

Ecological Impacts of a Proposed Residential Care Facility at Middle Head



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Date: 1/08/14

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Background

This expert ecological review of the proposal for a residential care facility at Middle Head was commissioned by the Headland Preservation Group Inc.. This report does not review any Flora and Fauna report that accompanies the proposal as it appears there has not been any ecological survey or impact assessment carried out for this proposal.

This report assesses the impact the proposed works are likely to have on ecological conservation values of the site and adjacent land.

The proposal is on Middle Head which is a prominent headland situated at the entrance to Sydney Harbour. The land to be developed is Federal land managed by the Sydney Harbour Federation Trust, which is bordered on the eastern, down slope, side by bushland that is part of Sydney Harbour National Park. See Map 1.

The locality is known to be an important area of habitat for many threatened plants and animals, and also contains Critically Endangered (EPBC Act) Littoral Rainforest Ecological Community. The most relevant threatened flora and fauna to this proposal are the Sunshine Wattle (*Acacia terminalis ssp. terminalis*), Barking Owl, Grey-headed Flying Fox and the Eastern Bentwing-bat. These species and community are protected on this site by Federal environmental legislation (EPBC Act) and are listed in State legislation (TSC Act). See Appendix A and B for a full list of Threatened Species known in the locality and Appendix C for the map showing records of Threatened Species nearby the site. See Map 2 for mapped vegetation communities.

Qualifications of the Author

I, Hanna Reed have a Bachelor of Science (BSc. Bio. USYD), Masters of Applied Science (M. App. Sc. in Environmental Science USYD). I have 2 years experience in professional ecological assessment in NSW and have completed several ecological surveys and assessments for proposals.

The Proposal

The proposal includes the removal of the existing buildings and construction of a residential care facility, with parking facilities and landscaping and a bushfire protection mound on the lower boundary of the property, these are shown on Map 1.

The proposal is immediately adjacent to Sydney Harbour National Park and the toe of the batter for the mound is on the park boundary which is also the State-Federal boundary. The property is Lot 203 in DP 1022020 on Middle head Road, at Mosman.

The proposal is for the:

- Demolition of existing single-storey buildings;
- Construction of two storey buildings;
- Landscaping; and,
- Bushfire protection measures in the form of a large earth mound on the eastern side of the proposal. The bushfire protection berm is approximately a 2-4m high and up to 20m wide and is constructed of earth.

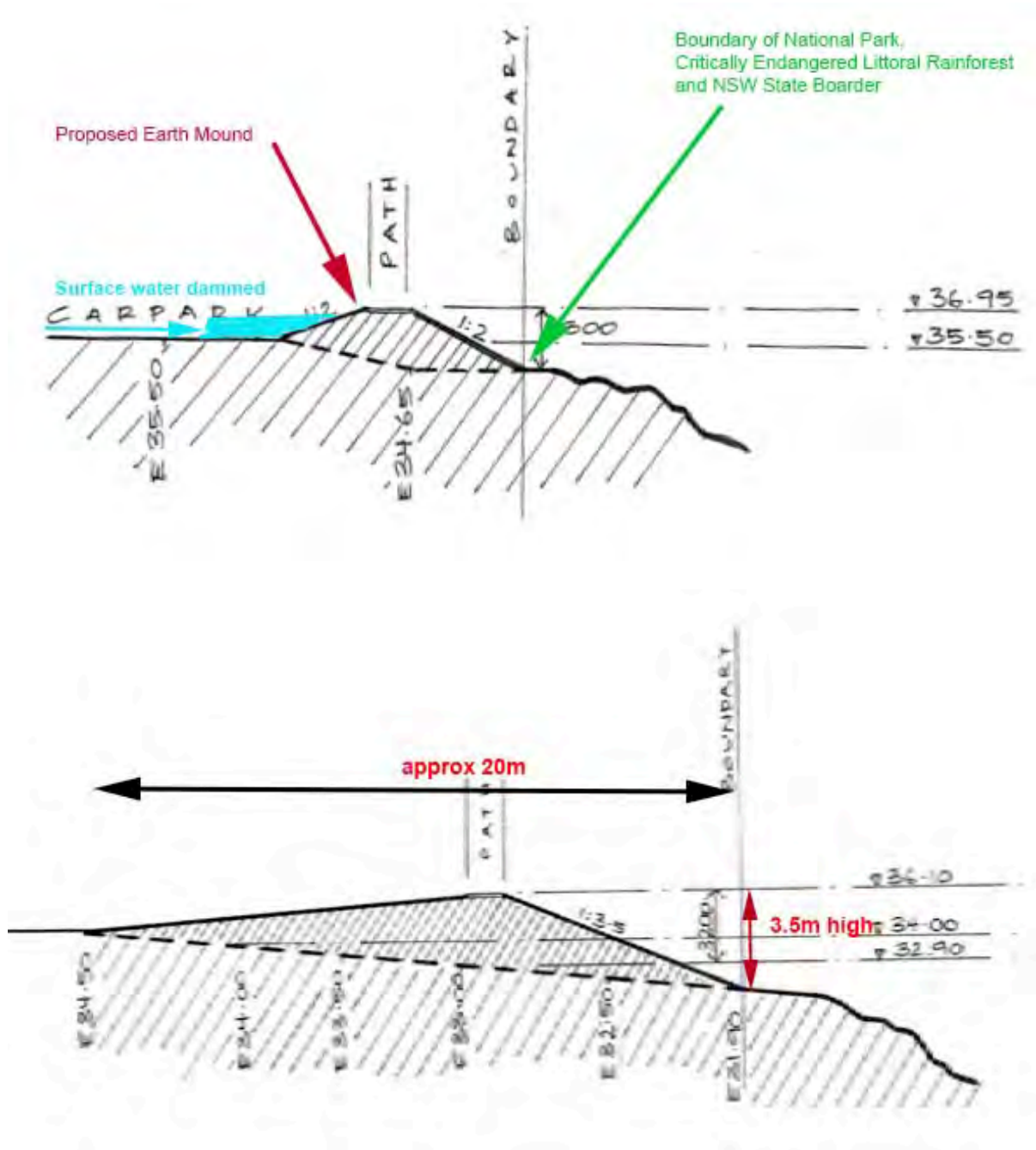
Additional likely impacts that are not shown on the plans are connection of utilities, the location of temporary works areas during construction, tree and vegetation protection fencing and temporary and permanent stormwater sediment and nutrient control measures.

The Site

The site is the footprint of the proposed works including; the demolition and new building areas, the land temporarily needed during construction (currently not known), landscaping areas, the location of the bushfire protection works (the berm), the area needed for sediment and nutrient

control and land disturbed for connection of utilities. The site is some times referred to as the 10 Terminal group of buildings. The site overlaps with existing bushland as shown on Map 1.

Typical sections of earth berm proposed



Direct Impacts of the Proposal

The footprint of the proposal will remove 2 areas of bushland that is mapped as Littoral Rainforest, a Critically Endangered Ecological Community under the EPBC Act (EEC under TSC Act) and remove and/or disturb habitat for at least 4 Threatened species (TSC Act and/or EPBC Act).

The proposal will remove large trees, which are important habitat for Threatened micro-bats and owls. The proposal will remove fig, eucalypt and banksia trees, which are important habitat for the Endangered Grey-headed Flying Fox, barking owl and micro bats. See Maps 1 and 2.

The assessment of the ecological consequences of these impacts are discussed in a later section.

Impacts to the downslope National Park

The indirect impacts that must be assessed, include down slope impacts such as the inevitable sedimentation from the earth mound, changes to drainage (surface water flows) patterns, changes in water quality and other edge effects that will harm the down hill vegetation, habitat and increase weed invasion.

The land directly down hill of this site is part of Sydney Harbour National Park which is ecologically sensitive bushland habitat that will be effected by sedimentation, transport of nutrients, changes to hydrology, spread of plant diseases, increase in weed invasion and feral animals, changes fire regimes, different levels of exposure to the sun and wind and other edge effects. These impacts are recognised threats to several Threatened plant and animals species and ecological communities that are known to occur in this locality. Animals in the adjacent National Park will have habitat and home ranges that overlap with the proposal area, the loss of this habitat may threaten the survival of local populations of these species.

The property is immediately adjacent to National Park Wildlife Services (NPWS) land, which contains native bushland which is much larger than 1ha in size. The small patches of vegetation on the property and large section on adjacent property has been mapped as Littoral Rainforest Endangered Ecological Community by OEH (Map 2). The proposal relies on fuel reduction within the National Park for bushfire protection. Such fuel reduction will remove additional Critically Endangered Littoral Rainforest.

Changes in Hydrology: The proposed berm will act as a dam and will prevent the existing surface water flow into the adjacent downslope Littoral Rainforest and habitat in the National Park. The surface water is proposed to be redirected to a few points where the flow into the national park will be concentrated, leading to a greatly increased water flow at these points and reduced flow in the majority of the national park below the site.

- 1. Decreased Soil Moisture Areas:** The soil moisture will be decreased in most of the down hill area which is likely to cause death of the Rainforest plants in this area and increase weed competition. This is likely to lead to the area no longer being able to be classified as Littoral Rainforest. This would be a significant impact on the Endangered (and Critically Endangered EPBC Act) Littoral Rainforest in the National Park.
- 2. Increased point water flow:** In the areas where the stormwater will be concentrated there is more likely to be;
 - Erosion of the steep slope;
 - Higher soil moisture levels;
 - Increased weed completion;
 - Increased nutrients;
 - The proposal will increase the proportion of impervious surfaces increasing the volume surface flow;
 - Increased sediment; and,
 - Expatiate the level of Phytophthora dieback (introduction of pathogens) which is listed as a threat under the Littoral Rainforest and *Acacia terminalis ssp. terminalis* determinations.

This would be a significant impact on the Endangered (and Critically Endangered EPBC Act) Littoral Rainforest in the National Park and possibly threatened species.

Relevant Ecological Legislation

Being a development on Federal land means that the proposal must satisfy the requirements of Federal ecological laws. Clause 71 of the SHFT Act 2001 exempts the proposal from needing to comply with State laws, however the SHFT has a policy of complying with industry best practice and relevant guidelines which is taken to include planning standards and environmental controls such as conservation of State listed Threatened species. State laws are also likely to apply when there will be impact to land, habitat and Threatened species that are in NSW. Taking into consideration the State laws would represent industry best practice and the State laws provide more detail on assessment of the acceptability of the impact. In respect to the ecological issues on this site the Federal laws are more restrictive especially with respect to the adjacent Littoral Rainforest, which is considered "Critically Endangered" Federally and only "Endangered" under NSW law. Due to the site being immediately adjacent to, and up hill of State land and impact to state land is unavoidable and State ecological laws need to be taken into consideration when planning and approving this proposal.

The planning and assessment of this proposal should take into consideration the requirements of both NSW and Federal ecological legislation and the ecological impacts of the proposal need to be formal assessment in respect to the EPBC Act, and the EP&A Act and in particular Part 5a with respect to threatened species and ecological communities should be taken into consideration especially where there is especially ecologically sensitive land immediately adjacent. This development cannot avoid impact to the ecology of the adjacent land that is of high conservation value.

In this case it is considered that both State and Federal ecological laws should be used to determine if the proposal will have an acceptable impact on the ecology of the site and adjacent land.

Ecological legislation to be addressed include:

Federal Ecological Legislation that must be applied

Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act 1999).

NSW Ecologically Relevant Legislation:

Environmental Planning and Assessment Act 1979, Rural Fires Act 1997, Threatened Species Conservation Act 1995 (TSC Act 1995), National Parks and Wildlife Act 1974 the Local Government Act and Water Management Act, Bushland in Urban Areas (SEPP 19) , Littoral Rainforest SEPP26 and Sydney Harbour Foreshore SEPP. These have not been addressed.

Local Ecologically Relevant Legislation:

Mosman Council Local Environment Plan and Development Control Plan.



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Littoral Rainforest
Critically Endangered
Ecological Community
as mapped by OEHL

Loss of mapped
Littoral Rainforest

Loss of mapped
Littoral Rainforest

East Maitland
Period

National Park Boundary and
East Maitland Period

Strategic Heritage Boundary

DP 552418

DP 10222020
203

DP 304478

Map 2.
Mapped Vegetation Types and Loss of Rainforest



Importance of this Site to Threatened Species

Electronic database search results

A search for Federally listed threatened species and ecological communities within 5km around the site found 3 endangered ecological communities, 64 Threatened species and 48 migratory species, this is a very large amount of species indicating the high ecological importance of this locality. Each of these species was assessed to determine the importance of the habitat on the site to the species conservation. Appendix A is the EPBC Act Protected Matters Search Results.

A search for State listed threatened species within a 10km by 10km square around the site found 1047 records from 76 Threatened sp. Appendix B is the BioNet Act Search Results. and C is a map showing the location of known records of the 4 most relevant Threatened species.

There are four (4) Threatened species that are likely to be impacted by the proposal and known to use on the subject site, or on adjacent land.

Sunshine Wattle, *Acacia terminalis ssp. terminalis*, TSC: E1, EPBC: E

Acacia terminalis ssp. terminalis is listed as Endangered in both Federal and State legislation. Federally it has been determined that it is “**facing a very high risk of extinction in the wild in the near future**”. In the State legislation it is determined to be “**Likely to become extinct in nature in NSW unless the circumstances and factors threatening its survival stop and it is in immediate danger of extinction**”.

The listings/determinations for this sub species in Federal and State legislation are provided in Appendices I, J, K, and L, which provide more detail on their biology and their conservation status.

Acacia terminalis ssp. terminalis is an erect shrub which is 1-5 metres tall. The shrub has pale yellow flowers (autumn) and seed pods 3-11 cm long. The species has a very limited distribution is mostly limited to Coastal scrub on sandy soil in coastal areas from the northern shores of Sydney Harbour south to Botany Bay. The map in Appendix L shows the known locations where this species occurs. This figures demonstrate the importance of Middle Head for this species. The habitat is generally sparse and scattered with most areas of habitat being small and isolated.

There are recent records of this species within 200m.

