made a final determination to insert the population referred to in paragraph (a) as an endangered population under that Act and, as a consequence, to omit a reference to the population referred to in paragraph (b) and, accordingly:

- (a) Schedule 1 to that Act is amended by inserting in alphabetical order in Part 2 under the heading “Myrtaceae” (under the heading “Plants”):

Eucalyptus oblonga DC.

Eucalyptus oblonga population at Bateau Bay, Forresters Beach and Tumbi Umbi in the Wyong local government area

- (b) Schedule 1 to that Act is amended by omitting from Part 2 under the heading “Myrtaceae” (under the heading “Plants”):

Eucalyptus oblonga Blakely

Eucalyptus oblonga population at Bateau Bay in the Wyong local government area

This Notice commences on the day on which it is published in the Gazette.

Dated, this 7th day of December 2010.

Dr Richard Major
Chairperson of the Scientific Committee

Notice of Final Determination

Copies of final determination and reasons

Copies of the final determination and the reasons for it are available to members of the public (free of charge) as follows:

- (a) on the Internet at www.environment.nsw.gov.au,
- (b) by contacting the Scientific Committee Unit, by post C/- Department of Environment, Climate Change and Water, PO Box 1967, Hurstville BC NSW 1481, by telephone (02) 9585 6940 or by facsimile (02) 9585 6989,
- (c) in person at the Department of Environment, Climate Change and Water Information Centre, Level 14, 59–61 Goulburn St, Sydney.



New South Wales

Notice of Final Determination

under the

Threatened Species Conservation Act 1995

The Scientific Committee established under the *Threatened Species Conservation Act 1995* has made a final determination to insert the following species as a critically endangered species under that Act and, accordingly, Schedule 1A to that Act is amended by inserting in alphabetical order in Part 1 under the heading “Proteaceae” (under the heading “Plants”):

Grevillea ilicifolia (R.Br.) R.Br. subsp. *ilicifolia*

This Notice commences on the day on which it is published in the Gazette.
Dated, this 7th day of December 2010.

Dr Richard Major
Chairperson of the Scientific Committee

Copies of final determination and reasons

Copies of the final determination and the reasons for it are available to members of the public (free of charge) as follows:

- (a) on the Internet at www.environment.nsw.gov.au,
- (b) by contacting the Scientific Committee Unit, by post C/- Department of Environment, Climate Change and Water, PO Box 1967, Hurstville BC NSW 1481, by telephone (02) 9585 6940 or by facsimile (02) 9585 6989,
- (c) in person at the Department of Environment, Climate Change and Water Information Centre, Level 14, 59–61 Goulburn St, Sydney.



New South Wales

Notice of Final Determination

under the

Threatened Species Conservation Act 1995

The Scientific Committee established under the *Threatened Species Conservation Act 1995* has made a final determination to insert the species referred to in paragraph (a) as a critically endangered species under that Act and, as a consequence, to omit a reference to that species as a vulnerable species and, accordingly:

- (a) Schedule 1A to that Act is amended by inserting in Part 1 in alphabetical order under the heading “Myobatrachidae” (under the heading “Amphibians”):

* *Pseudophryne pengilleyi* Wells and Wellington, Northern Corroboree
1985 Frog

- (b) Schedule 2 to that Act is amended by omitting from Part 1 under the heading “Myobatrachidae” (under the heading “Amphibians”):

* *Pseudophryne pengilleyi* Wells and Wellington, Northern Corroboree
1985 Frog

This Notice commences on the day on which it is published in the Gazette.
Dated, this 7th day of December 2010.

Dr Richard Major
Chairperson of the Scientific Committee

Copies of final determination and reasons

Copies of the final determination and the reasons for it are available to members of the public (free of charge) as follows:

- (a) on the Internet at www.environment.nsw.gov.au,

Notice of Final Determination

- (b) by contacting the Scientific Committee Unit, by post C/- Department of Environment, Climate Change and Water, PO Box 1967, Hurstville BC NSW 1481, by telephone (02) 9585 6940 or by facsimile (02) 9585 6989,
- (c) in person at the Department of Environment, Climate Change and Water Information Centre, Level 14, 59–61 Goulburn St, Sydney.



New South Wales

Notice of Determination

under the

Threatened Species Conservation Act 1995

The Scientific Committee established under the *Threatened Species Conservation Act 1995* has made a determination to amend the descriptions of certain ecological communities referred to in paragraphs (a)–(c) below pursuant to section 36A (1) (b) of the Act (being amendments or omissions that are necessary or desirable to correct any minor error or omission) and, accordingly, Part 3 of Schedule 1 to that Act is amended as follows:

- (a) Omit the matter relating to Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions and insert instead:

Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (as described in the determination of the Scientific Committee under Division 5 of Part 2)

- (b) Omit the matter relating to Montane Peatlands and Swamps of the New England Tableland, NSW North Coast, Sydney Basin, South East Corner, South Eastern Highlands and Australian Alps bioregions and insert instead:

Montane Peatlands and Swamps of the New England Tableland, NSW North Coast, Sydney Basin, South East Corner, South Eastern Highlands and Australian Alps Bioregions (as described in the determination of the Scientific Committee under Division 5 of Part 2)

Notice of Determination

- (c) Omit the matter relating to Subtropical Coastal Floodplain Forest of the New South Wales North Coast Bioregion and insert instead:

Subtropical Coastal Floodplain Forest of the New South
Wales North Coast Bioregion (as described in the
determination of the Scientific Committee under Division 5
of Part 2)

This Notice commences on the day on which it is published in the Gazette.
Dated, this 7th day of December 2010.

Dr Richard Major
Chairperson of the Scientific Committee

Copies of final determination and reasons

Copies of the final determination and the reasons for it are available to members of the public (free of charge) as follows:

- (a) on the Internet at www.environment.nsw.gov.au,
- (b) by contacting the Scientific Committee Unit, by post C/- Department of Environment, Climate Change and Water, PO Box 1967, Hurstville BC NSW 1481, by telephone (02) 9585 6940 or by facsimile (02) 9585 6989,
- (c) in person at the Department of Environment, Climate Change and Water Information Centre, Level 14, 59–61 Goulburn St, Sydney.

NSW SCIENTIFIC COMMITTEE

Determination to make a minor amendment to Part 3 of Schedule 1 of the Threatened Species Conservation Act

The Scientific Committee, established by the Threatened Species Conservation Act, has made a Determination to make a minor amendment to Part 3 of Schedule 1 (Endangered ecological communities) of the Act by inserting the Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions (as described in the determination of the Scientific Committee under Division 5 Part 2) and as a consequence to omit reference to the Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions (as described in the final determination to list the ecological community) which was published on pages 9406 to 9411 in the NSW Government Gazette No. 200 dated 17 December 2004. Minor amendments to the Schedules are provided for by Division 5 of Part 2 of the Act.

The Scientific Committee is of the opinion that the amendment is necessary or desirable to correct an omission in the Determination in relation to the Thackway and Cresswell (1995) reference.

The Scientific Committee has found that:

1. Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions is the name given to the ecological community associated with periodic or semi-permanent inundation by freshwater, although there may be minor saline influence in some wetlands. They typically occur on silts, muds or humic loams in depressions, flats, drainage lines, backswamps, lagoons and lakes associated with coastal floodplains. Floodplains are level landform patterns on which there may be active erosion and aggradation by channelled and overbank stream flow with an average recurrence interval of 100 years or less (adapted from Speight 1990). Freshwater Wetlands on Coastal Floodplains generally occur below 20 m elevation in the NSW North Coast, Sydney Basin and South East Corner bioregions. The structure of the community may vary from sedgelands and reedlands to herbfields, and woody species of plants are generally scarce. Typically these wetlands form mosaics with other floodplain communities, and often they include or are associated with ephemeral or semi-permanent standing water (e.g. Goodrick 1970).

The composition of Freshwater Wetlands on Coastal Floodplains is primarily determined by the frequency, duration and depth of waterlogging and may be influenced by the level of nutrients and salinity in the water and substrate. The community is characterised by the following assemblage of species:

<i>Alisma plantago-aquatica</i>	<i>Azolla filiculoides</i> var. <i>rubra</i>
<i>Azolla pinnata</i>	<i>Baumea articulata</i>
<i>Baumea rubiginosa</i>	<i>Bolboschoenus caldwellii</i>
<i>Bolboschoenus fluviatilis</i>	<i>Brasenia schreiberi</i>
<i>Carex appressa</i>	<i>Centipeda minima</i>
<i>Ceratophyllum demersum</i>	<i>Cyperus lucidus</i>
<i>Eclipta platyglossa</i>	<i>Eclipta prostrata</i>
<i>Eleocharis acuta</i>	<i>Eleocharis equisetina</i>
<i>Eleocharis minuta</i>	<i>Eleocharis sphacelata</i>
<i>Fimbristylis dichotoma</i>	<i>Gratiola pedunculata</i>
<i>Hemarthria uncinata</i>	<i>Hydrilla verticillata</i>
<i>Hydrocharis dubia</i>	<i>Juncus polyanthemus</i>
<i>Juncus usitatus</i>	<i>Leersia hexandra</i>
<i>Lemna</i> spp.	<i>Lepironia articulata</i>
<i>Ludwigia peploides</i> subsp. <i>montevidensis</i>	<i>Marsilea mutica</i>
<i>Maundia triglochoides</i>	<i>Myriophyllum crispatum</i>
<i>Myriophyllum latifolium</i>	<i>Myriophyllum propinquum</i>
<i>Myriophyllum variifolium</i>	<i>Najas marina</i>
<i>Najas tenuifolia</i>	<i>Nymphaea gigantea</i>
<i>Nymphoides geminata</i>	<i>Nymphoides indica</i>
<i>Ottelia ovalifolia</i>	<i>Panicum obseptum</i>
<i>Panicum vaginatum</i>	<i>Paspalum distichum</i>
<i>Persicaria attenuata</i>	<i>Persicaria decipiens</i>
<i>Persicaria hydropiper</i>	<i>Persicaria lapathifolia</i>
<i>Persicaria strigosa</i>	<i>Philydrum lanuginosum</i>
<i>Phragmites australis</i>	<i>Potamogeton crispus</i>
<i>Potamogeton ochreatus</i>	<i>Potamogeton perfoliatus</i>
<i>Potamogeton tricarinatus</i>	<i>Pseudoraphis spinescens</i>
<i>Ranunculus inundatus</i>	<i>Schoenoplectus litoralis</i>
<i>Schoenoplectus mucronatus</i>	<i>Schoenoplectus validus</i>
<i>Spirodella</i> spp.	<i>Triglochin procera</i> sensu lato
<i>Typha orientalis</i>	<i>Utricularia australis</i>
<i>Vallisneria</i> spp.	<i>Wolffia</i> spp.

2. The total species list of the community is considerably larger than that given above, with many species present at only one or two sites or in low abundance. The species composition of a site will be influenced by the size of the site, recent rainfall or drought conditions and by its disturbance history (including grazing, flooding, land clearing and pollution in the catchment). The number and relative abundance of species will change with time since flooding or significant rainfall, and may also change in response to changes in grazing regimes and land use in the catchment. At any one time, above-ground individuals of some species may be absent, but the species may be represented below ground in the soil seed banks or as dormant structures such as bulbs, corms, rhizomes, rootstocks or lignotubers. The list of species given above is of vascular plant species, the community also includes micro-organisms, fungi, cryptogamic plants and a diverse fauna, both vertebrate and invertebrate. These components of the community are poorly documented.
3. Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions is known from parts of the Local Government Areas of Tweed, Byron, Lismore, Ballina, Richmond Valley, Clarence Valley, Coffs Harbour, Bellingen, Nambucca, Kempsey, Hastings, Greater Taree, Great Lakes, Port Stephens, Maitland, Newcastle, Cessnock, Lake Macquarie, Wyong, Gosford, Hawkesbury, Baulkham Hills, Blacktown, Penrith, Fairfield, Liverpool, Wollondilly, Camden, Campbelltown, Wollongong, Shellharbour, Kiama, Shoalhaven, Eurobodalla and Bega Valley but may occur elsewhere in these bioregions. Bioregions are defined in Thackway and Cresswell (1995). Examples include Swan Bay, Gundurimba wetland, Bungawalbin Swamp, Dyraaba Creek and Tuckean Swamp on the Richmond floodplain; Southgate wetlands and Trenayr Swamp on the Clarence floodplain; Seven Oaks Swamp, Swan Pool, Kinchela Creek and Upper Belmore Swamp on the Macleay floodplain; Great Swamp on the Manning floodplain; Wentworth Swamp, Hexham Swamp, Wallis Creek and Ellalong Lagoon on the Hunter floodplain; Bushells, Pitt Town, Long Neck and Broadwater Lagoons on the Hawkesbury floodplain; Coomonderry Swamp on the Shoalhaven floodplain; Pedro and Old Man Bed Swamps on the Moruya floodplain; and Jellat Jellat Swamp on the Bega floodplain (Goodrick 1970).
4. Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions is dominated by herbaceous plants and have very few woody species. The structure and composition of the community varies both spatially and temporally depending on the water regime (Yen and Myerscough 1989, Boulton and Brock 1999). Wetlands or parts of wetlands that lack standing water most of the time are usually dominated by dense grassland or sedgeland vegetation, often forming a turf less than 0.5 metre tall and dominated by amphibious plants including *Paspalum distichum* (water couch), *Leersia hexandra* (swamp rice-grass), *Pseudoraphis spinescens* (mud grass) and *Carex appressa* (tussock sedge). Wetlands or parts of wetlands subject to regular inundation and drying may include large emergent sedges over 1 metre tall, such as *Baumea articulata*, *Eleocharis equisetina* and *Lepironia articulata*, as well as emergent or floating herbs such as *Hydrocharis dubia* (frogbit), *Philydrum lanuginosum* (frogsmouth), *Ludwigia peploides* subsp. *montevicensis* (water primrose), *Marsilea mutica* (nardoo) and *Myriophyllum* spp. (milfoils). As standing water becomes deeper or more permanent, amphibious and emergent plants become less abundant, while floating and submerged aquatic herbs become more abundant. These latter species include *Azolla filiculoides* var. *rubra*, *Ceratophyllum demersum* (hornwort), *Hydrilla verticillata* (water thyme), *Lemna* spp. (duckweeds), *Nymphaea gigantea* (giant waterlily), *Nymphoides indica* (water snowflake), *Ottelia ovalifolia* (swamp lily) and *Potamogeton* spp. (pondweeds). The threatened aquatic plants, *Aldrovanda vesiculosa* and *Najas marina*, also occur within this community. The composition and structure of the vegetation is also influenced by grazing history, changes to hydrology and soil salinity, catchment runoff and disturbance, and may have a substantial component of exotic grasses and forbs. Artificial wetlands created on previously dry land specifically for purposes such as sewerage treatment, stormwater management and farm production, are not regarded as part of this community, although they may provide habitat for threatened species.
5. Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions has a distinctive fauna that includes frogs, fish, freshwater tortoises, waterbirds and a diversity of micro- and macro-invertebrates. The frog families represented are Myobatrachidae (southern frogs) and Hylidae (tree frogs), including the threatened Green and Golden Bell Frog (*Litoria aurea*). Waterbirds include Black Swan (*Cygnus atratus*), Pacific Black Duck (*Anas superciliosa*), Australian Grey Teal (*Anas gracilis*), Pacific Heron (*Ardea pacifica*), White-faced Heron (*Ardea novaehollandiae*), Great Egret (*Ardea alba*), Intermediate Egret (*Ardea intermedia*), Little Egret (*Ardea garzetta*), Straw-necked Ibis (*Threskiornis spinicollis*), Sacred Ibis (*Threskiornis aethiopicus*), Black-necked Stork (*Ephippiorhynchus asiaticus*), Royal Spoonbill (*Platalea regia*), Yellow-billed Spoonbill (*Platalea flavipes*), Japanese Snipe (*Gallinago hardwickii*), Black-winged Stilt (*Himantopus himantopus*), Dusky Moorhen (*Gallinula tenebrosa*), Comb-crested jacana (*Jacana gallinacea*) and Purple swamphen (*Porphyrion porphyrio*).

6. Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions forms part of a complex of forested wetland and treeless wetland communities found throughout the coastal floodplains of NSW. A recent analysis of available quadrat data from these habitats identified several types of forested wetlands that are distinct from this treeless wetland community (Keith and Scott 2005). The combination of features that distinguish Freshwater Wetlands on Coastal Floodplains from other endangered ecological communities on the coastal floodplains include its scarcity or complete absence of woody plant species and the presence of amphibious, emergent, floating or submerged aquatic forbs, grasses or sedges. It generally occupies low-lying parts of floodplains, alluvial flats, depressions, drainage lines, backswamps, lagoons and lakes; habitats where flooding is periodic and standing fresh water persists for at least part of the year in most years. The community also occurs in backbarrier landforms where floodplains adjoin coastal sandplains (e.g. Pressey and Griffith 1992). However, it is distinct from Sydney Freshwater Wetlands, which may include a component of woody plant species and are associated with sandplains in the Sydney Basin bioregion.
7. Freshwater Wetlands on Coastal Floodplains may adjoin or intergrade with several other endangered ecological communities, which collectively cover all remaining native vegetation on the coastal floodplains of New South Wales. These include Lowland Rainforest on Floodplain in the NSW North Coast bioregion, Subtropical Floodplain Forest of the NSW North Coast bioregion, River-Flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions (including the formerly listed Sydney Coastal River-flat Forest in the Sydney Basin bioregion), Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions (including the formerly listed Sydney Coastal Estuary Swamp Forest Complex in the Sydney Basin bioregion) and Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and South East Corner bioregions. For example, Freshwater Wetlands on Coastal Floodplains are sometimes fringed by trees, such as *Casuarina glauca* (swamp oak) and *Melaleuca quinquenervia* (paperbark), indicating transitional zones to forested communities of the floodplains. The boundaries between these communities are dynamic and may shift in response to changes in hydrological regimes, fire regimes or land management practices (e.g. Johnston *et al.* 2003, Stevenson 2003). In addition, Freshwater Wetlands on Coastal Floodplains may adjoin or intergrade with Coastal Saltmarsh of the NSW North Coast, Sydney Basin and South East Corner bioregions and Sydney Freshwater Wetlands of the Sydney Basin bioregion. The Determinations for these communities collectively encompass the full range of intermediate assemblages.
8. A number of vegetation surveys and mapping studies have been conducted across the range of Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions. This community includes 'Fresh meadows', Seasonal fresh swamps', 'Semi-permanent fresh swamps', and 'Open fresh waters' in the general coastal wetlands classification of Goodrick (1970). In the Tweed valley lowlands, this community includes '*Eleocharis equisetina* tall closed sedgeland' (E2) and '*Triglochin procerum* tall forbland to tall open forbland' (E3) of Pressey and Griffith (1992) and parts of the 'Floodplain Wetland Complex' (FL) that are dominated by herbaceous plants (Pressey and Griffith 1992). In the lower Hunter valley, 'Freshwater Wetland Complex' (map unit 46) of NPWS (2000) falls within this community. In the Sydney region, this community includes 'Freshwater wetlands on the floodplains' of Benson and Howell (1990); 'Freshwater reed swamps' (map unit 28a) of Benson (1992) and Ryan *et al.* (1996) in the Penrith-St Albans district; '*Lepironia* freshwater swamp' (map unit 75 and part of map unit 79) of NPWS (2002a) in the Warragamba area; and 'Freshwater wetlands' (map unit 36) of Tozer (2003) on the Cumberland Plain. On the Illawarra plain, this community includes 'Floodplain Wetland' (map unit 54) of NPWS (2002b). In the Comprehensive Regional Assessment of southern New South Wales (Thomas *et al.* 2000), this community includes 'Coastal alluvial valley floor wetlands' (map unit 189). This community also includes those parts of 'Coastal freshwater lagoon' (map unit 313) of Tindall *et al.* (2004), on the south coast of NSW, and parts of 'Floodplain Wetlands' (map unit 60) of Keith and Bedward (1999), in the Eden region, that are dominated by herbaceous aquatic plants. Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions is included within the 'Coastal Freshwater Lagoons' vegetation class of Keith (2002, 2004). There may be additional or unmapped occurrences of Freshwater Wetlands on Coastal Floodplains within and beyond these surveyed areas.
9. The extent of the Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions prior to European settlement has not been mapped across its entire range. Estimates of wetland area also vary, depending on the scale of mapping (coarse scale maps may exclude many small wetlands), wetland definition and the occurrence of recent flooding. Mapping carried out by Kingsford *et al.* (2004), for example, focused on areas of open water and thus excluded many wetlands attributable to this community. One estimate based on a compilation of regional vegetation maps suggests that Coastal Freshwater Lagoons, which include Freshwater Wetlands on Coastal Floodplains, currently cover 90-160 km², representing