The threats identified in the determination of this listed threatened fauna species are; Clearing, land development and habitat degradation by rubbish dumping and access by people. The greatest threat is habitat loss due to urban development. Altered fire regimes may also threaten persistence at some locations. Plants that occur on the edge of walking tracks or roads, may be impacted on by park management activities or recreational usage. Phytophthora may indirectly impact the species due to death of surrounding trees, particularly *Eucalyptus* and *Angophora* species which facilitates weed growth. Weed invasion by various species, including Horehound (*Marrubium vulgare*), Bitou Bush (*Chrysanthemoides monilifera* subsp. *rotundata*), Lantana (*Lantana camara*), Blackberry (*Rubus* spp.) and Kikuyu (*Pennisetum clandestinum*).

The whole of Middle head is suitable habitat, for this species.

The site and the surrounding bushland have not been searched for this species the impact of the proposal on this species has not been formally assessed.

Barking Owl

The Barking Owl is listed as Vulnerable in the State legislation. In the State legislation it is determined to be “**Likely to become extinct unless the circumstances and factors threatening its survival cease to operate**”.

There are nearby recent Barking Owl records from Taronga Conservation Society in Mosman and at Watsons Bay. The locality contains at least one permanent Barking Owl resident important roosting habitat, large hollows that may provide breeding habitat and plentiful habitat for staple food sources such as the Common Ring-tailed Possum. The proposal will increase at three (3) known threats to the long-term survival of this vulnerable species.

The importance of the removal of trees with hollows and the loss of foraging habitat on this species has not been formally assessed. There are many suitable tree hollows in large trees immediately adjacent to the site to the north-west.

Distribution

The Barking Owl has declined greatly in southern Australia and now occurs in a wide but sparse distribution in NSW. Core populations exist on the western slopes and plains and in some northeast coastal and escarpment forests. Many populations have crashed as woodland on fertile soils was cleared, leaving linear riparian strips of remnant trees as the last inhabitable areas. Sometimes extend their home range into urban areas, hunting birds in garden trees and insects attracted to streetlights.

Important Habitat and ecology

- Inhabits woodland and open forest, including fragmented remnants and partly cleared farmland. It is flexible in its habitat use, and hunting can extend in to closed forest and more open areas. Sometimes able to successfully breed along timbered watercourses in heavily cleared habitats (e.g. western NSW) due to the higher density of prey on these fertile soils.
- Roost in shaded portions of tree canopies, including tall midstorey trees with dense foliage such as *Acacia* and *Casuarina* species. During nesting season, the male perches in a nearby tree overlooking the hollow entrance.
- Preferentially hunts small arboreal mammals such as Squirrel Gliders and Ringtail Possums, but when loss of tree hollows decreases these prey populations the owl becomes more reliant on birds, invertebrates and terrestrial mammals such as rodents and rabbits. Can catch bats and moths on the wing, but typically hunts by sallying from a tall perch.
- Requires very large permanent territories in most habitats due to sparse prey densities. Monogamous pairs hunt over as much as 6000 hectares, with 2000 hectares being more typical in NSW habitats.
- Two or three eggs are laid in hollows of large, old trees. Living eucalypts are preferred though dead trees are also used. Nest sites are used repeatedly over years by a pair, but they may switch sites if disturbed by predators (e.g. goannas).
- Nesting occurs during mid-winter and spring but is variable between pairs and among years. As a rule of thumb, laying occurs during August and fledging in November. The female incubates for 5 weeks, roosts outside the hollow when chicks are 4 weeks old, then fledging occurs 2-3 weeks later. Young are dependent for several months.

Threats

- Clearing and degradation of habitat, mostly through cultivation, intense grazing and the establishment of exotic pastures.
- Inappropriate forest harvesting practices that remove old, hollow-bearing trees and change open forest structure to dense regrowth.
- Firewood harvesting resulting in the removal of fallen logs and felling of large dead trees.
- Too-frequent fire leading to degradation of understorey vegetation which provides shelter and foraging substrates for prey species.
- Disturbance of nesting and excessive disturbance of foraging by inappropriate use of call-playback surveys

Activities to assist this species

- Apply a mosaic pattern during fire hazard reduction to ensure the same areas are not burned too frequently.
- Protect woodland and open forest remnants, especially those containing hollow-bearing trees.
- Retain and enhance vegetation along watercourses and surrounding areas to protect important habitat of the owls and their prey.

- Maintain a buffer of undisturbed native vegetation at least 200 metres radius around known nest sites.
- Retain standing dead trees and large fallen logs.
- Fence habitat remnants and protect from heavy grazing.

Appendix M is the determination for this species, which provide more detail on their biology and their conservation status.

Grey Headed Flying Fox, *Pteropus poliocephalus*, TSC: V, EPBC: V

The Grey Headed Flying Fox is listed as Vulnerable in both Federal and State legislation. Federally it has been determined that it is **“facing a high risk of extinction in the wild in the medium-term future”**. In the State legislation it is determined to be **“Likely to become extinct unless the circumstances and factors threatening its survival cease to operate”**.

Distributed along the east coast of Australia, the Grey-headed Flying-fox inhabits a wide range of habitats including rainforest, mangroves, paperbark forests, wet and dry sclerophyll forests and cultivated areas (Eby 1998). Bats commute daily to Foraging areas, and feed on the fruit from native figs (*Ficus* spp.), this forms a large part of their diet (Churchill 1998). Roost sites are commonly formed in gullies, typically not far from water and in vegetation with a thick canopy. NPWS has carried out surveying and mapping of this species (NPWS 2003). There is a large permanent colony a short distance away in Balgowlah.

The threats identified in the determination of this listed threatened fauna species are;- Disturbance to roost or breeding sites and destruction of foraging habitat, through the clearing and modification of native vegetation; direct harassment via shooting at roosts and destruction of camps; by being possible carriers of viral pathogens; potential competition and hybridisation from Black Flying-foxes.

Grey-headed Flying Foxes use the fig trees that are to be removed on a near nightly basis. The Banksia and eucalypt trees are also important food trees. The importance of the removal of the large fig trees on this species has not been formally assessed.

Appendices N and O are the NSW determination and the Federal listing for this species respectively, which provide more detail on their biology and their conservation status.

Eastern Bentwing-bat, *Miniopterus schreibersii oceanensis*, TSC: V,

The Barking Owl is listed as Vulnerable in the State legislation. In the State legislation it is determined to be **“Likely to become extinct unless the circumstances and factors threatening its survival cease to operate”**.

Eastern bent-wing Bats are known to have a very important roosting habitat on Middle Head. Due to the close proximity of this site it is likely that this site is important foraging habitat and the unused buildings may have microbats living in them. The impact of the proposal on this species needs to be assessed.

Distribution

Eastern Bentwing-bats occur along the east coast of Australia.

Habitat and ecology

Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other man-made structures.

Form discrete populations centred on a maternity cave that is used annually in spring and summer for the birth and rearing of young.

Maternity caves have very specific temperature and humidity regimes.

At other times of the year, populations disperse within about 300 km range of maternity caves.

Cold caves are used for hibernation in southern Australia.

Breeding or roosting colonies can number from 100 to 150,000 individuals.
Hunt in forested areas, catching moths and other flying insects above the tree tops.

Threats

Disturbance by recreational cave climbers and general public accessing the cave and adjacent areas particularly during winter or breeding.

Loss of foraging habitat.

Loss of food resources and indirect poisoning of individuals from nearby use of herbicides / insecticides.

Predation by feral cats and foxes.

Introduction of exotic pathogens, specifically known White-nosed fungus.

Threat of cave entrances being blocked for human safety reasons. Also, vegetation encroaching and blocking cave entrances.

Potential for large scale wildfire to impact on resource availability in surrounding habitat. Direct threats at caves from fire.

Weeds (blackberry) encroaching over cave entrances restrict access; need to ensure symphthetic control techniques for blackberry.

Activities to assist this species

Control foxes and feral cats around roosting sites, particularly maternity caves.

Retain native vegetation around roost sites, particularly within 300 m of maternity caves.

Minimise the use of pesticides in foraging areas.

Protect roosting sites from damage or disturbance.

The importance of the removal of the buildings and the loss of foraging habitat on this species has not been formally assessed.

Appendix P is the species profile, which provide more detail on this species biology and conservation status.

Importance of this Site to Endangered Ecological Communities

An ecological community is a unique and naturally occurring group of plants and animals. Its presence and distribution is determined by environmental factors such as soil type, position in the landscape, climate and water availability. Species within such communities interact and depend on each other - for example, for food or shelter. Examples of communities listed under the EPBC Act include woodlands, grasslands, shrublands, forests, Rainforest, wetlands, ground springs and cave communities.

Together with threatened species, ecological communities are protected as one of several matters of National Environmental Significance under the EPBC Act. Threatened ecological communities can be listed as **Critically Endangered**, **Endangered** or **Vulnerable**, categories which reflect their decline and potential for extinction across their national extent. Protection through the EPBC Act is vital for some ecological communities because they often occur outside of conservation reserves.

Ecological communities provide a range of ecosystem services, including the natural management of water, air and soil nutrients, the reduction of erosion and salinity and the provision of carbon storage. In addition to providing vital connections for wildlife corridors and habitat refuge for many threatened plant and animal species, they also contribute to tourism, recreation and the productivity of our farmlands.

There is one (1) Endangered Ecological Community that is present on the subject site and on the adjacent National Park. This Endangered community will be impacted by removal and disturbance caused by edge effects by the proposed development.

The two parts of the site that contains Littoral Rainforest are shown on Map 2. This mapping is the most accurate and the latest (2013) mapping by OEH and is known as “native Vegetation of Sydney Metropolitan Area V2. The overlap of the proposal and the existing vegetation can also be seen on Map 1. The site also meets the definition of Rainforest as described in Keith 2004 and Specht 1970. The site contains The dominant native trees in this area are *Pittosporum undulatum* (Sweet Pittosporum), *Acmena smithii* (Lillypilly), and *Glochidion ferdinandi var. ferdinand* (Cheese Tree) which are rainforest tree species and the native vines *Eustrephus latifolius* (Wombat Berry Vine) and *Geitonoplesium cymosum* (Scrambling Lily Vine).

This community is listed as Littoral Rainforest Endangered Ecological Community under the TSC Act and Littoral Rainforest and Coastal Thickets of Eastern Australia Critically Endangered Ecological Community under the EPBC Act.

A full description of this community and its conservation are included in Appendices E, F, G and H.

Littoral Rainforest, TSC: E1, EPBC: CE

Federally it has been determined that it is “**facing extremely high risk of extinction in the wild in the immediate future**”. In the State legislation it is determined to be “**Likely to become extinct unless the circumstances and factors threatening its survival cease to operate**”.

Littoral Rainforest is found on sand dunes or on soils that are derived from underlying rocks, on headlands which are exposed to strong wind action. In most cases the community is known to occur within 2km of the sea in the North Coast, Sydney Basin and South East Corner bioregions of NSW. Littoral Rainforest is generally a closed forest, comprised of predominantly rainforest species. The canopy is largely dominated by rainforest species such as species with compound leaves and vines. Other species include scattered emergent individuals of sclerophyll species, such as *Angophora costata*, *Banksia integrifolia*, *Eucalyptus botryoides* and *Eucalyptus tereticornis*. The species composition and structure are largely influenced by the proximity of the stand to the coast. The flora and fauna composition of the stand is influenced by a variety of factors including geographic location, extent of exposure, rainfall, size of the stand and level of disturbance.

The threats identified in the determination of this listed threatened fauna species are;- Invasion of weeds threaten the integrity of particular stands, clearing of stand-margins resulting in salt and wind damage and loss of canopy integrity. Clearing and/or physical disturbance to the understorey and surrounds from actions such as firewood collection, grazing, human visitation and rubbish dumping also threaten this community. Other threats include inappropriate collection of plant species (eg. epiphytes), fire, introduction of pathogens and predators causing loss of fauna and clearing and fragmentation of stands not protected by State Environmental Planning Policy 26.

Key for NSW Status

Status	Status	Status Notes
V	Vulnerable	Schedule 2, TSC Act 1995, Likely to become endangered unless the circumstances & factors threatening its survival or evolutionary development cease to operate.
E1	Endangered	Schedule 1, part 1, TSC Act 1995, Likely to become extinct in nature in NSW unless the circumstances and factors threatening its survival or evolutionary stop, in immediate danger of extinction

Key for Commonwealth Status

Code	Description	Definition under the EPBC Act 1999, and Migratory Birds agreement.
CE	Critically Endangered	Refers to a native species is eligible to be included in the critically endangered category at a particular time if, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria (Subdivision A of Division 1 of Part 13, Commonwealth EPBC Act 1999).
E	Endangered	Refers to a native species is eligible to be included in the endangered category at a particular time if, at that time: (a) it is not critically endangered; and (b) it is facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria (Subdivision A of Division 2 of Part 13, Commonwealth EPBC Act 1999).
V	Vulnerable	Refers to a native species is eligible to be included in the vulnerable category at a particular time if, at that time: (a) it is not critically endangered or endangered; and (b) it is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria (Subdivision A of Division 1 of Part 13, Commonwealth EPBC Act 1999).

Removal of vegetation: The removal of several fig trees, which are known foraging habitat of the Threatened Grey Headed Flying Fox will have an impact on the species in the local area. The removal of a small patch of Littoral Rainforest Endangered Ecological Community on the eastern side of the property will also have an impact on the vegetation community, increase edge effects and reducing the size of the stand.

Conclusion and Recommendations

The proposed development for a residential care facility on this site will have significant impacts to the ecology of the site and the adjacent National Park. When the assessment criterion of assessment of the EPBC Act are taken into consideration, the proposal was found to have a significant impact to matters on National Environmental Significance in particular Federally listed threatened species and an ecological community and referral to Environment Australia for assessment of impact to Threatened species and ecological communities under the EPBC is required.

The planning and assessment of this proposal needs to be consistent with the requirements of Federal ecological legislation the EPBC Act in particular the Matters of National Environmental Significance and specifically Threatened species and ecological communities and should also take into consideration NSW ecological legislation due to the impacts on the adjacent state land within the National Park and the impact to Threatened fauna species and an Critically endangered ecological community. There should be a formal assessment in respect to the ecological impact of the proposal.

The 2003 flora and fauna survey of Middle Head is out-dated and cannot be relied on for a development of this scale.

There needs to be a formal ecological survey and assessment of the impact of the proposal on the flora and fauna and ecological communities. The report should also include the likely impacts on the adjacent national park, including, but not limited to, the impact caused by sedimentation, nutrients, spread of plant diseases, weed invasion, change in fire regime, and the impact on Threatened species and ecological communities.