less than 60-90% of the original extent of this broadly defined vegetation class (Keith 2004). However, the remaining area of Freshwater Wetlands on Coastal Floodplains is likely to represent much less than 60-90% of its original range, because this combined estimate for the Coastal Freshwater Wetlands class (Keith 2004) is likely to include a considerable area of freshwater wetlands on coastal sandplains, which are excluded from this Determination. Goodrick (1970) estimated that approximately 21 700 ha of 'Fresh meadows', 'Seasonal fresh swamps', 'Semi-permanent fresh swamps', and 'Open fresh waters' remained on NSW coastal floodplains in 1969, representing less than 39% of their original area. Continued clearing and drainage works in the 35 years since Goodrick's (1970) survey are likely to have resulted in a substantial diminution of Freshwater Wetlands on Coastal Floodplains. More detailed surveys have identified the following areas attributable to Freshwater Wetlands on Coastal Floodplains: less than 150 ha on the Tweed lowlands in 1985 (Pressey and Griffith 1992); about 10 600 ha on the lower Clarence floodplain in 1982 (Pressey 1989a); about 11 200 ha on the lower Macleay floodplain in 1983 (Pressey 1989b); about 3500 ha in the lower Hunter – central Hunter region in 1990s (NPWS 2000); less than 2700 ha on the NSW south coast from Sydney to Moruya in the mid 1990s (Tindall *et al.* 2004), including about 660 ha on the Cumberland Plain in 1998 (Tozer 2003) and about 100 ha on the Illawarra Plain in 2001 (NPWS 2002); and less than 1000 ha in the Eden region in 1990 (Keith and Bedward 1999). The wetlands included in these estimates exist in various states of modification.

10. Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions has been extensively cleared and modified. Large areas that formerly supported this community are occupied by exotic pastures grazed by cattle, market gardens, other cropping enterprises (e.g. sorghum, corn, poplars, etc.) and, on the far north coast, canefields. On the Tweed lowlands, Pressey and Griffith (1992) estimated that less than 3% of the original Floodplain Wetlands remained in 1985. Similar estimates are likely to apply to Freshwater Wetlands on Coastal Floodplains in other parts of the NSW North Coast bioregion (Pressey 1989a, 1989b). In the lower Hunter – central coast region, about two-thirds was estimated to have remained during the 1990s (NPWS 2000), while approximately 40% remained on the Cumberland Plain in 1998 (Tozer 2003). In the Sydney – South Coast region, about 70% was estimated to remain in the mid 1990s (Tindall *et al.* 2004), in the Eden region about 30% was estimated to remain during the 1990s (Keith and Bedward 1999).
11. Land clearing continues to threaten Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions. A small minority of the remaining area occurs on public land (e.g. Pressey 1989a, b; Pressey and Griffith 1992), with most occurring on productive agricultural land or in close proximity to rural centres. The remaining stands are severely fragmented by past clearing and are further threatened by continuing fragmentation and degradation, flood mitigation and drainage works, filling associated with urban and industrial development, pollution and eutrophication from urban and agricultural runoff, weed invasion, overgrazing, trampling by livestock, soil disturbance by pigs, activation of 'acid sulfate soils' and rubbish dumping (e.g. Goodrick 1970; Pressey 1989a, b; Pressey and Griffith 1992; Boulton and Brock 1999, Johnston *et al.* 2003). The native fauna of Freshwater Wetlands on Coastal Floodplains is threatened by predation, particularly by mosquito fish and cane toads. Anthropogenic climate change may also threaten Freshwater Wetlands on Coastal Floodplains if sea levels rise and future flooding regimes change as predicted (IPCC 2001; Hughes 2003). Clearing of native vegetation; Alteration to the natural flow regimes of rivers, streams, floodplains and wetlands; Invasion of native plant communities by exotic perennial grasses; Predation, habitat destruction, competition and disease transmission by feral pigs; and Anthropogenic climate change are listed as Key Threatening Processes under the Threatened Species Conservation Act (1995).
12. Large areas of habitat formerly occupied by Freshwater Wetlands on Coastal Floodplains have been directly drained by construction of artificial channels (e.g. Pressey 1989a, Boulton and Brock 1999). By the early 1900s, drainage unions or trusts were formed on the major floodplains to enable adjacent landholders to arrange for co-ordinated drainage systems, which were designed and constructed by the former NSW Department of Public Works. Additional areas that have not been directly drained may have been altered hydrologically by changed patterns of flooding and drainage following flood mitigation works, particularly the construction of drains, levees and floodgates (Pressey and Griffith 1992). On the north coast of NSW, expansion of *Melaleuca quinquenervia* and *Casuarina glauca* into open floodplain swamps has been attributed to artificial drainage and shortening of the hydroperiod (Johnston *et al.* 2003, Stevenson 2003). These changes appear to be closely associated with enhanced acidity, altered ionic ratios, increased dissolved organic carbon and sulfide oxidation in the soil profile (Johnston *et al.* 2003). Conversely, alteration of tidal flows may have led to decreased soil salinity and localised expansion of Freshwater Wetland into areas that previously supported Coastal Saltmarsh or mangroves (Stevenson 2003). Re-instatement of tidal flows and other natural hydrological processes may therefore lead to contraction of Freshwater Wetlands. In addition, sedimentation and eutrophication of wetlands is associated with development of their catchments for intensive agriculture or urban or industrial infrastructure. Harmful runoff from developed catchments may include herbicides, pesticides, fertilisers,

sewerage, industrial waste and polluted stormwater. The widespread degradation of Freshwater Wetlands on Coastal Floodplains has led to regional declines in their dependent fauna including Magpie Geese (*Anseranas semipalmata*), Cotton Pygmy Geese (*Nettapus coromandelianus*), Hardhead (*Aythya australis*), Black-necked Stork (*Ephippiorhynchus asiaticus*), and Wandering Whistling Duck (*Dendrocygna arcuata*).

13. Very few examples of Freshwater Wetlands on Coastal Floodplains remain unaffected by weeds. The causes of weed invasion include physical disturbance to the vegetation structure of the community; the dumping of landfill, rubbish and garden refuse; eutrophication and polluted runoff from urban and agricultural areas; construction of roads and other utilities; soil disturbance by feral pigs and grazing by domestic livestock. In addition, mechanical and chemical methods of controlling aquatic weeds may threaten native components of the flora. The principal weed species affecting Freshwater Wetlands on Coastal Floodplains include *Alternanthera philoxeroides* (alligatorweed), *Baccharis halimifolia* (groundsel bush), *Echinochloa crus-galli* (barnyard grass), *Eichhornia crassipes* (water hyacinth), *Hygrophila costata* (glush weed), *Ludwigia longifolia*, *L. peruviana*, *Nymphaea capensis* (Cape waterlily), *Panicum repens* (torpedo grass), *Pennisetum clandestinum* (kikuyu) and *Salvinia molesta*, (Sainty and Jacobs 1981).
14. Small areas of Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions are contained within existing conservation reserves, including Ukerebagh, Tuckean, Tabbimoble Swamp, Hexham Swamp, Pambalong and Pitt Town Nature Reserves and Bungawalbin, Scheyville and Seven Mile Beach National Parks, although these are unevenly distributed throughout the range and unlikely to represent the full diversity of the community. In addition, wetlands within protected areas are exposed to hydrological changes that were, and continue to be initiated outside their boundaries. Some Freshwater Wetlands on Coastal Floodplains are protected by State Environmental Planning Policy 14, although this has not always precluded impacts on wetlands from the development of major infrastructure.
15. Given the dynamic hydrological relationship between Freshwater Wetlands on Coastal Floodplains, Coastal Saltmarsh and other endangered ecological communities on coastal floodplains, future management of water and tidal flows may result in the expansion of some communities at the expense of others. Proposals for the restoration of natural hydrological regimes and for the rehabilitation of acid sulfate soils may also result in changes to the distribution and composition of floodplain communities. Co-ordinated planning and management approaches across whole catchments will be required to address and resolve priorities between different management objectives.
16. In view of the above the Scientific Committee is of the opinion that Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions is likely to become extinct in nature in New South Wales unless the circumstances and factors threatening its survival or evolutionary development cease to operate.

Dr Richard Major

Chairperson

Scientific Committee

References

- Benson DH (1992) The natural vegetation of the Penrith 1:100 000 map sheet. *Cunninghamia* **2**, 541-596.
- Benson DH, Howell, J (1990) 'Taken for granted: the bushland of Sydney and its suburbs.' (Kangaroo Press, Sydney.)
- Boulton AJ, Brock MA (1999). 'Australian freshwater wetlands: processes and management.' (Gleneagles Publishing, Glen Osmond.)
- Goodrick GN (1970) A survey of wetlands of coastal New South Wales. Technical Memorandum No. 5. CSIRO, Canberra.
- Hughes L (2003) Climate change and Australia: trends, projections and impacts. *Austral Ecology* **28**, 423-443.
- IPCC (2001) Climate change 2001: Impacts, adaptation and vulnerability. Report from Working Group II. Intergovernmental Panel on Climate Change, Geneva.
- Johnston SG, Slavich PG, Hirst P (2003) Alteration of groundwater and sediment geochemistry in a sulfidic backswamp due to *Melaleuca quinquenervia* encroachment. *Australian Journal of Soil Research* **41**, 1343-1367.
- Keith DA (2002) 'A compilation map of native vegetation for New South Wales. NSW Biodiversity Strategy.' (NSW National Parks and Wildlife Service, Sydney.)
- Keith DA (2004) 'Ocean shores to desert dunes: the native vegetation of New South Wales and the ACT.' (NSW Department of Environment and Conservation, Sydney.)
- Keith DA, Bedward M (1999) Vegetation of the South East Forests region, Eden, New South Wales. *Cunninghamia* **6**, 1-218.
- Keith DA, Scott, J (2005) Native vegetation of coastal floodplains – a broad framework for definition of communities in NSW. *Pacific Conservation Biology* **11**, in press.
- Kingsford RT, Brandis K, Thomas RF, Crigton P, Knowles E, Gale E (2004) Classifying landform at broad spatial scales: the distribution and conservation of wetlands in New South Wales, Australia. *Marine and Freshwater Research* **55**, 17-31.
- NPWS (1999) Forest ecosystem classification and mapping for the upper and lower north east Comprehensive Regional Assessment. NSW National Parks and Wildlife Service, Coffs Harbour.
- NPWS (2000) Vegetation Survey, Classification and Mapping: Lower Hunter and Central Coast Region. Version 1.2. NSW National Parks and Wildlife Service, Sydney.
- NPWS (2002a). Native vegetation of the Warragamba Special Area. NSW National Parks and Wildlife Service, Sydney.
- NPWS (2002b) Native vegetation of the Wollongong escarpment and coastal plain. NSW National Parks and Wildlife Service, Sydney.
- Pressey RL (1989a) Wetlands of the lower Clarence floodplain, northern coastal New South Wales. *Proceedings of the Linnean Society of NSW* **111**, 143-155.
- Pressey RL (1989b) Wetlands of the lower Macleay floodplain, northern coastal New South Wales. *Proceedings of the Linnean Society of NSW* **111**, 157-168.
- Pressey RL, Griffith SJ (1992) Vegetation of the coastal lowlands of Tweed shire, northern New South Wales, species and conservation. *Proceedings of the Linnean Society of NSW* **113**, 203-243.
- Ryan K, Fisher M, Schaeper L (1996) The natural vegetation of the St Albans 1:100 000 map sheet. *Cunninghamia* **4**, 433-482.