The proposal is likely to have a Significant impact to NSW listed threatened species and a Test of Significance as described in part 5a for listed threatened species and endangered ecological community would come to the conclusion that there would be a significant impact and further assessment in the form of a Species Impact Statement is required.

Changes in hydrology and the impacts on edge effects will have an impact on the downslope Littoral Rainforest Endangered Ecological Community and Endangered Sunshine Wattle.

The proposed development, which will result in the removal of several large fig trees, will also impact on the Grey Headed Flying Fox which is known to forage in these trees.

The loss of trees and habitat for the Barking Owl and the Eastern Bet Wing bat may contribute to the extinction the local population of these species.

The impact of the proposal could be reduced by moving the berm away from the edge of the National Park by at least 15 metres so sediment (including from the earth mound) and nutrient treatment of the surface water entering the adjacent National Park can be achieved. The water flow can be throttled and spread to reduce the impact of the proposal on the downhill Littoral Rainforest Endangered Ecological Community and habitat in the National Park. The water entering the National Park and the Endangered Littoral Rainforest needs to be low in nutrients and sediment and to resemble natural flow rates and distribution to ensure the long term survival of the downhill Critically Endangered Littoral Rainforest and habitat in the National Park.

If the development proceeds then there should be an offset of the impact caused, in the form of long term bushregeneration of the whole of the area of Littoral Rainforest in the National Park shown on Map 2. The bushregeration would need to achieve a stable, fully structured, weed free Littoral Rainforest. This will require at least 10 years of planting and bushregeration.

The maintenance of the patch of grass in the National Park will become impossible due to the berm.

It is not clear if the steep slopes of the proposed berm can be maintained weed free, fuel free and with no erosion.

The large trees to the north of the development across Middle head road contain many large hollows that are particularly important fauna habitat including several threatened species. These trees do not appear to be part of the current proposal. These trees are of very high ecological importance and their removal must not become part of the proposal.

It is not acceptable that the proposed care facility rely on State land that is a National Park for the bushfire Asset Protection Zone as stated in section 2.4 of the Fire report.

The land identified in Figure 2.6 as a Strategic Fire Advantage Zone of the fire report is mapped as Critically Endangered Littoral Rainforest within a National Park and cannot legally be made or managed as a Strategic Fire Advantage Zone.

The proposal is likely to have an unacceptable ecological impact to Federally and State listed Threatened Species and Ecological Communities and should not be approved.

References and Documents Used

Fenwick R. 2014, Analysis of bushfire and ecology for Headland Preservation Group Inc at 10 Terminal Buildings Middle Head Road Mosman

Keith, David (2004) – *Ocean Shores to Desert Dunes – The Native Vegetation of New South Wales and the ACT*. The Department of Environment and Climate Change

Middle Head Health Care Earth Berm Treatment Design

Site plans and elevations prepared by *Boffa Robertson Group* dated March 2014

Travers J. 2014, Bushfire protection review for an aged care facility 10 Terminal buildings, Travers Bushfire and Ecology

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Appendix A. EPBC Act Protected Matters Search



EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about [Environment Assessments](#) and the EPBC Act including significance guidelines, forms and application process details.

Report created: 31/07/14 12:33:04

[Summary](#)

[Details](#)

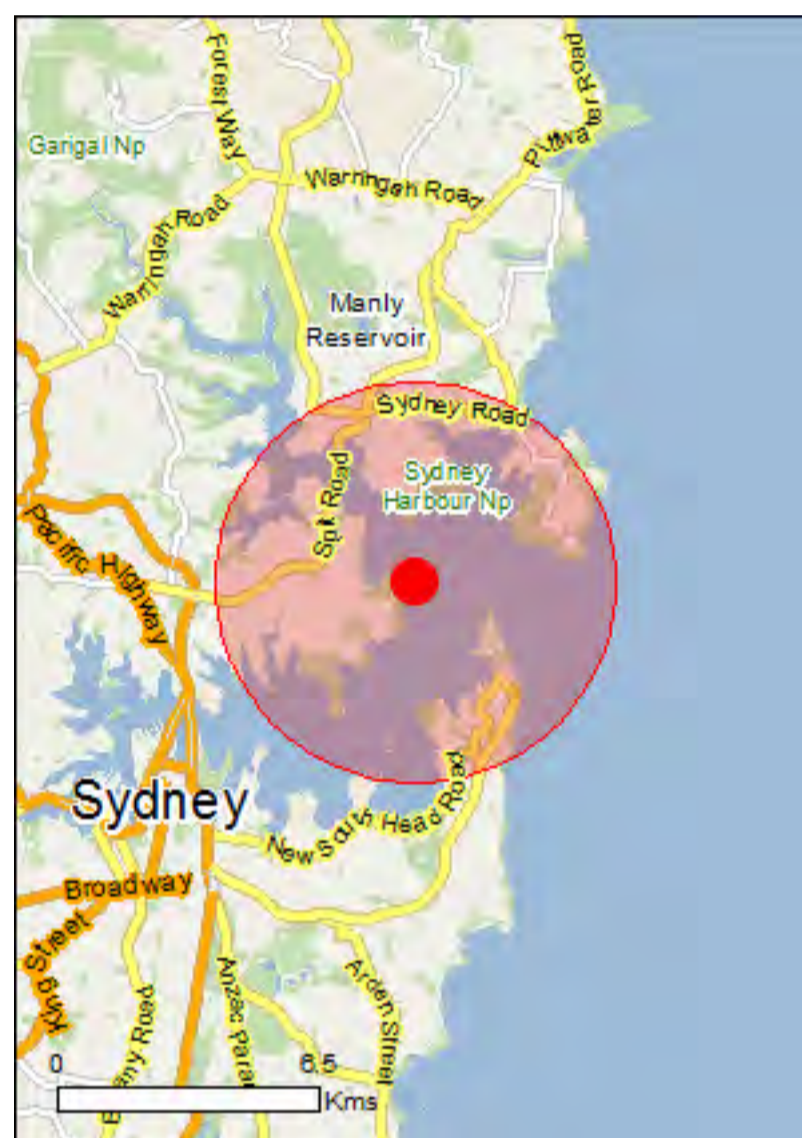
[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

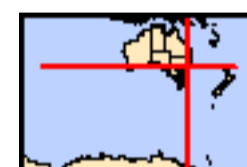
[Acknowledgements](#)



This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2010

[Coordinates](#)

Buffer: 5.0Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the [Administrative Guidelines on Significance](#).

World Heritage Properties:	1
National Heritage Places:	1
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Areas:	None
Listed Threatened Ecological Communities:	3
Listed Threatened Species:	64
Listed Migratory Species:	48

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As [heritage values](#) of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place and the heritage values of a place on the Register of the National Estate.

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

A [permit](#) may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	13
Commonwealth Heritage Places:	27
Listed Marine Species:	63
Whales and Other Cetaceans:	14
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

Place on the RNE:	147
State and Territory Reserves:	1
Regional Forest Agreements:	None
Invasive Species:	50
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

World Heritage Properties [\[Resource Information \]](#)

Name	State	Status
Sydney Opera House - Buffer Zone	NSW	Declared property

National Heritage Properties [\[Resource Information \]](#)

Name	State	Status
Historic		
North Head - Sydney	NSW	Listed place

Listed Threatened Ecological Communities [\[Resource Information \]](#)

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Eastern Suburbs Banksia Scrub of the Sydney Region	Endangered	Community known to occur within area
Littoral Rainforest and Coastal Vine Thickets of Eastern Australia	Critically Endangered	Community likely to occur within area
Western Sydney Dry Rainforest and Moist Woodland on Shale	Critically Endangered	Community may occur within area

Listed Threatened Species [\[Resource Information \]](#)

Name	Status	Type of Presence
Birds		
Anthochaera phrygia Regent Honeyeater [82338]	Endangered	Species or species habitat likely to occur within area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area
Dasyornis brachypterus Eastern Bristlebird [533]	Endangered	Species or species habitat likely to occur within area
Diomedea epomophora epomophora Southern Royal Albatross [25996]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora sanfordi Northern Royal Albatross [82331]	Endangered	Foraging, feeding or related behaviour likely to occur within area

Name	Status	Type of Presence
Diomedea exulans antipodensis Antipodean Albatross [82269]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans exulans Tristan Albatross [82337]	Endangered	Species or species habitat may occur within area
Diomedea exulans gibsoni Gibson's Albatross [82271]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans (sensu lato) Wandering Albatross [1073]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Fregetta grallaria grallaria White-bellied Storm-Petrel (Tasman Sea), White-bellied Storm-Petrel (Australasian) [64438]	Vulnerable	Species or species habitat likely to occur within area
Lathamus discolor Swift Parrot [744]	Endangered	Species or species habitat likely to occur within area
Macronectes giganteus Southern Giant-Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant-Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Pterodroma leucoptera leucoptera Gould's Petrel [26033]	Endangered	Species or species habitat may occur within area
Pterodroma neglecta neglecta Kermadec Petrel (western) [64450]	Vulnerable	Foraging, feeding or related behaviour may occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Species or species habitat known to occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta cauta Shy Albatross, Tasmanian Shy Albatross [82345]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche cauta salvini Salvin's Albatross [82343]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche cauta steadi White-capped Albatross [82344]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche eremita Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area

Name	Status	Type of Presence
Thalassarche melanophris impavida Campbell Albatross [82449]	Vulnerable	Species or species habitat may occur within area
Fish		
Epinephelus daemeli Black Rockcod, Black Cod, Saddled Rockcod [68449]	Vulnerable	Species or species habitat likely to occur within area
Prototroctes maraena Australian Grayling [26179]	Vulnerable	Species or species habitat likely to occur within area
Frogs		
Heleioporus australiacus Giant Burrowing Frog [1973]	Vulnerable	Species or species habitat likely to occur within area
Litoria aurea Green and Golden Bell Frog [1870]	Vulnerable	Species or species habitat may occur within area
Mammals		
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Chalinolobus dwyeri Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat likely to occur within area
Dasyurus maculatus maculatus (SE mainland population) Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat known to occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
Isodon obesulus obesulus Southern Brown Bandicoot (Eastern) [68050]	Endangered	Species or species habitat likely to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Petrogale penicillata Brush-tailed Rock-wallaby [225]	Vulnerable	Species or species habitat may occur within area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT) Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat likely to occur within area
Pseudomys novaehollandiae New Holland Mouse, Pookila [96]	Vulnerable	Species or species habitat likely to occur within area
Pteropus poliocephalus Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Plants		
Acacia bynoeana Bynoe's Wattle, Tiny Wattle [8575]	Vulnerable	Species or species habitat likely to occur within area
Acacia terminalis subsp. terminalis MS Sunshine Wattle [64829]	Endangered	Species or species habitat known to occur within area

Name	Status	Type of Presence
Allocasuarina portuensis Nielsen Park She-oak [21937]	Endangered	Species or species habitat known to occur within area
Asterolasia elegans [56780]	Endangered	Species or species habitat may occur within area
Caladenia tessellata Thick-lipped Spider-orchid, Daddy Long-legs [2119]	Vulnerable	Species or species habitat likely to occur within area
Cryptostylis hunteriana Leafless Tongue-orchid [19533]	Vulnerable	Species or species habitat likely to occur within area
Eucalyptus camfieldii Camfield's Stringybark [15460]	Vulnerable	Species or species habitat likely to occur within area
Genoplesium baueri Yellow Gnat-orchid [7528]	Endangered	Species or species habitat likely to occur within area
Melaleuca biconvexa Biconvex Paperbark [5583]	Vulnerable	Species or species habitat may occur within area
Microtis angusii Angus's Onion Orchid [64530]	Endangered	Species or species habitat likely to occur within area
Pelargonium sp. Striatellum (G.W.Carr 10345) Omeo Stork's-bill [84065]	Endangered	Species or species habitat may occur within area
Pimelea curviflora var. curviflora [4182]	Vulnerable	Species or species habitat known to occur within area
Prostanthera marifolia Seaforth Mintbush [7555]	Critically Endangered	Species or species habitat likely to occur within area
Streblus pendulinus Siah's Backbone, Sia's Backbone, Isaac Wood [21618]	Endangered	Species or species habitat likely to occur within area
Syzygium paniculatum Magenta Lilly Pilly, Magenta Cherry, Pocket-less Brush Cherry, Scrub Cherry, Creek Lilly Pilly, Brush Cherry [20307]	Vulnerable	Species or species habitat likely to occur within area
Thesium australe Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat likely to occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area

Name	Status	Type of Presence
Hoplocephalus bungaroides Broad-headed Snake [1182]	Vulnerable	Species or species habitat likely to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Sharks		
Carcharias taurus (east coast population) Grey Nurse Shark (east coast population) [68751]	Critically Endangered	Species or species habitat likely to occur within area
Carcharodon carcharias Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Pristis zijsron Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat may occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
Listed Migratory Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat may occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Diomedea dabbenena Tristan Albatross [66471]	Endangered*	Species or species habitat may occur within area
Diomedea epomophora (sensu stricto) Southern Royal Albatross [1072]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans (sensu lato) Wandering Albatross [1073]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea gibsoni Gibson's Albatross [64466]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered*	Foraging, feeding or related behaviour likely to occur within area
Macronectes giganteus Southern Giant-Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant-Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [1043]		Foraging, feeding or related behaviour likely

Name	Threatened	Type of Presence
Puffinus leucomelas Streaked Shearwater [66541]		to occur within area Species or species habitat may occur within area
Sterna albifrons Little Tern [813]		Species or species habitat may occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta (sensu stricto) Shy Albatross, Tasmanian Shy Albatross [64697]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Thalassarche eremita Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida Campbell Albatross [64459]	Vulnerable*	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Migratory Marine Species		
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Caperea marginata Pygmy Right Whale [39]		Species or species habitat may occur within area
Carcharodon carcharias Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat likely to occur

Name	Threatened	Type of Presence within area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area
Lamna nasus Porbeagle, Mackerel Shark [83288]		Species or species habitat likely to occur within area
Manta birostris Giant Manta Ray, Chevron Manta Ray, Pacific Manta Ray, Pelagic Manta Ray, Oceanic Manta Ray [84995]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
Sousa chinensis Indo-Pacific Humpback Dolphin [50]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Hirundapus caudacutus White-throated Needletail [682]		Species or species habitat known to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Monarcha trivirgatus Spectacled Monarch [610]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
Migratory Wetlands Species		
Ardea alba Great Egret, White Egret [59541]		Species or species habitat likely to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat likely to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species

Name	Threatened	Type of Presence
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	habitat may occur within area Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [\[Resource Information \]](#)

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Commonwealth Land -
Commonwealth Land - Australian Postal Commission
Commonwealth Land - Australian Postal Corporation
Commonwealth Land - Australian Telecommunications Commission
Commonwealth Land - Defence Housing Authority
Commonwealth Land - Telstra Corporation Limited
Defence - DEGAUSSING RANGE
Defence - GARDEN ISLAND
Defence - HMAS PENGUIN
Defence - HMAS WATSON
Defence - NFI CHOWDER BAY (fuel depot)
Defence - TRAINING SHIP CONDAMINE
Defence - VAUCLUSE TRAINING DEPOT

Commonwealth Heritage Places [\[Resource Information \]](#)

Name	State	Status
Historic		
Garden Island - Captain Cook Dock Precinct	NSW	Indicative Place
Army Cottage with return verandah	NSW	Listed place
Barracks Group HMAS Watson	NSW	Listed place
Batteries A83 and C9A	NSW	Listed place
Battery B42	NSW	Listed place
Battery for Five Guns	NSW	Listed place
Chowder Bay Barracks Group	NSW	Listed place
Cliff House	NSW	Listed place
Commonwealth Avenue Defence Housing	NSW	Listed place
Cottage at Macquarie Lighthouse	NSW	Listed place
Defence site - Georges Heights and Middle Head	NSW	Listed place
Garden Island Precinct	NSW	Listed place
Golf Clubhouse (former)	NSW	Listed place
HMAS Penguin	NSW	Listed place
Headquarters 8th Brigade Precinct	NSW	Listed place
Headquarters Training Command Precinct	NSW	Listed place
Macquarie Lighthouse	NSW	Listed place
Macquarie Lighthouse Group	NSW	Listed place
Macquarie Lighthouse Surrounding Wall	NSW	Listed place
Marine Biological Station (former)	NSW	Listed place
Military Road Framework - Defence Land	NSW	Listed place
Navy Refuelling Depot and Caretakers House	NSW	Listed place

Name	State	Status
North Head Artillery Barracks	NSW	Listed place
Officers Mess, HQ Training Command	NSW	Listed place
Shark Point Battery	NSW	Listed place
Ten Terminal Regiment Headquarters and AusAid Training Centre	NSW	Listed place
Thirty Terminal Squadron Precinct	NSW	Listed place

Listed Marine Species [[Resource Information](#)]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat likely to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat likely to occur within area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat may occur within area
Catharacta skua Great Skua [59472]		Species or species habitat may occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Diomedea dabbenena Tristan Albatross [66471]	Endangered*	Species or species habitat may occur within area
Diomedea epomophora (sensu stricto) Southern Royal Albatross [1072]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans (sensu lato) Wandering Albatross [1073]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea gibsoni Gibson's Albatross [64466]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered*	Foraging, feeding or related behaviour likely to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Hirundapus caudacutus White-throated Needletail [682]		Species or species habitat known to occur within area
Lathamus discolor Swift Parrot [744]	Endangered	Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Macronectes giganteus Southern Giant-Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant-Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Monarcha trivirgatus Spectacled Monarch [610]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area
Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [1043]		Foraging, feeding or related behaviour likely to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat may occur within area
Sterna albifrons Little Tern [813]		Species or species habitat may occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta (sensu stricto) Shy Albatross, Tasmanian Shy Albatross [64697]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Thalassarche eremita Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida Campbell Albatross [64459]	Vulnerable*	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area

Name	Threatened	Type of Presence
Acentronura tentaculata Shortpouch Pygmy Pipehorse [66187]		Species or species habitat may occur within area
Festucalex cinctus Girdled Pipefish [66214]		Species or species habitat may occur within area
Filicampus tigris Tiger Pipefish [66217]		Species or species habitat may occur within area
Heraldia nocturna Upside-down Pipefish, Eastern Upside-down Pipefish, Eastern Upside-down Pipefish [66227]		Species or species habitat may occur within area
Hippichthys penicillus Beady Pipefish, Steep-nosed Pipefish [66231]		Species or species habitat may occur within area
Hippocampus abdominalis Big-belly Seahorse, Eastern Potbelly Seahorse, New Zealand Potbelly Seahorse [66233]		Species or species habitat may occur within area
Hippocampus whitei White's Seahorse, Crowned Seahorse, Sydney Seahorse [66240]		Species or species habitat may occur within area
Histiogamphelus briggsii Crested Pipefish, Briggs' Crested Pipefish, Briggs' Pipefish [66242]		Species or species habitat may occur within area
Lissocampus runa Javelin Pipefish [66251]		Species or species habitat may occur within area
Maroubra perserrata Sawtooth Pipefish [66252]		Species or species habitat may occur within area
Notiocampus ruber Red Pipefish [66265]		Species or species habitat may occur within area
Phyllopteryx taeniolatus Common Seadragon, Weedy Seadragon [66268]		Species or species habitat may occur within area
Solegnathus spinosissimus Spiny Pipehorse, Australian Spiny Pipehorse [66275]		Species or species habitat may occur within area
Solenostomus cyanopterus Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		Species or species habitat may occur within area
Solenostomus paegnius Rough-snout Ghost Pipefish [68425]		Species or species habitat may occur within area
Solenostomus paradoxus Ornate Ghostpipefish, Harlequin Ghost Pipefish, Ornate Ghost Pipefish [66184]		Species or species habitat may occur within area
Stigmatopora argus Spotted Pipefish, Gulf Pipefish [66276]		Species or species habitat may occur within area
Stigmatopora nigra Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Syngnathoides biaculeatus Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area
Trachyrhamphus bicoarctatus Bentstick Pipefish, Bend Stick Pipefish, Short- tailed Pipefish [66280]		Species or species habitat may occur within area
Urocampus carinirostris Hairy Pipefish [66282]		Species or species habitat may occur within area
Vanacampus margaritifer Mother-of-pearl Pipefish [66283]		Species or species habitat may occur within area

Mammals

Arctocephalus forsteri New Zealand Fur-seal [20]		Species or species habitat may occur within area
Arctocephalus pusillus Australian Fur-seal, Australo-African Fur-seal [21]		Species or species habitat may occur within area

Reptiles

Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Pelamis platurus Yellow-bellied Seasnake [1091]		Species or species habitat may occur within area

Whales and other Cetaceans

[Resource Information]

Name	Status	Type of Presence
Mammals		
Balaenoptera acutorostrata Minke Whale [33]		Species or species habitat may occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Caperea marginata Pygmy Right Whale [39]		Species or species habitat may occur within area
Delphinus delphis Common Dophin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within

Name	Status	Type of Presence area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Sousa chinensis Indo-Pacific Humpback Dolphin [50]		Species or species habitat likely to occur within area
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area

Extra Information

Places on the RNE [[Resource Information](#)]

Note that not all Indigenous sites may be listed.

Name	State	Status
Natural		
North Sydney Harbour Aquatic Reserve	NSW	Indicative Place
Manly Dam and Surrounds	NSW	Registered
North Head	NSW	Registered
North Head Military Reserve	NSW	Registered
Sydney Harbour National Park (1980 Boundary)	NSW	Registered
Indigenous		
Aboriginal Boat Carvings	NSW	Indicative Place
Historic		
Balmoral Baths	NSW	Indicative Place
Balmoral Shark Proof Pool	NSW	Indicative Place
Blackwood	NSW	Indicative Place
Clem Morath Pool	NSW	Indicative Place
Clive Park Rock Pool	NSW	Indicative Place
Constables Cottage	NSW	Indicative Place
Coo-looba	NSW	Indicative Place
Cremorne Conservation Area	NSW	Indicative Place
Cremorne Point Conservation Area	NSW	Indicative Place
Dungowan	NSW	Indicative Place
Eventide including Front Fence	NSW	Indicative Place

Name	State	Status
Fairlight Pool	NSW	Indicative Place
Garden Island - Captain Cook Dock Precinct	NSW	Indicative Place
Gilbert Park	NSW	Indicative Place
Honda	NSW	Indicative Place
House	NSW	Indicative Place
Houses	NSW	Indicative Place
Kings Theatre (former)	NSW	Indicative Place
Kurraba Point Conservation Area	NSW	Indicative Place
Langwarren	NSW	Indicative Place
Little Sirius Cove Enclosure Remnants	NSW	Indicative Place
Manly Fire Station	NSW	Indicative Place
Manly Public Baths Remnants	NSW	Indicative Place
Manly Reservoir R64	NSW	Indicative Place
McCallum Pool	NSW	Indicative Place
Middle Harbour Submarine Sewerage Syphon	NSW	Indicative Place
Middle Head and Georges Heights	NSW	Indicative Place
Milson Road Group	NSW	Indicative Place
Mobarik	NSW	Indicative Place
Montague Road Conservation Area	NSW	Indicative Place
Mosman Reservoir	NSW	Indicative Place
Nielsen Park Pool & Associated Structures	NSW	Indicative Place
Neutral Bay Fire Station	NSW	Indicative Place
North Sydney Sewerage Sewer Aqueduct	NSW	Indicative Place
Park and Oaks Avenues Conservation Area	NSW	Indicative Place
Parsley Bay Swimming Enclosure	NSW	Indicative Place
Reservoir No 120 and Reservoir No 121	NSW	Indicative Place
Residence	NSW	Indicative Place
Rose Bay Post Office	NSW	Indicative Place
Sirius Hoe	NSW	Indicative Place
St Peters Anglican Church	NSW	Indicative Place
Sydney Harbour Entrance	NSW	Indicative Place
Sydney Harbour Landscape Area	NSW	Indicative Place
Terrace Houses	NSW	Indicative Place
The Cedars	NSW	Indicative Place
The Scotland Australia Cairn	NSW	Indicative Place
Upper Middle Harbour Area	NSW	Indicative Place
Watsons Bay Baths	NSW	Indicative Place
Ythanbank	NSW	Indicative Place
Archbishops House (former)	NSW	Registered
Army Cottage with return verandah	NSW	Registered
Ashton Park	NSW	Registered
Balmoral Beach Conservation Area	NSW	Registered
Barracks Group HMAS Watson	NSW	Registered
Batteries A83 and C9A	NSW	Registered
Battery B42	NSW	Registered
Battery for Five Guns	NSW	Registered
Belvedere	NSW	Registered
Bradleys Head Fortification Complex	NSW	Registered
Catholic Convent of the Sacred Heart	NSW	Registered
Chowder Bay Barracks Group	NSW	Registered
Cliff House	NSW	Registered
Commonwealth Avenue Defence Housing	NSW	Registered
Cottage at Macquarie Lighthouse	NSW	Registered
Cranbrook Avenue Group	NSW	Registered
Cranbrook Group	NSW	Registered
Crater Cove Huts	NSW	Registered
Defence Site - Georges Heights and Middle Head	NSW	Registered
Dunara	NSW	Registered
Esslemont and Grounds	NSW	Registered
Fairy Bower Pool	NSW	Registered
Fernleigh Castle	NSW	Registered
Fishermans Cottage Group	NSW	Registered
Garden Island Precinct	NSW	Registered
Golf Clubhouse (former)	NSW	Registered
Greenway	NSW	Registered
Greycliffe House	NSW	Registered

Name	State	Status
HMAS Penguin	NSW	Registered
HMAS Sydney Mast	NSW	Registered
Headquarters 8th Brigade Precinct	NSW	Registered
Headquarters Training Command Precinct	NSW	Registered
Hornby Lighthouse	NSW	Registered
Hornby Lighthouse Group	NSW	Registered
Hornby Lighthouse Keepers Cottages	NSW	Registered
House	NSW	Registered
House	NSW	Registered
House	NSW	Registered
House	NSW	Registered
House	NSW	Registered
House and Gardens	NSW	Registered
Macquarie Lighthouse	NSW	Registered
Macquarie Lighthouse Group	NSW	Registered
Macquarie Lighthouse Surrounding Wall	NSW	Registered
Manly Beach and Surrounds	NSW	Registered
Marine Biological Station (former)	NSW	Registered
Middle Head Fortifications	NSW	Registered
Milestone Obelisk	NSW	Registered
Military Road Framework - Defence Land	NSW	Registered
Military Road Framework - Sydney Harbour National Park	NSW	Registered
Morella	NSW	Registered
Navy Refuelling Depot and Caretakers House	NSW	Registered
New Quarantine Cemetery	NSW	Registered
North Head Artillery Barracks	NSW	Registered
North Head Fortifications	NSW	Registered
North Head Quarantine Station & Reserve (former)	NSW	Registered
Nutcote and Garden	NSW	Registered
Officers Mess, HQ Training Command	NSW	Registered
Radio Signal Station - Middle Head	NSW	Registered
Roberts House	NSW	Registered
Rose Bay Police Station	NSW	Registered
Sandstone Cottage	NSW	Registered
Scout Hall	NSW	Registered
Shark Point Battery	NSW	Registered
Sir John Robertson Memorial	NSW	Registered
South Head Signal Station	NSW	Registered
St Andrews Presbyterian Church	NSW	Registered
St Marys Catholic Church	NSW	Registered
St Michaels Anglican Church	NSW	Registered
St Patricks Seminary and Grounds (former)	NSW	Registered
St Peters Anglican Church and Adjacent Bush	NSW	Registered
Stone Pillar	NSW	Registered
Stoneleigh House	NSW	Registered
Strickland House & Grounds	NSW	Registered
Sydney Ancher House	NSW	Registered
Ten Terminal Regiment Headquarters and AusAid Training Centre	NSW	Registered
The Barn (Scout Hall)	NSW	Registered
The Cobbles	NSW	Registered
The Hermitage	NSW	Registered
Thirty Terminal Squadron Precinct	NSW	Registered
Three Weatherboard Cottages	NSW	Registered
Timber Cottage	NSW	Registered
Timber Cottage	NSW	Registered
Tower House and Stone Perimeter Walls	NSW	Registered
Two Storey Georgian House	NSW	Registered
Vaucluse House & Grounds	NSW	Registered
Victorian Cottage	NSW	Registered
Victorian Timber Cottage	NSW	Registered
Victorian Weatherboard Cottage	NSW	Registered
Watsons Bay Church Group	NSW	Registered
Wentworth Mausoleum	NSW	Registered
Whitehall	NSW	Registered

State and Territory Reserves [\[Resource Information \]](#)

Name	State
Sydney Harbour	NSW

Invasive Species [\[Resource Information \]](#)

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resources Audit, 2001.