- Sainty GR, Jacobs SWL (1981) 'Waterplants of New South Wales.' (Water Resources Commission of NSW, Sydney.)
- Speight JG (1990) Landform. In: 'Australian soil and land survey. Field handbook' Second edition (Eds. RC McDonald, RF Isbell, JG Speight, J, Walker, MS Hopkins), pp9-57. Inkata Press, Melbourne.
- Stevenson, M (2003) Remote sensing and historical investigation of environmental change and *Melaleuca* encroachment in Tuckean Swamp, north-eastern NSW. Unpublished report. School of Environmental Science and Management, Southern Cross University, Lismore.
- Thackway R, Cresswell ID (1995) (eds) 'An interim biogeographic regionalisation of Australia: a framework for establishing the national system of reserves.' (Version 4.0 Australian Nature Conservation Agency: Canberra).
- Tindall D, Pennay C, Tozer MG, Turner K, Keith DA (2004) Native vegetation map report series. No. 4. Araluen, Batemans Bay, Braidwood, Burragorang, Goulburn, Jervis Bay, Katoomba, Kiama, Moss Vale, Penrith, Port Hacking, Sydney, Taralga, Ulladulla, Wollongong. NSW Department of Environment and Conservation and NSW Department of Infrastructure, Planning and Natural Resources, Sydney.
- Thomas V, Gellie N, Harrison T (2000) Forest ecosystem classification and mapping for the southern Comprehensive Regional Assessment. NSW National Parks and Wildlife Service, Queanbeyan.
- Tozer MG (2003) The native vegetation of the Cumberland Plain, western Sydney: systematic classification and field identification of communities. *Cunninghamia* **8**, 1-75.
- Yen S, Myerscough PJ (1989) Co-existence of three species of amphibious plants in relation to spatial and temporal variation: field evidence. *Australian Journal of Ecology* **14**, 291-304.

NSW SCIENTIFIC COMMITTEE

**Determination to make a minor amendment to Part 3 of Schedule 1
of the Threatened Species Conservation Act**

The Scientific Committee, established by the Threatened Species Conservation Act, has made a Determination to make a minor amendment to Part 3 of Schedule 1 (Endangered ecological communities) of the Act by inserting the Montane Peatlands and Swamps of the New England Tableland, NSW North Coast, Sydney Basin, South East Corner, South Eastern Highlands and Australian Alps bioregions (as described in the determination of the Scientific Committee under Division 5 Part 2) and as a consequence to omit reference to the Montane Peatlands and Swamps of the New England Tableland, NSW North Coast, Sydney Basin, South East Corner, South Eastern Highlands and Australian Alps bioregions (as described in the final determination to list the ecological community) which was published on pages 9414 to 9419 in the NSW government Gazette No. 200 dated 17 December 2004. Minor amendments to the Schedules are provided for by Division 5 of Part 2 of the Act.

The Scientific Committee is of the opinion that the amendment is necessary or desirable to correct an omission in the Determination in relation to the Thackway and Cresswell (1995) reference.

The Scientific Committee has found that:

1. Montane Peatlands and Swamps of the New England Tableland, NSW North Coast, Sydney Basin, South East Corner, South Eastern Highlands and Australian Alps bioregions is the name given to the plant community associated with accumulated peaty or organic-mineral sediments on poorly drained flats in the headwaters of streams. It occurs on undulating tablelands and plateaus, above 400-500 m elevation, generally in catchments with basic volcanic or fine-grained sedimentary substrates or, occasionally, granite. Montane Peatlands and Swamps is characterised by the assemblage of species listed in paragraph 2 and comprises a dense, open or sparse layer of shrubs with soft-leaved sedges, grasses and forbs. It is the only type of wetland that may contain more than trace amounts of *Sphagnum* spp., the hummock peat-forming mosses. Small trees may be present as scattered emergents or absent from the community.
2. Montane Peatlands and Swamps of the New England Tableland, NSW North Coast, Sydney Basin, South East Corner, South Eastern Highlands and Australian Alps bioregions is characterised by following assemblage of species:

<i>Acaena novae-zelandiae</i>	<i>Arthropodium milleflorum</i>
<i>Asperula gunnii</i>	<i>Baeckea gunniana</i>
<i>Baeckea utilis</i>	<i>Baloskion australe</i>
<i>Baloskion stenocoleum</i>	<i>Baumea rubiginosa</i>
<i>Blechnum nudum</i>	<i>Blechnum penna-marina</i>
<i>Brachyscome graminea</i>	<i>Callistemon pityoides</i>
<i>Carex appressa</i>	<i>Carex fascicularis</i>
<i>Carex gaudichaudiana</i>	<i>Comesperma retusum</i>
<i>Deyeuxia gunniana</i>	<i>Deyeuxia quadriseta</i>
<i>Drosera binata</i>	<i>Drosera peltata</i>
<i>Eleocharis acuta</i>	<i>Eleocharis sphacelata</i>
<i>Empodisma minus</i>	<i>Epacris breviflora</i>
<i>Epacris microphylla</i>	<i>Epacris paludosa</i>
<i>Epilobium billardierianum</i>	<i>Epilobium gunnianum</i>
<i>Eucalyptus ovata</i>	<i>Eucalyptus pauciflora</i>
<i>Eucalyptus stellulata</i>	<i>Gahnia sieberiana</i>
<i>Geranium neglectum</i>	<i>Gleichenia dicarpa</i>
<i>Gonocarpus micranthus</i>	<i>Gratiola latifolia</i>
<i>Gratiola peruviana</i>	<i>Hakea microcarpa</i>
<i>Hydrocotyle peduncularis</i>	<i>Hypericum gramineum</i>
<i>Hypericum japonicum</i>	<i>Hypoxis hygrometrica</i>
<i>Isotoma fluviatilis</i>	<i>Juncus falcatus</i>
<i>Juncus planifolius</i>	<i>Juncus sarophorus</i>
<i>Lagenifera stipitata</i>	<i>Leptospermum juniperinum</i>
<i>Leptospermum lanigerum</i>	<i>Leptospermum myrtifolium</i>
<i>Leptospermum obovatum</i>	<i>Leptospermum polygalifolium</i> subsp. <i>polygalifolium</i>
<i>Lepyrodia anarthria</i>	<i>Lythrum salicaria</i>
<i>Mitrasacme serpyllifolia</i>	<i>Myriophyllum pedunculatum</i>
<i>Myriophyllum propinquum</i>	<i>Neopaxia australasica</i>
<i>Oreobolis ambiguus</i>	<i>Oreomyrrhis ciliata</i>
<i>Phragmites australis</i>	<i>Poa costiniana</i>
<i>Poa labillardieri</i>	<i>Poa sieberiana</i> var. <i>sieberiana</i>
<i>Prasophyllum canaliculatum</i>	<i>Pratia pedunculata</i>
<i>Prunella vulgaris</i>	<i>Pteridium esculentum</i>
<i>Ranunculus lappaceus</i>	<i>Ranunculus pimpinellifolius</i>

Scaevola hookeri
Scirpus polystachyus
Sphagnum novo-zelandicum
Stellaria pungens
Utricularia dichotoma
Viola caleyana
Wahlenbergia ceracea

Schoenus apogon
Sphagnum cristatum
Spiranthes sinensis subsp. australis
Stylidium graminifolium
Viola betonicifolia
Viola hederacea
Xerochrysum palustre