Name	Status	Type of Presence
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Birds

Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Alauda arvensis Skylark [656]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Carduelis chloris European Greenfinch [404]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Lonchura punctulata Nutmeg Mannikin [399]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Passer montanus Eurasian Tree Sparrow [406]		Species or species habitat likely to occur within area
Pycnonotus jocosus Red-whiskered Bulbul [631]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area

Frogs

Bufo marinus Cane Toad [1772]		Species or species habitat likely to occur within area
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Name	Status	Type of Presence
Rhinella marina Cane Toad [83218]		Species or species habitat likely to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus norvegicus Brown Rat, Norway Rat [83]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Alternanthera philoxeroides Alligator Weed [11620]		Species or species habitat likely to occur within area
Anredera cordifolia Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine, Anredera, Gulf Madeiravine, Heartleaf Madeiravine, Potato Vine [2643]		Species or species habitat likely to occur within area
Asparagus aethiopicus Asparagus Fern, Ground Asparagus, Basket Fern, Sprengi's Fern, Bushy Asparagus, Emerald Asparagus [62425]		Species or species habitat likely to occur within area
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Asparagus plumosus Climbing Asparagus-fern [48993]		Species or species habitat likely to occur within area
Asparagus scandens Asparagus Fern, Climbing Asparagus Fern [23255]		Species or species habitat likely to occur within area
Cabomba caroliniana Cabomba, Fanwort, Carolina Watershield, Fish Grass, Washington Grass, Watershield, Carolina Fanwort, Common Cabomba [5171]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within

Name	Status	Type of Presence area
Chrysanthemoides monilifera subsp. monilifera Boneseed [16905]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera subsp. rotundata Bitou Bush [16332]		Species or species habitat likely to occur within area
Cytisus scoparius Broom, English Broom, Scotch Broom, Common Broom, Scottish Broom, Spanish Broom [5934]		Species or species habitat likely to occur within area
Dolichandra unguis-cati Cat's Claw Vine, Yellow Trumpet Vine, Cat's Claw Creeper, Funnel Creeper [85119]		Species or species habitat likely to occur within area
Eichhornia crassipes Water Hyacinth, Water Orchid, Nile Lily [13466]		Species or species habitat likely to occur within area
Genista linifolia Flax-leaved Broom, Mediterranean Broom, Flax Broom [2800]		Species or species habitat likely to occur within area
Genista monspessulana Montpellier Broom, Cape Broom, Canary Broom, Common Broom, French Broom, Soft Broom [20126]		Species or species habitat likely to occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat likely to occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Opuntia spp. Prickly Pears [82753]		Species or species habitat likely to occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Protasparagus plumosus Climbing Asparagus-fern, Ferny Asparagus [11747]		Species or species habitat likely to occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Sagittaria platyphylla Delta Arrowhead, Arrowhead, Slender Arrowhead [68483]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area
Senecio madagascariensis Fireweed, Madagascar Ragwort, Madagascar Groundsel [2624]		Species or species habitat likely to occur within area

Name	Status	Type of Presence within area
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Coordinates

-33.82778 151.26361

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World Heritage and Register of National Estate properties, Wetlands of International Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

For species where the distributions are well known, maps are digitised from sources such as recovery plans and detailed habitat studies. Where appropriate, core breeding, foraging and roosting areas are indicated under 'type of presence'. For species whose distributions are less well known, point locations are collated from government wildlife authorities, museums, and non-government organisations; bioclimatic distribution models are generated and these validated by experts. In some cases, the distribution maps are based solely on expert knowledge.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

- [-Department of Environment, Climate Change and Water, New South Wales](#)
- [-Department of Sustainability and Environment, Victoria](#)
- [-Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [-Department of Environment and Natural Resources, South Australia](#)
- [-Parks and Wildlife Service NT, NT Dept of Natural Resources, Environment and the Arts](#)
- [-Environmental and Resource Management, Queensland](#)
- [-Department of Environment and Conservation, Western Australia](#)
- [-Department of the Environment, Climate Change, Energy and Water](#)
- [-Birds Australia](#)
- [-Australian Bird and Bat Banding Scheme](#)
- [-Australian National Wildlife Collection](#)
- Natural history museums of Australia
- [-Museum Victoria](#)
- [-Australian Museum](#)
- [-SA Museum](#)
- [-Queensland Museum](#)
- [-Online Zoological Collections of Australian Museums](#)
- [-Queensland Herbarium](#)
- [-National Herbarium of NSW](#)
- [-Royal Botanic Gardens and National Herbarium of Victoria](#)
- [-Tasmanian Herbarium](#)
- [-State Herbarium of South Australia](#)
- [-Northern Territory Herbarium](#)
- [-Western Australian Herbarium](#)
- [-Australian National Herbarium, Atherton and Canberra](#)
- [-University of New England](#)
- [-Ocean Biogeographic Information System](#)
- [-Australian Government, Department of Defence](#)
- [-State Forests of NSW](#)
- [-Geoscience Australia](#)
- [-CSIRO](#)
- Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the [Contact Us](#) page.

Appendix B. BioNet Threatened Species Search

Data from the BioNet Atlas of NSW Wildlife website, which holds records from a number of custodians. The data are only indicative and cannot be considered a comprehensive inventory, and may contain errors and omissions.

Species listed under the Sensitive Species Data Policy may have their locations denatured (^ rounded to 0.1_; ^^ rounded to 0.01_).

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Search criteria : Licensed Report of all Valid Records of Threatened (listed on TSC Act 1995) or Commonwealth listed Entities in selected area [North: -33.76 West: 151.21 East: 151.31 South: -33.86] returned a total of 1,047 records of 76 species.

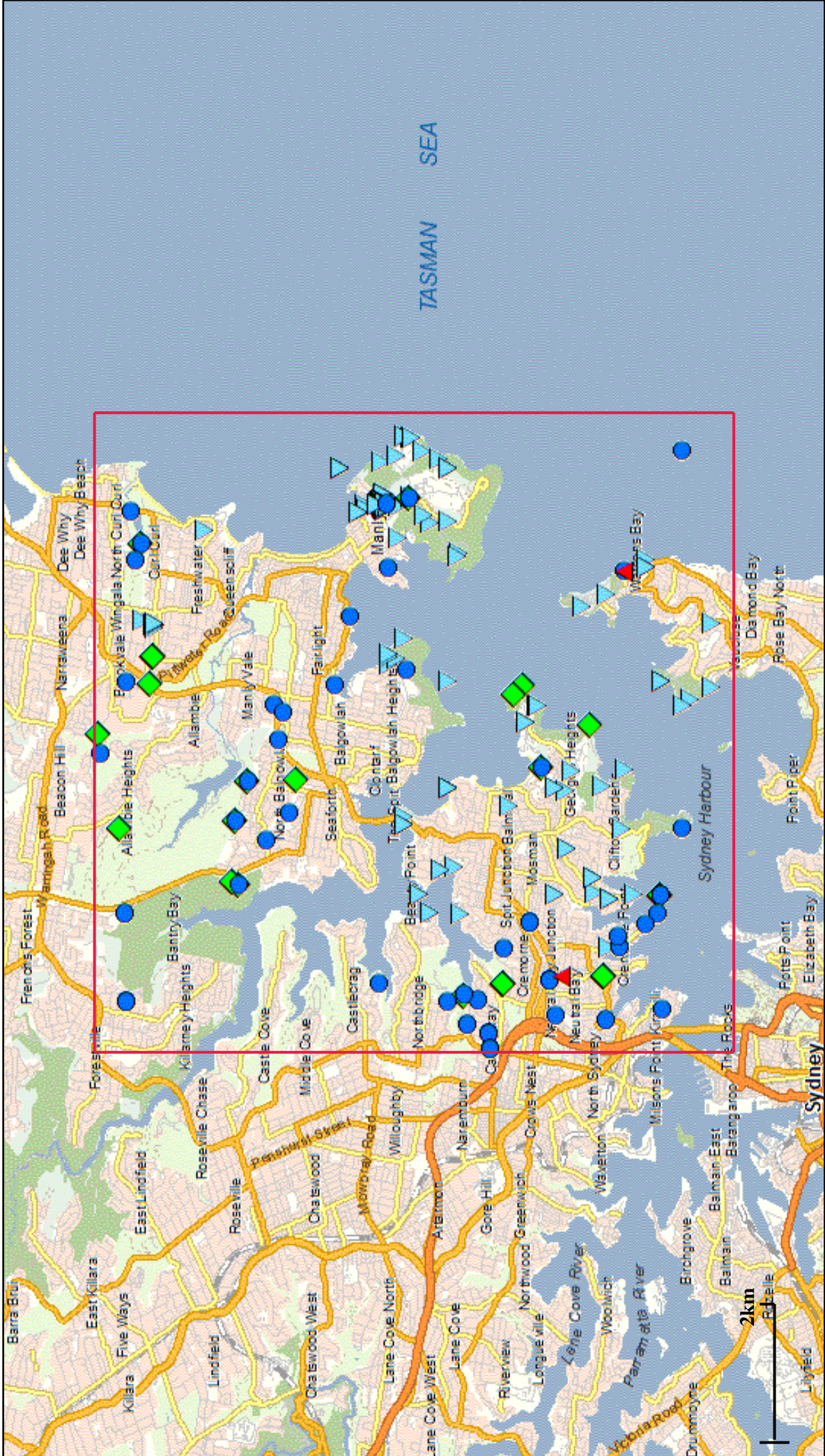
Report generated on 31/07/2014 10:52 AM

Kingdom	Class	Family	Species Code	Scientific Name	Exotic	Common Name	NSW status	Comm. status	Records	Info
Animalia	Amphibia	Miyobatrachidae	3116	<i>Pseudophryne australis</i>		Red-crowned Toadlet	V,P		77	
Animalia	Reptilia	Cheloniidae	2007	<i>Chelonia mydas</i>		Green Turtle	V,P	V	3	
Animalia	Reptilia	Dermochelyidae	2013	<i>Dermochelys coriacea</i>		Leatherback Turtle	E1,P	E	1	
Animalia	Reptilia	Varanidae	2287	<i>Varanus rosenbergi</i>		Rosenberg's Goanna	V,P		2	
Animalia	Aves	Anseranatidae	0199	<i>Anseranas semipalmata</i>		Maggie Goose	V,P		1	
Animalia	Aves	Columbidae	0023	<i>Ptilinopus superbus</i>		Superb Fruit-Dove	V,P		5	
Animalia	Aves	Diomedidae	0086	<i>Diomedea exulans</i>		Wandering Albatross	E1,P	E,J	6	
Animalia	Aves	Diomedidae	0092	<i>Phoebastria fusca</i>		Sooty Albatross	V,P	V	1	
Animalia	Aves	Diomedidae	0091	<i>Thalassarche cauta</i>		Shy Albatross	V,P	V	2	
Animalia	Aves	Diomedidae	0088	<i>Thalassarche melanophris</i>		Black-browed Albatross	V,P	V	2	
Animalia	Aves	Procellariidae	0072	<i>Ardenna carneipes</i>		Flesh-footed Shearwater	V,P	J,K	1	
Animalia	Aves	Procellariidae	0929	<i>Macronectes giganteus</i>		Southern Giant Petrel	E1,P	E	1	
Animalia	Aves	Procellariidae	8684	<i>Pterodroma leucoptera leucoptera</i>		Gould's Petrel	V,P	E	2	
Animalia	Aves	Spheniscidae	0005	<i>Eudyptula minor</i>		Little Penguin in the Manly Point Area (being the area on and near the shoreline from Cannae Point generally northward to the point near the intersection of Stuart Street and Oyama Cove Avenue, and extending 100 metres offshore from that shoreline)	E2,P		4	
Animalia	Aves	Ardeidae	0196	<i>Ixobrychus flavicollis</i>		Black Bittern	V,P		1	
Animalia	Aves	Accipitridae	0225	<i>Hieraetus morphnoides</i>		Little Eagle	V,P		3	
Animalia	Aves	Accipitridae	8739	<i>Pandion cristatus</i>		Eastern Osprey	V,P,3		4	
Animalia	Aves	Burhinidae	0174	<i>Burhinus grallarius</i>		Bush Stone-curlew	E1,P		2	
Animalia	Aves	Haematopodidae	0131	<i>Haematopus fuliginosus</i>		Sooty Oystercatcher	V,P		6	
Animalia	Aves	Haematopodidae	0130	<i>Haematopus longirostris</i>		Pied Oystercatcher	E1,P		1	
Animalia	Aves	Laridae	0120	<i>Onychoprion fuscata</i>		Sooty Tern	V,P		3	
Animalia	Aves	Cacatuidae	0265	<i>^Calyptorhynchus lathami</i>		Glossy Black-Cockatoo	V,P,2		1	

Animalia	Aves	Psittacidae	0260	<i>Glossopsitta pusilla</i>	Little Lorikeet	V,P	2	<small>PSITACIDAE Glossopsitta pusilla LITTLE LORIKEET V.P.</small>
Animalia	Aves	Psittacidae	0309	<i>Lathamus discolor</i>	Swift Parrot	E1,P,3	4	<small>PSITACIDAE Lathamus discolor SWIFT PARROT E1,P,3</small>
Animalia	Aves	Strigidae	0246	<i>Ninox connivens</i>	Barking Owl	V,P,3	2	<small>STRIGIDAE Ninox connivens BARKING OWL V,P,3</small>
Animalia	Aves	Strigidae	0248	<i>Ninox strenua</i>	Powerful Owl	V,P,3	44	<small>STRIGIDAE Ninox strenua POWERFUL OWL V,P,3</small>
Animalia	Aves	Meliphagidae	0603	<i>Anthochaera phrygia</i>	Regent Honeyeater	E4A,P	3	<small>MELIPHAGIDAE Anthochaera phrygia REGENT HONEYEATER E4A,P</small>
Animalia	Aves	Neosittidae	0549	<i>Daphoenositta chrysoptera</i>	Varied Sittella	V,P	1	<small>NEOSITTIDAE Daphoenositta chrysoptera VARIED SITTELLA V,P</small>
Animalia	Aves	Petroicidae	0380	<i>Petroica boodang</i>	Scarlet Robin	V,P	1	<small>PETROICIDAE Petroica boodang SCARLET ROBIN V,P</small>
Animalia	Aves	Estrilidae	0652	<i>Stagonopleura guttata</i>	Diamond Firetail	V,P	1	<small>ESTRILIDAE Stagonopleura guttata DIAMOND FIRETAIL V,P</small>
Animalia	Mammalia	Dasyuridae	1008	<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	V,P	2	<small>DASYURIDAE Dasyurus maculatus SPOTTED-TAILED QUOLL V,P</small>
Animalia	Mammalia	Peramelidae	1097	<i>Perameles nasuta</i>	Long-nosed Bandicoot, North Head	E2,P	249	<small>PERAMELIDAE Perameles nasuta LONG-NOSSED BANDICOOT, NORTH HEAD E2,P</small>
Animalia	Mammalia	Phascolarctidae	1162	<i>Phascolarctos cinereus</i>	Koala	V,P	1	<small>PHASCOLARCTIDAE Phascolarctos cinereus KOALA V,P</small>
Animalia	Mammalia	Pteropodidae	1280	<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V,P	102	<small>PTEROPODIDAE Pteropus poliocephalus GREY-HEADED FLYING-FOX V,P</small>
Animalia	Mammalia	Vespertilionidae	1346	<i>Miniopterus australis</i>	Little Bentwing-bat	V,P	1	<small>VESPERTILIONIDAE Miniopterus australis LITTLE BENTWING-BAT V,P</small>
Animalia	Mammalia	Vespertilionidae	1834	<i>Miniopterus schreibersii oceanensis</i>	Eastern Bentwing-bat	V,P	28	<small>VESPERTILIONIDAE Miniopterus schreibersii oceanensis EASTERN BENTWING-BAT V,P</small>
Animalia	Mammalia	Dugongidae	1558	<i>Dugong dugon</i>	Dugong	E1,P	1	<small>DUGONGIDAE Dugong dugon DUGONG E1,P</small>
Animalia	Mammalia	Otariidae	1543	<i>Arctocephalus forsteri</i>	New Zealand Fur-seal	V,P	2	<small>OTARIIDAE Arctocephalus forsteri NEW ZEALAND FUR-SEAL V,P</small>
Animalia	Mammalia	Otariidae	1882	<i>Arctocephalus pusillus doriferus</i>	Australian Fur-seal	V,P	6	<small>OTARIIDAE Arctocephalus pusillus doriferus AUSTRALIAN FUR-SEAL V,P</small>
Animalia	Mammalia	Balaenidae	1561	<i>Eubalaena australis</i>	Southern Right Whale	E1,P	5	<small>BALAEINIDAE Eubalaena australis SOUTHERN RIGHT WHALE E1,P</small>
Animalia	Mammalia	Balaenopteridae	1575	<i>Megoptera novaeangliae</i>	Humpback Whale	V,P	12	<small>BALAEINIDAE Megoptera novaeangliae HUMPBACK WHALE V,P</small>
Plantae	Flora	Asteraceae	9458	<i>Senecio spathulatus</i>	Coast Groundsel	E1,P	1	<small>ASTERACEAE Senecio spathulatus COAST GROUNSEL E1,P</small>
Plantae	Flora	Casuarinaceae	8321	<i>Allocasuarina portuensis</i>	Nielsen Park She-oak	E1,P,3	69	<small>CASUARINACEAE Allocasuarina portuensis NIELSEN PARK SHE-OAK E1,P,3</small>
Plantae	Flora	Dilleniaceae	11250	<i>Hibbertia superans</i>		E1,P	1	<small>DILLENACEAE Hibbertia superans E1,P</small>
Plantae	Flora	Elaeocarpaceae	6205	<i>Tetratheca glandulosa</i>		V,P	18	<small>ELEOCARPACEAE Tetratheca glandulosa V,P</small>
Plantae	Flora	Elaeocarpaceae	6206	<i>Tetratheca juncea</i>	Black-eyed Susan	V,P	2	<small>ELEOCARPACEAE Tetratheca juncea BLACK-EYED SUSAN V,P</small>
Plantae	Flora	Ericaceae	7752	<i>Epacris purpurascens var. purpurascens</i>		V,P	2	<small>ERICACEAE Epacris purpurascens var. purpurascens V,P</small>
Plantae	Flora	Euphorbiaceae	9851	<i>Chamaesyce psammageton</i>	Sand Spurge	E1,P	3	<small>EUPHORBIACEAE Chamaesyce psammageton SAND SPURGE E1,P</small>
Plantae	Flora	Fabaceae (Faboideae)	3007	<i>Pultenaea parviflora</i>		E1,P	1	<small>FABACEAE (FABOIDEAE) Pultenaea parviflora E1,P</small>
Plantae	Flora	Fabaceae (Mimosoideae)	3728	<i>Acacia bynoeana</i>	Bynoe's Wattle	E1,P	12	<small>FABACEAE (MIMOSOIDEAE) Acacia bynoeana BYNOE'S WATTLE E1,P</small>
Plantae	Flora	Fabaceae (Mimosoideae)	3860	<i>Acacia pubescens</i>	Downy Wattle	V,P	1	<small>FABACEAE (MIMOSOIDEAE) Acacia pubescens DOWNY WATTLE V,P</small>
Plantae	Flora	Fabaceae (Mimosoideae)	9672	<i>Acacia terminalis subsp. terminalis</i>	Sunshine Wattle	E1,P	214	<small>FABACEAE (MIMOSOIDEAE) Acacia terminalis subsp. terminalis SUNSHINE WATTLE E1,P</small>
Plantae	Flora	Grammitidaceae	9471	<i>Grammitis stenophylla</i>	Narrow-leaf Finger Fern	E1,P,3	1	<small>GRAMMITIDACEAE Grammitis stenophylla NARROW-LEAF FINGER FERN E1,P,3</small>
Plantae	Flora	Lamiaceae	9884	<i>Prostanthera junonis</i>	Somersby Mintbush	E1,P	3	<small>LAMIACEAE Prostanthera junonis SOMERSBY MINTBUSH E1,P</small>

Plantae	Flora	Lamiaceae	3418	<i>Prostanthera marifolia</i>	Seaforth Mintbush	E4A,P,3	CE	29
Plantae	Flora	Myrtaceae	4007	<i>Callistemon linearifolius</i>	Netted Bottle Brush	V,P,3		3
Plantae	Flora	Myrtaceae	4024	<i>Darwinia biflora</i>		V,P	V	1
Plantae	Flora	Myrtaceae	4067	<i>Eucalyptus camfieldii</i>	Camfield's Stringybark	V,P	V	25
Plantae	Flora	Myrtaceae	4134	<i>Eucalyptus nicholii</i>	Narrow-leaved Black Peppermint	V,P	V	3
Plantae	Flora	Myrtaceae	6809	<i>Melaleuca biconvexa</i>	Biconvex Paperbark	V,P	V	1
Plantae	Flora	Myrtaceae	4248	<i>Melaleuca deanei</i>	Deane's Paperbark	V,P	V	1
Plantae	Flora	Myrtaceae	4293	<i>Syzygium paniculatum</i>	Magenta Lilly Pilly	E1,P	V	18
Plantae	Flora	Myrtaceae	9670	<i>Triplarina imbricata</i>	Creek Triplarina	E1,P	E	1
Plantae	Flora	Orchidaceae	4386	<i>Caladenia tessellata</i>	Thick Lip Spider Orchid	E1,P,2	V	6
Plantae	Flora	Orchidaceae	9616	<i>Microtis angusii</i>	Angus's Onion Orchid	E1,P,2	E	1
Plantae	Flora	Orchidaceae	4504	<i>Prasophyllum fuscum</i>	Slaty Leek Orchid	E4A,P,2	V	1
Plantae	Flora	Orchidaceae	4584	<i>Sarcocochilus hartmannii</i>	Hartman's Sarcocochilus	V,P,2	V	1
Plantae	Flora	Proteaceae	5365	<i>Grevillea caleyi</i>	Caley's Grevillea	E4A,P,3	E	6
Plantae	Flora	Proteaceae	5458	<i>Persoonia hitsuta</i>	Hairy Geebung	E1,P,3	E	5
Plantae	Flora	Proteaceae	9502	<i>Persoonia laxa</i>		E4,P	X	1
Plantae	Flora	Proteaceae	5467	<i>Persoonia nutans</i>	Nodding Geebung	E1,P	E	1
Plantae	Flora	Rutaceae	10885	<i>Asterolasia buxifolia</i>		E1,P		1
Plantae	Flora	Santalaceae	5871	<i>Thesium australe</i>	Austral Toadflax	V,P	V	1
Plantae	Flora	Sterculiaceae	6140	<i>Lasiopetalum joyceae</i>		V,P	V	1
Plantae	Flora	Thymelaeaceae	6965	<i>Pimelea curviflora</i> var. <i>curviflora</i>		V,P	V	14
Plantae	Flora	Thymelaeaceae	6190	<i>Pimelea spicata</i>	Spiked Rice-flower	E1,P	E	2

Appendix C. BioNet Map of 4 most relevant Threatened Species



Atlas of NSW Wildlife records Middle Head

Legend

- ▲ Barking Owl (*Ninox connivens*)
- Grey-headed Flying-fox (*Pteropus poliocephalus*)
- ◆ Eastern Bentwing-bat (*Miniopterus schreibersii oceanensis*)
- ▲ Sunshine Wattle (*Acacia terminalis* subsp. *terminalis*)

Data from the BioNet Atlas of NSW Wildlife website, which holds records from a number of custodians. Location accuracy varies. Maps from the website are interactive: map displays can be modified from the original extent and a maximum of 5 species can be selected to display. Map may contain errors and omissions. Neither the Office of Environment and Heritage nor any other data custodian will accept liability for any loss, damage, cost or expenses incurred as a result of the use of, or reliance upon, the information in the map. Map copyright the State of NSW through the Office of Environment and Heritage.

Your Selection: Licensed Report of all Valid Records of Threatened (listed on TSC Act 1995) or Commonwealth listed Entities in selected area
 [North: -33.76 West: 151.21 East: 151.31 South: -33.86] returned a total of 1,047 records of 76 species.

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Appendix D. Littoral Rainforest CEEC EPBC Listing

**Advice to the Minister for the Environment, Water, Heritage and the Arts from the
Threatened Species Scientific Committee (the Committee) on Amendments to the List of
Ecological Communities under the *Environment Protection and Biodiversity Conservation
Act 1999* (EPBC Act)**

1. Summary of conservation assessment by the Committee

This advice follows the assessment of information to list the **Mixed microphyll/notophyll vine thicket on beach ridges (Quaternary Sands)** ecological community. The nomination was made available for public exhibition and comment for a period of two months. The Threatened Species Scientific Committee (Committee) had regard to all public and expert comments that were relevant to the survival of the ecological community.

The Committee judges that the ecological community has been demonstrated to have met sufficient elements of:

- Criterion 2 to make it **eligible** for listing as **critically endangered**; and
- Criterion 4 to make it **eligible** for listing as **critically endangered**.

2. Name of the ecological community

A nomination was received for the Mixed Microphyll/Notophyll Vine Thicket on Beach Ridges ecological community that occurs on Quaternary sands in the northern portion of the South Eastern Queensland Bioregion. Experts identified similar vine forests on beach ridges and headlands in other bioregions along the east coast of Australia, including offshore islands, as components of a broader ecological community. The broader extent of this ecological community is supported by its adaptation to coastal processes. In this context, the Committee considers it appropriate to extend the current nomination to cover littoral rainforest and coastal vine thickets on the east coast of Australia from Princess Charlotte Bay in the Cape York Peninsula Bioregion, Queensland (QLD), to the Gippsland Lakes in the South East Corner Bioregion, Victoria.

To reflect the broader extent of the ecological community, the Committee recommends that the name be changed from that nominated to the '**Littoral Rainforest and Coastal Vine Thickets of Eastern Australia**'. The ecological demarcation of this ecological community is discussed in detail under Section 5, 'National Context'.

3. Description

General Features

The ecological community represents a complex of rainforest and coastal vine thickets, including some that are deciduous, on the east coast of Australia. Typically, the ecological community occurs within two kilometres of the coast or adjacent to a large salt water body, such as an estuary and, thus, is influenced by the sea. It is naturally distributed as a series of disjunct and localised stands occurring on a range of landforms derived from coastal processes that can include dunes and flats, cheniers, berms, cobbles, headlands, scree, seacliffs, marginal bluffs, spits, deltaic deposits, coral rubble and islands. As a result, the ecological community is not associated with a particular soil type and can occur on a variety of geological substrata.

The ecological community occurs from Princess Charlotte Bay, Cape York Peninsula to the Gippsland Lakes in Victoria as well as on offshore islands on the east coast. The latitudinal range where the ecological community occurs encompasses warm temperate, sub-tropical and

tropical climate zones. In terms of temperature and humidity, the climate is more equable than sites further inland.

The ecological community is defined by habitat expressed in terms of structure, floristic composition and ecology in response to coastal processes. The unifying feature of its habitat is the salinity, derived from the ecological community's proximity to the sea. Saline influence is delivered via aerosols, saline water-tables or occasional inundation.

Whilst the ecological community's canopy species are well adapted to coastal exposure (e.g. strong and persistent salt-laden winds and storm events), the canopy protects less tolerant species and propagules in the understorey. The canopy height varies with the degree of exposure and can range from dwarf to medium (<1-25 m; Specht 1970). Due to extreme exposure to salt laden winds, the canopy often demonstrates a continuum of heights. Highly exposed patches will display the effect of windshear in the canopy. In more sheltered sites, for example, around estuaries, wind shear may not be evident in the canopy.

The canopy is typically closed but may also be patchy and may include emergents. Those stands that occur in exposed coastal situations can have many rainforest gaps caused by storm events which, in turn, may lead to canopy decapitation. In these exposed sites, there is often a secondary canopy that has developed below the old canopy.

The diversity of plant taxa (particularly canopy species) generally declines in a north to south direction, i.e. with increasing latitude. However, species richness of adjacent patches may vary considerably within one latitudinal zone.