3. The total species list of the community is larger than that given above, with many species present only in one or two sites, or in low abundance. The species composition of a site will be influenced by the size of the site, recent rainfall or drought conditions and by its disturbance (including grazing, land clearing and fire) history. The number and relative abundance of species will change with time since fire, and may also change in response to changes in fire frequency or water regime. At any one time, above-ground individuals of some species may be absent, but the species may be represented below ground in the soil seed banks or as dormant structures such as bulbs, corms, rhizomes, rootstocks or lignotubers. The list of species given above is mainly of vascular plant species, however the community also includes micro-organisms, fungi, cryptogamic plants and a diverse fauna, both vertebrate and invertebrate. These components of the community are poorly documented.
4. Montane Peatlands and Swamps of the New England Tableland, NSW North Coast, Sydney Basin, South East Corner, South Eastern Highlands and Australian Alps bioregions typically has an open to very sparse layer of shrubs, 1-5 m tall, including species of *Baeckea*, *Callistemon* and *Leptospermum*. Species of *Epacris* and *Hakea microcarpa* are also common shrubs. In some peatlands and swamps, particularly those with a history of disturbance to vegetation, soils or hydrology, the shrub layer comprises dense thickets of *Leptospermum* species. In other peatlands and swamps with a history of grazing by domestic livestock, the shrub layer may be very sparse or absent. Montane Peatlands typically have a dense groundcover of sedges, grasses and forbs, except where a dense cover of tall shrubs casts deep shade. Soft-leaved species of *Carex* and *Poa* typically make up most of the groundcover biomass, while other common sedges include *Baloskion* spp., *Baumea rubiginosa*, *Empodisma minus*, *Juncus* spp. and *Schoenus apogon*. Forbs growing amongst the sedges include *Drosera* spp., *Geranium neglectum*, *Gratiola* spp., *Mitrasacme serpyllifolia*, *Ranunculus* spp. and *Viola* spp. Hummocks of *Sphagnum* moss may occur amongst other components of the ground layer. The continuity of the ground layer may be interrupted by erosion, trampling, partial clearing or earthworks. There may be considerable variation in soils and species composition between and within individual peatlands and swamps. Regionally, a number of species are confined to the northern or southern parts of the community's distribution. Locally, toward the margins of any particular peatland or swamp, the average watertable depth typically declines, the mineral content of surface soils increases and hydrophilic plant species are replaced by species that are less tolerant of waterlogged conditions.
5. Montane Peatlands and Swamps may be distinguished from Upland Wetlands of the Drainage Divide of the New England Tableland bioregion, also listed on Schedule 1 of the Threatened Species Conservation Act 1995, by several biological and physical characteristics. The latter community has fewer woody plants, a greater component of aquatic herbs, is based on substrates with less peat and higher mineral content, and has shallow temporary to near-permanent standing water, *cf.* a varying depth of seeping water within Montane Peatlands and Swamps.
6. Montane Peatlands and Swamps of the New England Tableland, NSW North Coast, Sydney Basin, South East Corner, South Eastern Highlands and Australian Alps bioregions provides habitat for a number of endangered plant species including *Carex klaphakei*, *Diuris pedunculata*, *Eucalyptus approximans*, *Euphrasia scabra*, *Gentiana baueriana*, *G. bredboensis*, *G. wingecarribiensis*, *Grevillea acanthifolia* subsp. *paludosa*, *Lysimachia vulgaris* var. *davurica* and *Prasophyllum uroglossum*; and vulnerable plant species including *Baloskion longipes*, *Boronia deanei*, *Callitris oblonga*, *Diuris venosa*, *Eucalyptus aquatica*, *Leptospermum thompsonii*, *Prasophyllum fuscum*, *Pultenaea parrisiae* subsp. *parrisiae*, *Ranunculus anemoneus*, *Tasmannia purpurascens* and *T. glaucifolia*. Some of these species are associated with ecotones of adjoining forests or watercourses. Montane peatlands and swamps provide habitat for a range of threatened fauna, particularly amphibians and, notably the Northern and Southern corroboree frogs (*Pseudophryne pengilleyi* and *P. corroboree*) and the Giant Dragonfly (*Petalura gigantea*).
7. Montane Peatlands and Swamps of the New England Tableland, NSW North Coast, Sydney Basin, South East Corner, South Eastern Highlands and Australian Alps bioregions is currently known from parts of the Local Government Areas of Armidale Dumaresq, Bega Valley, Bellingen, Blue Mountains, Bombala, Cooma-Monaro, Eastern Capital City, Eurobodalla, Gloucester, Greater Argyle, Guyra, Hawkesbury, Lithgow, Oberon, Severn, Shoalhaven, Snowy River, Tenterfield, Tumbarumba, Tumut, Upper Lachlan and Wingecarribee but may occur elsewhere in these bioregions. Bioregions are defined in Thackway and Cresswell (1995).

8. A number of vegetation surveys and mapping studies have been conducted across the range of Montane Peatlands and Swamps of the New England Tableland, NSW North Coast, Sydney Basin, South East Corner, South Eastern Highlands and Australian Alps bioregions. In Whinam and Chilcott's (2002) classification of peatland vegetation, this community includes 'Tea-tree *Sphagnum* Peatlands' (Group 3), 'Shrubby herbaceous *Sphagnum* peatlands' (Group 4), 'Shrubby-sedgey *Sphagnum* peatlands' (Group 5), 'Heathy *Sphagnum* Peatlands' (Group 6), 'Barrington drainage line *Sphagnum* Swamps' (Group 7), 'Degraded *Sphagnum* Moss Beds' (Group 8) and 'Alpine *Sphagnum* peatlands' (Group 9). In the New England bioregion, this community includes 'Heath Swamps on Leucogranite and Granite' (map unit 20) of Benson and Ashby (2000), 'Plateau Wet Herbfield' (map unit 1) and 'Wet Heath' (map unit 5) of Clarke *et al.* (2000), and the *Sphagnum* bogs described by Millington (1954). In the Barrington Tops area, this community includes the swamps described by Mort (1983), 'Sedgeland' (Community 12) of Zoete (2000) and 'Subalpine bogs' of Fraser & Vickery (1939). On the central tablelands, this community includes 'Coxs River swamps' (map unit 20b) and 'Boyd plateau bogs' (map unit 26b) of Keith & Benson (1988) and Benson & Keith (1990); 'Highlands peat swamp' (map unit 25a) and 'Bindook highlands grassland' (map unit 18) of NPWS (2003); and the swamps and bogs described by Black (1976) and Kodela *et al.* (1996). On the southern tablelands, this community includes peatlands described by Hope & Southern (1981), including Wingecarribee swamp (Kodela *et al.* 2001); 'Montane Wet Heath/Bog' (map unit 123), 'Western Montane Wet Heath/Herb Grass Woodland' (map unit 124), 'Montane Wet Heath/Herb Grassland' (map unit 125), and 'Montane Wet Sedgeland' (map unit 126) of Thomas *et al.* (2000); and 'Tableland Bog' (map unit 53) and 'Shrubby Swamp Meadow' (map unit 5557) of Tindall *et al.* (2004); 'Subalpine Bog' (map unit 59) of Keith & Bedward (1999); and '*Carex gaudichaudiana* Alliance', '*Epacris paludosa* – *Sphagnum cymbifolium* Alliance' and '*Carex gaudichaudiana* – *Sphagnum cymbifolium* Alliance' of Costin (1954). In the Kosciusko-Monaro district, this community also includes the *Sphagnum* peatlands of Clarke & Martin (1999), the '*Carex gaudichaudiana*' and '*Epacris paludosa*' alliances of Costin (1954), 'Bog and Fen' (map unit 9) of Wimbush & Costin (1973) and the '*Poa* association', '*Poa-Restio* ecotone', '*Restio* associates', '*Hypolaena* associates', '*Richea* associates', '*Epacris* associates', '*Callistemon* consociation' and '*Baeckea* consociation' of McLuckie & Petrie (1927). Montane Peatlands and Swamps of the New England Tableland, NSW North Coast, Sydney Basin, South East Corner, South Eastern Highlands and Australian Alps bioregions included within the 'Montane Bogs and Fens' and 'Alpine Bogs and Fens' vegetation classes of Keith (2002, 2004). There may be additional or unmapped occurrences of Montane Peatlands and Swamps within and beyond these surveyed areas.
9. Montane Peatlands and Swamps of the New England Tableland, NSW North Coast, Sydney Basin, South East Corner, South Eastern Highlands and Australian Alps bioregions are threatened by land clearing; grazing, trampling and soil disturbance caused by feral pigs, goats, deer, horses and domestic livestock; damage to vegetation and soils by off-road vehicles; peat mining; frequent or high-intensity fires; pollution and eutrophication from urban areas, cropping and improved pastures in the catchment; weed invasion; changes to water tables and surface flows caused by drainage works or altered flows in the catchment; erosion and sedimentation; and climate change.
10. Losses of Montane Peatlands and Swamps of the New England Tableland, NSW North Coast, Sydney Basin, South East Corner, South Eastern Highlands and Australian Alps bioregions due to land clearing are difficult to estimate. However, estimates vary from about 20% in the Guyra district (Benson and Ashby 2000) to more than 75% in the far southeast of NSW (Keith and Bedward 1999). Clearing of catchments for pastures or plantations, and earthworks associated with road or track construction may also adversely affect peatlands by causing erosion, sedimentation or changes in hydrology (Whinam & Chilcott 2002). Clearing of native vegetation is listed as a Key Threatening Process under the Threatened Species Conservation Act (1995).
11. Overgrazing may cause changes in species composition by reducing the abundance of the most palatable plants, as well as woody species with poor regenerative capacity (Whinam & Chilcott (2002). Trampling by hooved animals, such as pigs, goats, deer, horses or cattle, causes channelling of water flow, which may lead to erosion or drying in different parts of a peatland (Whinam & Chilcott 2002). Digging and rooting by feral pigs and horses may also cause severe damage to vegetation and soils, even in conservation reserves, such as Kosciuszko and Kanangra-Boyd National Parks, where control measures are carried out (Whinam & Chilcott 2002). Predation, habitat destruction, competition and disease transmission by feral pigs, Competition and habitat degradation by feral goats, and Herbivory and environmental degradation caused by feral deer are listed as a Key Threatening Processes under the Threatened Species Conservation Act (1995).
12. Peat mining, although localised, may have catastrophic impacts on the hydrology and ecological function of Montane Peatlands and Swamps. For example, peat was extracted from Wingecarribee Swamp, the largest peatland on mainland Australia, for 25 years until it underwent a massive structural collapse in 1998 (Arachchi & Lambkin 1999). The collapse left only 20% of the swamp intact, with the remainder affected by drying, fissuring and oxidation of the peat, loss of *Sphagnum* and herbaceous flora and the expansion of

Leptospermum juniperinum and exotic woody species such as *Rubus fruticosus* agg. and *Salix* spp. (Kodala *et al.* 2001). Underground mining of coal may also affect the hydrology of Montane Peatlands and Swamps where subsidence causes fissuring and subsequent drying or erosion (Young 1982), or where mine water is disposed into swamps and alters surface flows or causes erosion or sedimentation. Changes to hydrology may also result from the construction of drainage channels for agricultural land use or earthworks associated with infrastructure, such as roads, pipelines or other constructions. Alteration to the natural flow regimes of rivers, streams, floodplains and wetlands is listed as a Key Threatening Process under the Threatened Species Conservation Act (1995).