The ecological community provides important stepping stones along the eastern Australian coast for various migratory and marine birds. For example, the nationally listed marine species *Ducula bicolor* (Pied Imperial Pigeon), a migratory species from north of New Guinea, feeds on fruit associated with mainland littoral rainforests and disperses the seeds on offshore islands where it roosts. Given its proximity to the sea, seabirds may also be associated with some stands of littoral rainforest, e.g. the nationally endangered migratory *Pterodroma leucoptera leucoptera* (Gould's Petrel) has one significant breeding locality at Cabbage Tree Island off the coast at Port Stephens in New South Wales (NSW) (DEC 2006a).

Key Diagnostic Characteristics

The key diagnostic features of the ecological community are described below to aid its identification.

- The ecological community occurs in the following IBRA bioregions: Cape York Peninsula (from Princess Charlotte Bay southwards), Wet Tropics, Central Mackay Coast, South Eastern Queensland, NSW North Coast, Sydney Basin and South East Corner.
- Patches of the ecological community occur within two kilometres of the east coast, including offshore islands, or adjacent to a large body of salt water, such as an estuary, where they are subject to maritime influence.
- The structure of the ecological community typically is a closed canopy of trees that can be interspersed with canopy gaps that are common in exposed situations or with storm events. Usually, several vegetation strata are present. However, where there is extreme exposure to salt laden winds, these strata may merge into a height continuum rather than occurring as distinct vegetation layers. The canopy forms a mosaic due to canopy regeneration, typically in the form of basal coppice following canopy decapitation due to prevailing salt laden winds and storm events. Wind sheared canopy can be present on the frontal section leading to closed secondary canopies. Emergents may be present, for

example, species from the genera *Araucaria* (northern bioregions only), *Banksia* or *Eucalyptus*. The ground stratum of the vegetation typically is very sparse.

- The ecological community contains a range of plant life forms including trees, shrubs, vines, herbs, ferns and epiphytes. To the north, most plant species diversity is in the tree and shrub (i.e. canopy) layers rather than in lower strata. The converse generally occurs from the Sydney Basin Bioregion southwards. Feather palms, fan palms, large leaved vascular epiphytes and species that exhibit buttressing are generally rare. Ground ferns and vascular epiphytes are lower in diversity in littoral rainforests compared to most other rainforest types.
- Plants with xeromorphic and succulent features are generally more common in littoral rainforest than in hinterland rainforest types. Canopy stem sizes also tend to be smaller compared to that in hinterland rainforest. Trunks rarely host mosses though lichens are usually common.
- Whilst species can be regionally predictable, there may be considerable variation in the composition of individual stands of the ecological community within any given bioregion. Attachment A provides a list of flora species for each relevant bioregion.

4. Condition Thresholds

The listed Littoral Rainforest and Coastal Vine Thickets of Eastern Australia ecological community comprises those patches that meet the key diagnostic characteristics (above) and the condition thresholds presented below.

- Small patches can be resilient and viable, but the minimum size of a patch needs to be 0.1 ha; AND
 - The cover of transformer weed species (as identified in Attachment A) is 70% or less. Transformer weeds are highly invasive taxa with the potential to seriously alter the structure and function of the ecological community. This threshold recognises the relative resilience and recoverability of the ecological community to invasion by weed species; AND
 - The patch must have:
 - at least 25% of the native plant species diversity characteristic of this ecological community in that bioregion (Attachment A);
- OR
- at least 30% canopy cover of one rainforest canopy (either tree or shrub) species (Attachment A, excluding *Banksia* and *Eucalyptus* species that may be part of the ecological community).

Condition Threshold Notes

Where gaps in the canopy exist, they should be in the process of regenerating with the usual suite of rainforest gap species for the site. Where weed invasion is significant, natural regeneration of native gap species may be limited.

As species diversity diminishes from northern to southern latitudes, it is important to take into account the natural diversity of a patch in a particular bioregion when examining specific sites. For example, it is possible to find littoral rainforest stands that are dominated by single tree species or a small number of species (Miles & Kendall 2006). If such patches are in good

condition, they will also be representative of the ecological community and they may also contain rainforest dependent fauna species.

The condition criteria outlined above represent the minimum level for patches to be included in the listed ecological community.

5. National Context

Littoral rainforest occurs throughout the Indo-Pacific region, where it has a broadly similar structure and often includes widespread floristic elements (Adam 1992). Within Australia, littoral rainforest occurs along the coast from far eastern Victoria up the east coast through NSW and Qld and across the Northern Territory (NT) and Western Australia (WA).

Throughout this distribution, littoral rainforest crosses different climatic zones and gradually changes in species composition. This gradual variation in composition makes it difficult to provide explicit spatial circumscription of this ecological community and a range of somewhat arbitrary disjunctions may be valid. Given this situation, the Committee considers that the ecological demarcation, discussed below, achieves the best conservation outcome.

The continuity of rainforest areas on the north-eastern coast of Australia is fragmented by a dry corridor of relatively low rainfall in the Laura Basin, which is situated in the southern portion of Cape York Peninsula and meets the coast at Princess Charlotte Bay (Winter et al. 1987). This corridor separates the northern occurrences of littoral rainforest, which encompasses most of the Cape York Peninsula, the NT and Kimberley, from the southern occurrences of littoral rainforest, which encompasses the southern portion of the Cape York Peninsula, NSW and eastern Victoria. Generally, a greater monsoonal influence further distinguishes the northern littoral rainforests from the southern littoral rainforest ecological community.

This listing advice covers the particular aspects pertaining to the southern occurrences of littoral rainforest along the eastern coastline of Australia (including offshore islands) from Princess Charlotte Bay, Cape York Peninsula to, and including, eastern Victoria. The national extent of the southern ecological community, thus, encompasses the following IBRA bioregions: Cape York Peninsula (from Princess Charlotte Bay southwards), Wet Tropics, Central Mackay Coast, South Eastern Qld, NSW North Coast, Sydney Basin and South East Corner.

In Qld, the Regional Ecosystems that equate wholly to the ecological community are: 3.2.1a, 3.2.1b, 3.2.12, 3.2.13, 3.2.28, 3.2.29, 3.2.31, 3.2.11, 3.12.20, 7.2.1a-i, 7.2.2a-h, 7.2.5a, 7.2.6b, 7.11.3b, 7.12.11d, 8.2.2 and 12.2.2. Under the *Vegetation Management Act, December 2005*, the vegetation management status of these regional ecosystems is mainly 'of concern' whilst the biodiversity status is mainly 'of concern' or 'endangered'.

Regional Ecosystem 11.2.3, which also equates to littoral rainforest and occurs in the Brigalow Belt North Bioregion, was listed on 4 April 2001 as a component of the nationally endangered ecological community, *Semi-Evergreen Vine Thickets of the Brigalow Belt (North and South) and Nandewar Bioregions*. As a result, Regional Ecosystem 11.2.3 is not included as part of the proposed listing of the Littoral Rainforest and Coastal Vine Thickets of Eastern Australia ecological community.

In NSW, 'Littoral Rainforest in NSW North Coast, Sydney Basin and South East Corner Bioregions' is listed as endangered under the *Threatened Species Conservation Act 1995*. The legal definition of the ecological community under the State Environmental Planning Policy No. 26 (SEPP 26) includes littoral rainforest occurring on headlands as well as on sand. This is consistent with the definition of the Littoral Rainforest and Coastal Vine Thickets of Eastern Australia ecological community.

The ecological community is not listed in Victoria nor was it recognised until recently, when surveys identified patches of the ecological community between Aragannu Beach, near Bermagui, NSW and the Gippsland Lakes in Victoria (Peel in prep.). The occurrence of the ecological community in Victoria is limited to eastern Gippsland.

6. Relevant Biology and Ecology

The ecological community provides a range of benefits to the landscape. It is an important buffer to coastal erosion and wind damage (Meier & Figgis 1985) and provides natural refugia, suitable nest sites and food resources for resident and seasonally migratory species (Williams 1993). For example, rainforest taxa including Lauraceae (laurels), Myrtaceae (lilypillies) and Arecaceae (palms), which are part of the ecological community, provide important fruits to the nationally endangered *Casuarium casuarium johnsonii* (Southern Cassowary) which occurs in the Cape York Peninsula and the Wet Tropics Bioregions. In return, the bird disperses the seeds of these rainforest fruits (Buosi & Burnett 2006). The mode of seed dispersal by this keystone species ensures the long-term viability of rainforest communities (Williams 1993). Similarly, *Pteropus poliocephalus* (Grey-headed Flying Fox), which occurs along the coastal belt from south-eastern Qld to Melbourne, Victoria, is responsible for the seed dispersal of many rainforest trees, such as native figs and palms (Tidemann 1998) which are components of the ecological community. The extent of seed dispersal by the species is exceptional among Australian frugivores as the species moves seeds between isolated rainforest patches (Eby 1991).

There are also insect and other invertebrate species restricted to the ecological community as it provides refuge/critical habitat for rainforest dependent species. For example, two beetle species, *Helperella manningensis* and *H. miyal* (Buprestidae), are known only from littoral rainforest remnants at Harrington and Manning Point, NSW (Williams 1993).

The ecological community exhibits a decline in plant species diversity from northern to southern latitudes. For example, compared to southern NSW, littoral rainforest stands in northern NSW are likely to have a greater number of canopy species reflecting their derivation from subtropical rainforest (Miles & Kendall 2006). In the south coast of NSW, littoral rainforest stands may be dominated by one or few tree species, e.g. *Acmena smithii* (Lillypilly), *Pittosporum undulatum* (Sweet Pittosporum), *Ficus rubiginosa* (Port Jackson Fig) or *Myrsine howittiana* (Muttonwood) (Miles & Kendall 2006).

The ecological community often occurs in a state of regeneration due to ongoing natural disturbance, e.g. from storm events. Consequently, patches may have canopy gaps that are temporary and, over time, will be filled-in with the usual suite of rainforest gap species for the site. Moreover, gaps are important for some gap-specialist species such as the nationally endangered *Cynanchum elegans* (White-flowered wax plant).

The ecological community is somewhat protected from fire by coastal processes including oceanic aerosols, salt laden wind and storm surges. Other factors that help protect the ecological community from fire include prevailing winds (south-easterly and north-easterly winds are relatively cool and maintain relatively high levels of humidity on the coast), and the occurrence of swamps, streams, coastal inlets, mangroves or salt pans, that frequently occur on the inland side of littoral rainforest. This natural protection against fire is however significantly compromised when woody weeds invade littoral rainforest patches.

A list of nationally threatened species associated with the Littoral Rainforest and Coastal Vine Thickets of Eastern Australia ecological community is at Attachment B. Whilst the list is not exhaustive, it includes 26 endangered species listed under the EPBC Act (19 flora and 7 fauna).

7. Description of Threats

What was once an almost continuous archipelago of patches of the ecological community along the eastern coast of Australia has been reduced and fragmented primarily by coastal development, sandmining and agriculture (Bradley & Merrillyn 1992). The resulting fragmentation and reduction in patch size render the ecological community more vulnerable to other threats including weed invasion, edge effects and fire. The key threats to this ecological community are outlined below.

Past Developments

Past development actions, including sand mining and agriculture, have resulted in the decline and fragmentation of the ecological community across its range. For example, the high quality soils on the Permian volcanic Kiama coastline led to clearance for agriculture from the early 1800s' (Mills 2006, pers. comm.). Presently, there are just small remnants left at Gerroa that are listed under SEPP 26 (Mills 2006, pers. comm.).

Coastal Development

Urban development is one of the main pressures on Australia's coastal environment (Beeton et al. 2006) where the ecological community continues to be threatened by vegetation clearance. For example, in the Wet Tropics Bioregion, residential development and the widening of the Cook Highway, between Oak Beach and White Cliffs near Cairns, represent major threats to the ecological community (EPA 2005a). Also, at Mission Beach, south of Innisfail, the ecological community is threatened by clearing for residential development and tourism.

Such development is likely to intensify over time due to the predicted increase of the human population along the eastern coastline of Australia. From 1980 to 2004 coastal urban development rose (Beeton et al. 2006). As a result, it was projected that 42.3% of the Nowra (NSW) to Noosa (Qld) coastline will be urbanised by the year 2050, with the resulting loss of much of Australia's temperate and tropical coastal systems (Beeton et al. 2006) including this ecological community.

Along the Qld coast, the human population is projected to increase significantly. For example, in Qld, the statistical division of Moreton is projected to experience an increase in population of approximately 56% between 2006 and 2026. Moreover, the statistical divisions of Wide Bay-Burnett and Fitzroy are projected to experience growth of approximately 34% and 29% respectively over the same period whilst that of Mackay and the Northern regions (which overlap with the Wet Tropics Bioregion) are projected to increase by approximately 37% and 26% respectively. The Far North statistical division is also projected to grow by 31% for the same period (Queensland and Statistical Divisions 2006).

In NSW, coastal regions will continue to have the fastest growth rates in the state. By 2030, the population living in coastal NSW is projected to grow by approximately 440 000 people or 28%. This represents almost one-third of all growth projected in the State (Culpin et al. 2000). The NSW Government's South Coast Regional Strategy expects that over the next 25 years an additional 45 600 new dwellings will be built along the coast from Nowra to the Victorian border (Pacey 2007).

In Victoria, where the ecological community occurs, the human population in East Gippsland, is projected to increase from approximately 39 000 in 2001 to 47 000 by 2031, an increase of approximately 20% (DSE 2004a). Population growth in East Gippsland is likely to be concentrated around Paynesville and Lakes Entrance where the ecological community occurs (DSE 2004a).

Tourism and Visitor Disturbance

According to the Bureau of Tourism Research (DISR 2001), 50% of international visits and 42% of domestic visits are to coastal (and marine) areas. Due to the ongoing demand for tourism and recreational facilities to cater for non-consumptive uses of coastal and marine ecosystems (Ward & Butler 2006), this trend is likely to increase over time. Such pressure is likely to result in more development on coastal land and a rise in visitor numbers in conservation areas where the ecological community occurs.

Visitor disturbance in conservation areas includes soil compaction and disturbance, erosion from foot, cycle, trail bike and four wheel drive tracks, the introduction of pests and the creation of new planned and unplanned tracks. Increased visitation results in increased demand for and use of visitor facilities, such as walking tracks, viewing platforms, toilet blocks and picnic areas, many of which are located in littoral rainforest patches because of their attractive landscape features (shade, open understorey and proximity to the sea). These impacts hinder the recruitment of key canopy species, slowing regeneration rates and facilitating establishment of weeds. Other impacts in such areas include the dumping of cars and rubbish and the dumping of garden waste which has the potential to cause weed infestation (NSW Scientific Committee 2004). For example, in the Central Mackay Coast Bioregion, the ecological community receives high use by recreational vehicles and foot traffic where it occurs close to urban areas. In addition to these impacts the ecological community is invaded by Lantana (*Lantana camara*) (EPA 2005b). At Corringale Slips, near Orbost, Wingan Inlet and Mallacoota, Victoria, recreational development, such as campgrounds, is the most common and ongoing key threat to this ecological community (Peel in prep.).