13. Some areas of Montane Peatlands and Swamps are exposed to high frequency fire, which alters species composition by favouring fire-tolerant sedges at the expense of woody plants that are slow to regenerate after fire (Keith 1996) and by creating exposed conditions unsuitable for the recovery of *Sphagnum* (Whinam *et al.* 1989, 2001). Survival of rhizomatous species, such as *Baloskion australe* and *Empodisma minus*, and tussock sedges, such as *Carex gaudichaudiana*, is important for the maintenance of substrate integrity after fire. Elimination of woody species by frequent burning is likely to be accelerated by grazing. Under dry conditions, fires may consume peat, resulting in the complete death of surface vegetation and seed banks, and exposure of the remaining substrate to further erosion. Changes that follow peat fires may therefore be long-lasting (Keith 1996). High frequency fire is listed as a Key Threatening Process under the Threatened Species Conservation Act (1995).
14. Pollution and eutrophication of peatlands is caused by run off or drift of fertilisers, pesticides, waste water, storm water and other pollutants from adjacent pastures and developed industrial or urban areas. This results in the replacement of native peatland vegetation by exotic weeds at a rate determined by the chemical composition and input rate of the pollutants. Common weed species include *Rubus fruticosus* agg. (blackberries), *Salix* spp. (willows), *Pinus radiata*, *Dactylis glomerata* (cocksfoot), *Cirsium vulgare* (spear thistle), *Conyza bonariensis* (fleabane), *Hypochaeris radicata* (cats ear), *Lotus uliginosus*, *Ranunculus repens* (creeping buttercup), *Taraxicum officinale* (dandelion), *Anthoxanthum odoratum* (sweet vernal grass), *Holcus lanatus* (Yorkshire fog), *Paspalum dilatatum*, *Juncus articulatus*. Invasion of native plant communities by exotic perennial grasses is listed as a Key Threatening Process under the Threatened Species Conservation Act (1995).
15. Climate change may threaten the persistence of Montane Peatlands and Swamps through the alteration of hydrological budgets (Hughes 2003). Reduced precipitation and increased evaporation rates are likely to cause drying and contraction of peatlands (Whinam *et al.* 2003). There may also be indirect impacts if climate change results in higher fire frequencies and greater incidence of peat fires. Anthropogenic climate change is listed as a Key Threatening Process under the Threatened Species Conservation Act (1995).
16. Montane Peatlands and Swamps of the New England Tableland, NSW North Coast, Sydney Basin, South East Corner, South Eastern Highlands and Australian Alps bioregions is currently known from conservation reserves including Werrikimbee, Barrington, Kanangra-Boyd, Monga, Wadbilliga, South East Forests and Kosciusko National Parks. However, these examples are generally small, unrepresentative of the range of variation in the community, affected by past disturbances and continue to be threatened by some of the processes described above (Whinam & Chilcott 2002, Whinam *et al.* 2003). Analogous communities occur in Victoria, where the community is listed as threatened under the Flora and Fauna Guarantee Act, and in the Australian Capital Territory.
17. In view of the above, the Scientific Committee is of the opinion that Montane Peatlands and Swamps of the of the New England Tableland, NSW North Coast, Sydney Basin, South East Corner, South Eastern Highlands and Australian Alps bioregions is facing a high risk of becoming extinct in nature in New South Wales unless the circumstances and factors threatening its survival or evolutionary development cease to operate.

Dr Richard Major

Chairperson

Scientific Committee

References

- Arachchi B, Lambkin KJ (1999) Wingecarribee Reservoir Swamp failure. *ANCOLD Bulletin* **113**, 37-45.
- Benson DH, Keith DA (1990) The natural vegetation of the Wallerawang 1:100 000 map sheet. *Cunninghamia* **2**, 305-35.
- Benson JS, Ashby EM (2000) The natural vegetation of the Guyra 1:100 000 map sheet, New England Bioregion of New South Wales. *Cunninghamia* **6**, 747-872.
- Black D (1976) An exploratory survey of the vegetation of the Boyd Plateau. MSc thesis, University of Sydney.
- Clarke PJ, Martin RH (1999) *Sphagnum* peatlands of Kosciuszko National Park in relation to altitude, time and disturbance. *Australian Journal of Botany* **47**, 519-36.
- Clarke PJ, Copeland LM, Noble NE, Bale CL, Williams JB (2000) 'The vegetation and plant species of New England National Park.' University of New England, Armidale.
- Costin AB (1954) 'A study of the ecosystem of the Monaro region of New South Wales with special reference to soil erosion.' (AH Pettifer, Government Printer: Sydney).
- Fraser L, Vickery JW (1939) The ecology of the upper William River and Barrington Tops district. I. Introduction. *Proceedings of the Linnean Society of New South Wales* **64**, 1-33.
- Hope G & Southern W (1981) 'Organic deposits of the Southern Tablelands region, New South Wales.' NSW National Parks and Wildlife Service, Sydney.
- Hughes L (2003) Climate change and Australia: trends, projections and impacts. *Austral Ecology* **28**, 423-443.
- Keith DA (1996) Fire-driven mechanisms of extinction in vascular plants: a review of empirical and theoretical evidence in Australian vegetation. *Proceedings of the Linnean Society of New South Wales* **116**, 37-78.
- Keith DA, Benson DH (1988) The natural vegetation of the Katoomba 1:100 000 map sheet. *Cunninghamia* **2**, 107-43.
- Keith DA, Bedward M (1999) Vegetation of the South East Forest region, Eden, New South Wales. *Cunninghamia* **6**, 1-218.
- Keith DA (2002) *A compilation map of native vegetation for New South Wales NSW Biodiversity Strategy*. NSW National Parks and Wildlife Service, Sydney
- Keith DA (2004) 'Ocean shores to desert dunes: the native vegetation of New South Wales and the ACT.' (NSW Department of Environment and Conservation, Sydney.)
- Kodala PG, James TA, Hind PD (1996) Vegetation and flora of the swamps on the Boyd Plateau, Central Tablelands, New South Wales. *Cunninghamia* **4**, 525-30.
- Kodala PG, Sainty GR, Bravo FJ, James TA (2001) 'Wingecarribee Swamp flora survey and related management issues.' Sydney Catchment Authority, New South Wales.
- McLuckie J, Petrie AHK (1927) The vegetation of the Kosciusko Plateau. *Proceedings of the Linnean Society of New South Wales* **52**, 94-113.
- Millington RJ (1954) *Sphagnum* bogs of the New England Plateau, New South Wales. *Journal of Ecology* **42**, 328-344.
- Mort SJ (1983) The Barrington Tops swamps - flora, ecology and conservation. BSc(Hons) thesis, University of New South Wales.
- NPWS (2003) *The Native Vegetation of the Warragamba Special Area*. Technical Report. NSW National Parks and Wildlife Service, Sydney

- Thackway R, Cresswell ID (1995) (eds) 'An interim biogeographic regionalisation of Australia: a framework for establishing the national system of reserves.' (Version 4.0 Australian Nature Conservation Agency: Canberra).
- Thomas V, Gellie N, Harrison T (2000) 'Forest ecosystem classification and mapping for the southern Comprehensive Regional Assessment.' NSW National Parks and Wildlife Service, Queanbeyan.
- Tindall D, Pennay C, Tozer MG, Turner K, Keith DA (2004) 'Native vegetation map report series. No. 4. Araluen, Batemans Bay, Braidwood, Burragorang, Goulburn, Jervis Bay, Katoomba, Kiama, Moss Vale, Penrith, Port Hacking, Sydney, Taralga, Ulladulla, Wollongong.' NSW Department of Environment and Conservation and NSW Department of Infrastructure, Planning and Natural Resources, Sydney.
- Whinam J, Barmuta LA, Chilcott N (2001) Floristic descriptions and environmental relationships of Tasmanian *Sphagnum* communities and their conservation management. *Australian Journal of Botany* **4**, 673-685.
- Whinam J, Chilcott N (2002) Floristic description and environmental relationships of *Sphagnum* communities in NSW and the ACT and their conservation management. *Cunninghamia* **7**, 463-500.
- Whinam J, Eberhard S, Kirkpatrick J, Moscal T (1989) 'Ecology and conservation of *Sphagnum* peatlands in Tasmania.' Tasmanian Conservation Trust Inc., Hobart.
- Whinam J, Hope GS, Clarkson BR, Buxton RP, Alspach PA, Adam P (2003) *Sphagnum* in peatlands of Australasia: their distribution, utilisation and management. *Wetland Ecology and Management* **11**, 37-49.
- Wimbush DJ, Costin AB (1973) 'Vegetation mapping in relation to ecological interpretation and management in the Kosciusko alpine area.' CSIRO, Plant Industry Technical paper No. 32, Melbourne.
- Young ARM (1982) Upland swamps (dells) on the Woronora plateau, N.S.W. PhD thesis, University of Wollongong.
- Zoete T (2000) Vegetation Survey of the Barrington Tops and Mount Royal National Parks for use in Fire Management. *Cunninghamia* **6**, 511-78.

NSW SCIENTIFIC COMMITTEE

**Determination to make a minor amendment to Part 3 of Schedule 1
of the Threatened Species Conservation Act**

The Scientific Committee, established by the Threatened Species Conservation Act, has made a to make a minor amendment to Part 3 of Schedule 1 (Endangered ecological communities) of the Act by inserting the Subtropical Coastal Floodplain Forest of the NSW North Coast bioregion (as described in the determination of the Scientific Committee under Division 5 Part 2) and as a consequence to omit reference to the Subtropical Coastal Floodplain Forest of the NSW North Coast bioregion (as described in the final determination to list the ecological community) which was published on pages 9427 to 9431 in the NSW Government Gazette No. 200 dated 17 December 2004. Minor amendments to the Schedules are provided for by Division 5 of Part 2 of the Act.

The Scientific Committee is of the opinion that the amendment is necessary or desirable to correct an omission in the Determination in relation to the Thackway and Cresswell (1995) reference.

The Scientific Committee has found that:

1. Subtropical Coastal Floodplain Forest of the NSW North Coast bioregion is the name given to the ecological community associated with clay-loams and sandy loams, on periodically inundated alluvial flats, drainage lines and river terraces associated with coastal floodplains. Floodplains are level landform patterns on which there may be active erosion and aggradation by channelled and overbank stream flow with an average recurrence interval of 100 years or less (adapted from Speight 1990). Subtropical Coastal Floodplain Forest generally occurs below 50 m, but may occur on localised river flats up to 250 m elevation in the NSW North Coast bioregion. The structure of the community may vary from tall open forests to woodlands, although partial clearing may have reduced the canopy to scattered trees. Typically these forests and woodlands form mosaics with other floodplain forest communities and treeless wetlands, and often they fringe treeless floodplain lagoons or wetlands with semi-permanent standing water (e.g. Pressey 1989a).

The composition of Subtropical Coastal Floodplain Forest is primarily determined by the frequency and duration of waterlogging and the texture, nutrient and moisture content of the soil. Composition also varies with latitude. The community is characterised by the following assemblage of species:

<i>Acacia concurrens</i>	<i>Acacia disparrima subsp. disparrima</i>
<i>Allocasuarina torulosa</i>	<i>Alphitonia excelsa</i>
<i>Angophora paludosa</i>	<i>Angophora subvelutina</i>
<i>Angophora woodsiana</i>	<i>Aristida vagans</i>
<i>Brachychiton populneus subsp. populneus</i>	<i>Breynia oblongifolia</i>
<i>Brunoniella australis</i>	<i>Callistemon salignus</i>
<i>Callistemon viminalis</i>	<i>Callitris columellaris</i>
<i>Casuarina cunninghamiana subsp. cunninghamiana</i>	<i>Casuarina glauca</i>
<i>Centella asiatica</i>	<i>Cheilanthes sieberi subsp. sieberi</i>
<i>Cissus hypoglauca</i>	<i>Commelina cyanea</i>
<i>Commersonia bartramia</i>	<i>Commersonia fraseri</i>
<i>Cordyline congesta</i>	<i>Corymbia intermedia</i>
<i>Cupaniopsis anacardioides</i>	<i>Cupaniopsis parviflora</i>
<i>Cymbidium suave</i>	<i>Cymbopogon refractus</i>
<i>Cyperus enervis</i>	<i>Desmodium rhytidophyllum</i>
<i>Desmodium varians</i>	<i>Dianella caerulea</i>
<i>Dianella longifolia</i>	<i>Dichelachne micrantha</i>
<i>Dichondra repens</i>	<i>Digitaria parviflora</i>
<i>Drypetes australasica</i>	<i>Echinopogon caespitosus var. caespitosus</i>
<i>Elaeocarpus reticulatus</i>	<i>Entolasia marginata</i>
<i>Entolasia stricta</i>	<i>Eragrostis leptostachya</i>
<i>Eucalyptus acmeniodes</i>	<i>Eucalyptus amplifolia</i>
<i>Eucalyptus moluccana</i>	<i>Eucalyptus propinqua</i>
<i>Eucalyptus resinifera subsp. hemilampra</i>	<i>Eucalyptus robusta</i>
<i>Eucalyptus seeana</i>	<i>Eucalyptus siderophloia</i>
<i>Eucalyptus tereticornis</i>	<i>Eustrephus latifolius</i>
<i>Ficus macrophylla subsp. macrophylla</i>	<i>Ficus obliqua</i>
<i>Ficus superba var. henneana</i>	<i>Gahnia aspera</i>
<i>Gahnia clarkei</i>	<i>Geitonoplesium cymosum</i>
<i>Glochidion ferdinandii</i>	<i>Glycine clandestina</i>
<i>Hardenbergia violacea</i>	<i>Hibbertia scandens</i>
<i>Hibiscus diversifolius</i>	<i>Hibiscus tiliaceus</i>
<i>Hovea acutifolia</i>	<i>Imperata cylindrica var. major</i>
<i>Kennedia rubicunda</i>	<i>Lagenifera stipitata</i>
<i>Laxmannia gracilis</i>	<i>Lomandra filiformis</i>
<i>Lomandra longifolia</i>	<i>Lomandra multiflora subsp. multiflora</i>
<i>Lophostemon suaveolens</i>	<i>Maclura cochinchinensis</i>
<i>Mallotus philippensis</i>	<i>Melaleuca alternifolia</i>
<i>Melaleuca decora</i>	<i>Melaleuca nodosa</i>

<i>Melaleuca quinquenervia</i>	<i>Melaleuca styphelioides</i>
<i>Microlaena stipoides</i> var. <i>stipoides</i>	<i>Morinda jasminoides</i>
<i>Notelaea longifolia</i>	<i>Oplismenus aemulus</i>
<i>Oplismenus imbecillis</i>	<i>Panicum simile</i>
<i>Parsonsia straminea</i>	<i>Persoonia stradbrokeensis</i>
<i>Phyllanthus virgatus</i>	<i>Pimelea linifolia</i>
<i>Pittosporum revolutum</i>	<i>Pratia purpurascens</i>
<i>Pteridium esculentum</i>	<i>Sigesbeckia orientalis</i>
<i>Smilax australis</i>	<i>Smilax glycyphylla</i>
<i>Stephania japonica</i> var. <i>discolor</i>	<i>Themeda australis</i>
<i>Tricoryne elatior</i>	<i>Vernonia cinerea</i>
<i>Viola hederacea</i>	<i>Wikstroemia indica</i>

- The total species list of the community is considerably larger than that given above, with many species present at only one or two sites or in low abundance. The species composition of a site will be influenced by the size of the site, recent rainfall or drought conditions and by its disturbance (including fire, grazing, flooding and land clearing) history. The number and relative abundance of species will change with time since fire, flooding or significant rainfall, and may also change in response to changes in grazing regimes. At any one time, above-ground individuals of some species may be absent, but the species may be represented below ground in the soil seed banks or as dormant structures such as bulbs, corms, rhizomes, rootstocks or lignotubers. The list of species given above is of vascular plant species, the community also includes micro-organisms, fungi, cryptogamic plants and a diverse fauna, both vertebrate and invertebrate. Some of these components of the community are poorly documented.
- Subtropical Coastal Floodplain Forest of the NSW North Coast bioregion is known from parts of the Local Government Areas of Tweed, Byron, Lismore, Ballina, Richmond Valley, Clarence Valley, Coffs Harbour, Bellingen, Nambucca, Kempsey, Hastings, Greater Taree, Great Lakes and Port Stephens, but may occur elsewhere in this bioregion. Bioregions are defined in Thackway and Cresswell (1995). Major examples once occurred on the floodplains of the Tweed, Richmond, Clarence, Macleay, Hastings and Manning Rivers, although smaller floodplains would have also supported considerable areas of this community.
- Subtropical Coastal Floodplain Forest of the NSW North Coast bioregion has a tall open tree layer of eucalypts, which may exceed 40 m in height, but can be considerably shorter in regrowth stands or under conditions of lower site quality. While the composition of the tree stratum varies considerably, the most widespread and abundant dominant trees include *Eucalyptus tereticornis* (forest red gum), *E. siderophloia* (grey ironbark), *Corymbia intermedia* (pink bloodwood) and, north of the Macleay floodplain, *Lophostemon suaveolens* (swamp turpentine). Other trees may be scattered throughout at low abundance or locally common at few sites, particularly where there is an influence from lithic substrates upslope. These include *Eucalyptus moluccana* (grey box), *E. propinqua* (grey gum), *E. seeana* (narrow-leaved red gum), *Angophora subvelutina* (broad-leaved apple), *E. robusta* (swamp mahogany), *Eucalyptus resinifera* subsp. *hemilampra* (red mahogany), *E. acmenoides* (white mahogany), *Angophora woodsiana*, *A. paludosa* and rainforest trees such as *Ficus* spp. (figs) and *Cupaniopsis* spp (tuckeroos). A layer of small trees may be present, including *Allocasuarina torulosa* (forest oak), *Alphitonia excelsa* (red ash), *Glochidion ferdinandi* (cheese tree), *Callistemon* spp. (bottlebrushes), *Melaleuca* spp. (paperbarks) and *Casuarina glauca* (swamp oak). Scattered shrubs include *Breynia oblongifolia* (coffee bush), *Acacia concurrens* (curracabah), *Commersonia* spp., and *Hibiscus* spp. Occasional vines include *Eustrephus latifolius* (wombat berry), *Parsonsia straminea* (common silkpod) and *Geitonoplesium cymosum* (scrambling lily). The groundcover is composed of abundant forbs, scramblers and grasses including *Imperata cylindrica* var. *major* (blady grass), *Themeda australis* (kangaroo grass), *Vernonia cinerea*, *Dianella caerulea* (blue flax lily), *Pratia purpurascens* (whiteroot), *Cheilanthes sieberi* subsp. *sieberi*, and *Dichondra repens* (kidney weed). The composition and structure of the understorey is influenced by grazing and fire history, changes to hydrology and soil salinity and other disturbance, and may have a substantial component of exotic grasses, vines and forbs.
- Subtropical Coastal Floodplain Forest of the NSW North Coast bioregion provides habitat for a broad range of animals, including many that are dependent on trees for food, nesting or roosting (Law *et al.* 2000). These include species of Cormorant (*Phalacrocorax* spp.) and Egret (*Ardea* spp. and *Egretta* spp.), the Black-necked Stork (*Ephippiorhynchus asiaticus*), Osprey (*Pandion haliaetus*), Brahminy Kite (*Haliastur indus*), Whistling Kite (*Haliastur sphenurus*), White-bellied Sea-eagle (*Haliaeetus leucogaster*), as well as the Brush-tailed Phascogale (*Phascogale tapoatafa*), Squirrel Glider (*Petaurus norfolcensis*), Common Blossum Bat (*Syconycteris australis*) (Law 1994) and Grey-headed Flying Fox (*Pteropus poliocephalus*). The fauna of Subtropical Coastal Floodplain Forest also includes several species of southern frog (family Myobatrachidae) and tree frog (family Hylidae), such as the threatened *Litoria brevipalmata*, , and many species of forest birds including honeyeaters, kingfishers, cuckoos, owls, doves, whistlers and fantails.
- Subtropical Coastal Floodplain Forest of the NSW North Coast bioregion forms part of a complex of forested and treeless wetland communities found throughout the coastal floodplains of NSW. A recent analysis of available quadrat data from these habitats identified a distinct grouping of vegetation samples attributable to this community (Keith and Scott 2005). The combination of features that distinguish Subtropical Coastal Floodplain Forest from other endangered ecological communities on the coastal floodplains include: its dominance by a mixed eucalypt canopy, often with *Lophostemon suaveolens*; the presence of rainforest elements as scattered trees or understorey plants; the relatively low abundance or sub-dominance of *Casuarina* and *Melaleuca* species; the relatively low abundance of *Eucalyptus robusta*; and the prominent groundcover of soft-leaved forbs and grasses. It may occupy central or marginal parts of floodplains and sandy

flats, including Pleistocene back-barrier flats (Pressey and Griffith 1992); habitats where flooding is periodic and soils are rich in silt and sand, sometimes humic, and show little influence of saline ground water.

7. Subtropical Coastal Floodplain Forest may adjoin or intergrade with several other endangered ecological communities, which collectively cover all remaining native vegetation on the coastal floodplains of New South Wales. These include Lowland Rainforest on Floodplain in the NSW North Coast bioregion, River-Flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions (including the formerly listed Sydney Coastal River-flat Forest in the Sydney Basin bioregion), Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions (including the formerly listed Sydney Coastal Estuary Swamp Forest in the Sydney Basin bioregion), Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and South East Corner bioregions and Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions. For example, south from the Manning valley, Subtropical Coastal Floodplain Forest of the NSW North Coast bioregion may adjoin or intergrade with River-Flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions. As soil salinity increases Subtropical Coastal Floodplain Forest may intergrade with, and be replaced by, Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and South East Corner bioregions. As soils become sandier and more waterlogged, Subtropical Coastal Floodplain Forest may intergrade with, and be replaced by, Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions. The boundaries between all of these communities are dynamic and may shift in response to changes in hydrological regimes, fire regimes or land management practices. The Determinations for these communities collectively encompass the full range of intermediate assemblages in transitional habitats.
8. A number of vegetation surveys and mapping studies have been conducted across the range of Subtropical Coastal Floodplain Forest of the NSW North Coast bioregion. In the Comprehensive Regional Assessment of the north-eastern NSW (NPWS 1999), areas mapped as 'Forest Ecosystem 46, Eastern Red Gum', and those parts of areas mapped as 'Forest Ecosystem 73, Lowland Red Gum' on coastal floodplains are included within this community. On the Tweed lowlands, this community includes *Eucalyptus tereticornis*-*E. intermedia*-*Lophostemon suaveolens* tall to very tall open forest' (F5) of Pressey and Griffith (1992) and parts of the 'Floodplain Wetland Complex' (FL) dominated by eucalypts or *Lophostemon suaveolens* (Pressey and Griffith 1992). Subtropical Coastal Floodplain Forest of the NSW North Coast bioregion is included within the 'Coastal Floodplain Wetlands' vegetation class of Keith (2002, 2004). There may be additional or unmapped occurrences of Subtropical Floodplain Forest within and beyond these surveyed areas.
9. The extent of the Subtropical Coastal Floodplain Forest of the NSW North Coast bioregion prior to European settlement has not been mapped across its entire range. However, one estimate based on a compilation of regional vegetation maps suggests that Coastal Floodplain Wetlands, which include Subtropical Coastal Floodplain Forest, currently cover 800-1400 km², representing less than 30% of the original extent of this broadly defined vegetation class (Keith 2004). Compared to this combined estimate, the remaining area of Subtropical Coastal Floodplain Forest is likely to be considerably smaller and is likely to represent much less than 30% of its original range. For example, there were less than 350 ha of native floodplain vegetation on the Tweed lowlands in 1985 (Pressey and Griffith 1992).
10. Subtropical Coastal Floodplain Forest of the NSW North Coast bioregion has been extensively cleared and modified. Large areas that formerly supported this community are occupied by exotic pastures grazed by cattle, market gardens, other cropping enterprises (e.g. sorghum, corn, poplars, etc.) and, on the far north coast, canefields and tea-tree plantations. On the Tweed lowlands, Pressey and Griffith (1992) estimated that less than 3% of the original Floodplain Wetlands and Floodplain Forest remained in 1985. Similar estimates are likely to apply to Subtropical Coastal Floodplain Forest in other parts of the NSW North Coast bioregion (Goodrick 1970, Pressey 1989a, 1989b, NPWS 1999).
11. Land clearing continues to threaten Subtropical Coastal Floodplain Forest of the NSW North Coast bioregion. Little of the remaining area occurs on public land (e.g. Pressey and Griffith 1992), with most occurring on productive agricultural land or in close proximity to rural centres. Conversion of grazing farms to cropping often involves removal of isolated paddock trees and disturbed patches of vegetation, which locally may be the only remnants of the community. The remaining stands are severely fragmented by past clearing and further threatened by continuing fragmentation and degradation, flood mitigation and drainage works, landfilling and earthworks associated with urban and industrial development, pollution from urban and agricultural runoff, weed invasion, inappropriate grazing, trampling and other soil disturbance by domestic livestock and feral animals including pigs, activation of 'acid sulfate soils' and rubbish dumping (e.g. Pressey 1989a, b; Pressey and Griffith 1992, Boulton and Brock 1999). Anthropogenic climate change may also threaten Subtropical Coastal Floodplain Forest if future flooding regimes are affected (IPCC 2001, Hughes 2003). Localised areas, particularly those within urbanised regions, may also be exposed to frequent burning which reduces the diversity of woody plant species. Clearing of native vegetation; Alteration to the natural flow regimes of rivers, streams, floodplains and wetlands; Invasion of native plant communities by exotic perennial grasses; Predation, habitat destruction, competition and disease transmission by feral pigs; Anthropogenic climate change; High frequency fire and Removal of dead wood and dead trees are listed as Key Threatening Processes under the Threatened Species Conservation Act (1995).
12. Large areas of habitat formerly occupied by Subtropical Coastal Floodplain Forest have been directly drained by construction of artificial channels (e.g. Pressey 1989a, Boulton and Brock 1999). By the early 1900s, drainage unions or trusts were formed on the major floodplains to enable adjacent landholders to arrange for co-ordinated drainage systems, which were designed and constructed by the NSW Department of Public Works. Additional areas that have not been

directly drained may have been altered hydrologically by changed patterns of flooding and drainage following flood mitigation works, particularly the construction of drains, levees and floodgates (Pressey and Griffith 1992). On the north coast of NSW, expansion of *Melaleuca quinquenervia* and *Casuarina glauca* has been attributed to artificial drainage and shortening of the hydroperiod (Johnston *et al.* 2003). These changes appear to be closely associated with enhanced acidity, altered ionic ratios, increased dissolved organic carbon and sulfide oxidation in the soil profile (Johnston *et al.* 2003).

13. Very few examples of Subtropical Coastal Floodplain Forest remain unaffected by weeds. The causes of weed invasion include physical disturbance to the vegetation structure of the community, dumping of landfill rubbish and garden refuse, polluted runoff from urban and agricultural areas, construction of roads and other utilities, and grazing by domestic livestock. The principal weed species affecting Subtropical Coastal Floodplain Forest include *Araujia sericiflora* (moth plant), *Asparagus asparagoides* (bridal creeper), *A. plumosus* (climbing asparagus fern), *Axonopus* spp. (carpet grasses), *Baccharis halimifolia* (groundsel bush), *Bidens pilosa* (cobble's peg), *Cinnamomum camphora* (camphor laurel), *Conyza* spp. (fleabanes), *Hypochaeris radicata* (catsear), *Ipomoea* spp. (morning glories), *Lantana camara*, *Ligustrum sinense* (small-leaved privet), *L. lucidum* (large-leaved privet), *Lonicera japonica* (Japanese honeysuckle), *Olea europaea* subsp. *cuspidata* (African olive), *Paspalum dilatatum* (paspalum), *Pennisetum clandestinum* (kikuyu), *Rubus fruticosus* agg. (blackberries), *Senecio madagascariensis* (fireweed), *Setaria parviflora* (slender pigeon grass), *Sida rhombifolia* (Paddy's lucerne), *Solanum mauritianum* (wild tobacco bush), *S. nigrum* (black-berry nightshade), *Tradescantia fluminensis* (wandering jew) and *Verbena bonariensis* (purpletop) (Keith and Scott 2005).
14. Small areas of Subtropical Coastal Floodplain Forest of the NSW North Coast bioregion are contained within existing conservation reserves, including Stotts Island, Ukerebagh and Limeburners Creek Nature Reserves and Bundjalung and Myall Lakes National Parks, and these are unevenly distributed throughout the range and unlikely to represent the full diversity of the community.
15. In view of the above the Scientific Committee is of the opinion that Subtropical Coastal Floodplain Forest of the NSW North Coast bioregion is likely to become extinct in nature in New South Wales unless the circumstances and factors threatening its survival or evolutionary development cease to operate.

Dr Richard Major

Chairperson

Scientific Committee

References

- Boulton AJ, Brock MA (1999). 'Australian freshwater wetlands: processes and management.' (Gleneagles Publishing, Glen Osmond.)
- Goodrick GN (1970) A survey of wetlands of coastal New South Wales. Technical Memorandum No. 5. CSIRO, Canberra.
- Hughes L (2003) Climate change and Australia: trends, projections and impacts. *Austral Ecology* **28**, 423-443.
- IPCC (2001) Climate change 2001: Impacts, adaptation and vulnerability. Report from Working Group II. Intergovernmental Panel on Climate Change, Geneva.
- Johnston SG, Slavich PG, Hirst P (2003) Alteration of groundwater and sediment geochemistry in a sulfidic backswamp due to *Melaleuca quinquenervia* encroachment. *Australian Journal of Soil Research* **41**, 1343-1367.
- Keith DA (2002) 'A compilation map of native vegetation for New South Wales.' (NSW Biodiversity Strategy. NSW National Parks and Wildlife Service, Sydney.)
- Keith DA (2004) 'Ocean shores to desert dunes: the native vegetation of New South Wales and the ACT.' (NSW Department of Environment and Conservation, Sydney.)
- Keith DA, Scott J (2005) 'Native vegetation of coastal floodplains—a broad framework for definition of communities in NSW. *Pacific Conservation Biology* **11**, in press.
- Law BS (1994) Nectar and pollen: dietary items affecting the abundance of the Common blossom bat (*Syconycteris australis*) in NSW *Australian Journal of Ecology* **19**, 425-434.
- Law BS, Mackowski C, Schoer L, Tweedie T (2002b) The flowering phenology of myrtaceous trees and their relation to environmental and disturbance variables in Northern New South Wales. *Austral Ecology* **25**, 160-178.
- NPWS (1999) Forest ecosystem classification and mapping for the upper and lower north east Comprehensive Regional Assessment. NSW National Parks and Wildlife Service, Coffs Harbour.
- Pressey RL (1989a) Wetlands of the lower Clarence floodplain, northern coastal New South Wales. *Proceedings of the Linnean Society of NSW* **111**, 143-155.
- Pressey RL (1989b) Wetlands of the lower Macleay floodplain, northern coastal New South Wales. *Proceedings of the Linnean Society of NSW* **111**, 157-168.
- Pressey RL, Griffith SJ (1992) Vegetation of the coastal lowlands of Tweed shire, northern New South Wales, species and conservation. *Proceedings of the Linnean Society of NSW* **113**, 203-243.
- Speight JG (1990) Landform. In: 'Australian soil and land survey. Field handbook' Second edition (Eds. RC McDonald, RF Isbell, JG Speight, J, Walker, MS Hopkins), pp9-57. Inkata Press, Melbourne.
- Thackway R, Cresswell ID (1995) (eds) 'An interim biogeographic regionalisation of Australia: a framework for establishing the national system of reserves.' (Version 4.0 Australian Nature Conservation Agency: Canberra).

ISSN 0155-6320

Authorised to be printed
DENIS H. HELM, Government Printer.