Climate Change

Another significant threat is climate change which has the capacity to augment the detrimental effects of natural disturbances and other threats including fire and invasive weeds. As a result of climate change, the following changes are likely to affect the ecological community: rising sea levels; increased rainfall variability; and increased frequency of severe weather events which are projected to lead to major coastal erosion events, storm surges and saline inundation (DSE 2004b).

Weeds

The establishment of transformer weeds in littoral rainforest patches can have a significantly detrimental effect. Transformer weeds are highly invasive taxa with the potential to seriously alter the structure and function of the ecological community. Whilst it is accepted that the ecological community can tolerate a significant amount of weed cover due to its relative resilience, if left unchecked, such weeds will eventually take over and destroy the affected patch. Weeds that invade littoral rainforest, notably Pond Apple (*Annona glabra*), Lantana, Bitou Bush (*Chrysanthemoides monilifera* subsp. *rotundata*) and Rubber Vine (*Cryptostegia grandiflora*) are all recognised as Weeds of National Significance i.e. high impact, highly invasive species.

Transformer weeds of the warm temperate climate zone of south-eastern Australia, such as Cape Ivy (*Delairea odorata*), Bitou Bush, Lantana and Madeira Vine (*Anredera cordifolia*), also extend into the sub-tropical zone of northern NSW (Williams 1993; Peel in prep.). Also Rubber Vine and *Senna siamea* are currently a problem near Princess Charlotte Bay and within Lakefield National Park, Cape York Peninsula, and have the potential to expand if left unchecked. This demonstrates that certain transformer weeds have the capacity to significantly expand their range on the eastern coastline.

Whether the ecological community is protected in reserves or not, the risk of weed infestation increases where patches of the ecological community are located near human habitation and/or are subject to visitor disturbance. This is supported by Peel's (in prep.) study where a positive correlation was found between proximity to human activity and weed invasion based on a sample of 251 sites. Peel (in prep.) found that the majority of weeds recorded were incidentally introduced through human activities such as agriculture, recreation, domestic gardens and associated refuse dumping.

Weed invasion can also occur through seed dispersal by birds and mammals. For example, this mode of dispersal has led to weed infestations of wilderness areas, such as Croajingolong National Park and Howe Wilderness, in Victoria. In NSW, many coastal habitats have been invaded by Bitou Bush through the spread of fruit by birds and flying foxes. Bitou Bush smothers canopy and may form dense growth around the edge of littoral rainforest (Adam 1992). This transformer weed has also spread into Qld where it has the potential to flourish in rainforest stands in southern south-east Qld. In the Cape York Peninsula Bioregion transformer weed invasion is mainly attributable to disturbance by cattle and pigs (Stanton & Fell 2005). Included in the array of transformer weeds that currently impact the ecological community in this Bioregion are Lantana, Pond Apple and Guinea Grass (*Megathyrsus maximus*).

Fire

The ecological community is generally protected from fire as a result of coastal processes (including high humidity, oceanic aerosols, wind direction, abundance of surface water), the presence of fire retardant vegetation (such as mangroves and salt marshes) and indigenous fire protection to conserve food resources. However, the accumulation of fuel loads derived from weeds with a high amount of flammable material increases the risk of fire which, depending on its intensity and frequency, can destroy an adjacent patch if not suppressed. The fragmented nature of the ecological community and the relatively small sized patches increase the risk of irreversible damage from fire.

Feral Animals

Grazing and browsing by feral deer {Sambar deer (*Cervus unicolor*) and Hog deer (*C. porcinus*)} has been shown to detrimentally impact the ecological community on both a local and landscape level. Browsing prevents regeneration of littoral rainforest canopy and understorey species and creates gaps in the vegetation which allows colonisation by weeds. This has occurred in the area near Genoa River, in Victoria, where the vegetation gaps have been colonised by Cape Ivy (*Delairea odorata*) and dense thickets of Madeira Winter-cherry (*Solanum pseudocapsicum*). These weeds are seriously contributing to the collapse of the existing littoral rainforest patches through the smothering of shrubs and young trees. Severe damage to littoral rainforest has also been observed from Twofold Bay in NSW to the Gippsland Lakes in Victoria. Persistent infestations are documented as causing the local loss of rainforest species and whole sections of mature rainforest in Victoria (Peel et al. 2005). The coastal expansion of feral deer has reached at least as far north as Bermagui (Peel in prep.). Where the ranges of the two deer overlap, patches of littoral rainforest (e.g. Marl Island) have been destroyed (Peel in prep.).

'Herbivory and habitat degradation caused by feral deer' is listed as a Key Threatening Process under the NSW *Threatened Species Conservation Act 1995*. 'Reduction in biodiversity of native vegetation by *Cervus unicolor* (Sambar Deer)' is listed as a Key Threatening Process under the Victorian *Flora and Fauna Guarantee Act 1988*.

Land Tenure

Nationally, approximately 65% of the ecological community is not protected in reserves (Accad et al. 2006; Bureau of Rural Sciences 2005; CAPAD 2004; Peel in prep.). This figure is indicative as the datasets available sometimes interface with incomplete mapping of the ecological community. Irrespective of this, residential and recreational developments and tourism will continue to exert increasing pressure both directly and indirectly on unprotected patches of the ecological community. Such development causes loss of habitat either directly through land clearing or indirectly through exposure of protected vegetation to salt and wind damage which causes loss of canopy integrity (NSW Scientific Committee 2004). Other indirect impacts include fragmentation and weed invasion which can increase the risk of fire.

Patches of the ecological community in conservation areas are detrimentally being impacted by the effects of visitor disturbance, weed invasion and feral deer browsing. If not managed effectively, such impacts will continue (Peel in prep.).

Natural Disturbance

In addition to the above anthropogenic sources of impacts, the ecological community is subject to natural disturbances, such as storm events and cyclones, which, depending on their intensity and frequency, can have a detrimental effect. For example, a severe storm can cause coastal erosion and accelerate the rate of weed invasion as the canopy and ground layer are disturbed.

8. How judged by TSSC in relation to the EPBC Act criteria.

The TSSC judges the ecological community is **eligible** for listing as **critically endangered** under the EPBC Act. The assessment against the criteria is as follows.

Criterion 1 - Decline in geographic distribution

There are significant gaps in the knowledge about the historic extent of the ecological community in Australia. In Qld, decline in extent is based on pre-European estimates and data on remnant vegetation from 1997 to 2003. The data indicate that there has been approximately an 11% decline (Table 1) (Accad et al. 2006). This figure is indicative as it is based on broad regional ecosystem datasets. With respect to individual bioregions, the greatest decline has occurred in Southeast Qld where the ecological community has experienced a 34% decline.

Data on decline over time do not exist for NSW and Victoria.

Bioregion	Regional Ecosystems	Pre-Clear Extent (ha)	Remnant Extent 1997 (ha)	Remnant Extent 2003 (ha)	Decline Pre-Clear to 2003 %
Cape York Peninsula	3.2.1, 3.2.31, 3.2.29, 3.2.28, 3.2.13, 3.2.12, 3.2.11, 3.12.20	9952	9946	9924	0.3
Wet Tropics	7.2.1, 7.2.2, 7.2.5, 7.2.6, 7.11.3, 7.12.11	22 717	20 012	20 009	12
Central Qld	8.2.2	2826	2513	2497	12
South-East Qld	12.2.2	2993	1995	1977	34
All Qld REs		38 488	34 466	34 407	11

Table 1. Decline in extent of the Littoral Rainforest and Coastal Vine Thickets of Eastern Australia ecological community based on broad regional ecosystem data in Queensland (Accad et al. 2006).

There are insufficient quantitative data available to estimate the extent to which the ecological community has undergone a decline. Although the Committee recognises that the ecological community is likely to have undergone a decline, the data are insufficient to determine whether that decline is very severe, severe or substantial. Therefore, as the ecological community has not been demonstrated to have met each of the required elements of Criterion 1, it is **not eligible** for listing in any category under this criterion.

Criterion 2 - Small geographic distribution coupled with demonstrable threat

The linear distribution of the ecological community along the eastern coastline of Australia straddles various bioregions. Within its distribution, the ecological community occurs in a range of patch sizes¹. In Qld, there is generally a greater proportion of large patches compared to NSW and Victoria. A summary of mapping data sources including scale of mapping, list of pertinent regional ecosystems and associated species is at Attachment C. The following sections provide more detail on patch size and area of occupancy.

Queensland

In Qld, the total area of occupancy of the ecological community is approximately 16 135 ha (Table 2) (Accad et al. 2006)². A total of 879 patches constitute the area of occupancy with patch sizes ranging from less than 0.1 ha to 2311 ha. More specifically, Table 2 shows that:

- the majority of patches, i.e. 77%, are less than 10 ha in size each; and
- only 18 patches (approximately 2%) are greater than 100 ha each.

Patch size (ha)	Number of patches	Total area of occupancy (ha)	Number of patches as % of total	Area of occupancy as % of total
0.1-<0.5	121	35	14	0.2
0.5-<1	122	88	14	0.5
1-<10	428	1704	49	11
10-<100	190	5770	21	36
≥100	18	8538	2	53
Total	879	16 135	100	100

Table 2. Data on area of occupancy and number of patches of the Littoral Rainforest and Coastal Vine Thickets of Eastern Australia ecological community in Queensland including islands off the east coast (Accad et al. 2006).

¹ Individual patches that are less than 0.1 ha exist in each State. However, they are not considered in the data on area of occupancy as the condition threshold on the minimum viable patch size is 0.1 ha.

² Because of scale limitations, which are being refined, the regional ecosystem mapping does not identify all Littoral Rainforest patches in Queensland.

New South Wales

Littoral rainforest is the least extensive of the rainforest types that occur in NSW and represents less than one per cent of the total area of rainforest (NSW Scientific Committee 2004).

Estimates for NSW are approximate as they derive from several sources (SEPP 26; Tozer et al. 2006; Miles & Kendall 2006; Peel in prep.).

The total area of occupancy of the ecological community is approximately 1624 ha (Table 3). A total of 433 patches constitute the area of occupancy with patch sizes ranging from 0.06 ha to 136 ha. More specifically, Table 3 shows that:

- the majority of individual patches, i.e. 92%, are less than 10 ha in size; and
- only one patch³ (approximately 0.2%) is greater than 100 ha.

Patch size (ha)	Number of patches	Total area of occupancy (ha)	Number of patches as % of total	Area of occupancy as % of total
0.1-<0.5	98	23	23	1
0.5-<1	81	60	19	4
1-<10	219	629	50	39
10-<100	34	776	8	48
≥100	1	136	0.2	8
Total	433	1624	100	100

Table 3. Data on area of occupancy and number of patches of the Littoral Rainforest and Coastal Vine Thickets of Eastern Australia ecological community in New South Wales (Tindall et al. 2004; Peel in prep.; Tozer et al. 2006; Miles & Kendall 2006).

In relation to SEPP 26, the mapping is incomplete as it does not include all patches within National Parks, Flora Reserves and Jervis Bay (Australian Capital Territory). Moreover, the mapping data have not been revised since the SEPP 26 gazettal in 1988.

In determining the above area of occupancy, there is a slight overestimate where data overlap between Tuross Head and Murramarang National Park (by approximately 30 km).

Victoria

In Victoria, the total area of occupancy of the ecological community is approximately 279 ha (Table 4). A total of 108 patches constitute the area of occupancy with patch sizes ranging from 0.01 ha to 35 ha. More specifically, Table 4 shows that:

- the majority of individual patches, i.e. 91%, are less than 10 ha in size; and
- no patches are greater than 100 ha each.

³ This patch is unmapped and is located at Iluka Nature Reserve which is the largest known stand of Littoral Rainforest in New South Wales comprising approximately 136 ha (NSW Scientific Committee 2004).

Patch size (ha)	Number of patches	Total area of occupancy (ha)	Number of patches as % of total	Area of occupancy as % of total
0.1-<0.5	53	6	49	2
0.5-<1	12	6	11	2
1-<10	33	102	31	37
10-<100	10	165	9	59
≥100	0	0	0	0
Total	108	279	100	100

Table 4. Data on area on occupancy and number of patches of the Littoral Rainforest and Coastal Vine Thickets of Eastern Australia ecological community in Victoria (Peel in prep.).

The data used to derive the above values are based on Peel's (in prep.) latest field work on the ecological community within the South East Corner Bioregion. The Victorian portion of the analysis has been used to derive the above values.

Nationally

The available data show that the ecological community has a broad though linear extent along the eastern coastline. When data from each of the States are amalgamated, the total area of occupancy of the ecological community is approximately 18 000 ha.

Nationally, a total of 1420 patches constitute the area of occupancy with patch sizes ranging from less than 0.1 ha to 2311 ha. More specifically, Table 5 shows that:

- the majority of patches, i.e. 82%, are less than 10 ha in size and, thus, generally small; and
- only 19 patches (approximately 1%) are greater than 100 ha each. Except for the patch at Iluka Nature Reserve in NSW, all the bigger patches occur in Qld. The majority of these (i.e. 14) occur in the Cape York Peninsula Bioregion where a significant portion of the mapping along the eastern coastline has not been updated (although development in this bioregion is likely to be less intense compared to the other Qld bioregions).

Patch size (ha)	Number of patches	Total area of occupancy (ha)	Number of patches as % of total	Area of occupancy as % of total
0.1-<0.5	272	64	19	0.3
0.5-<1	215	154	15	1
1-<10	680	2435	48	13
10-<100	234	6711	17	37
≥100	19	8674	1	48
Total	1420	18 038	100	100

Table 5. Data on area of occupancy and number of patches of the Littoral Rainforest and Coastal Vine Thickets of Eastern Australia ecological community including islands off the east coast (Accad et al. 2006).

Using the above data, the graph below (Figure 1) shows the frequency of the patch sizes on a national level. As the majority of patches are less than 10 ha each, the ecological community is very restricted.

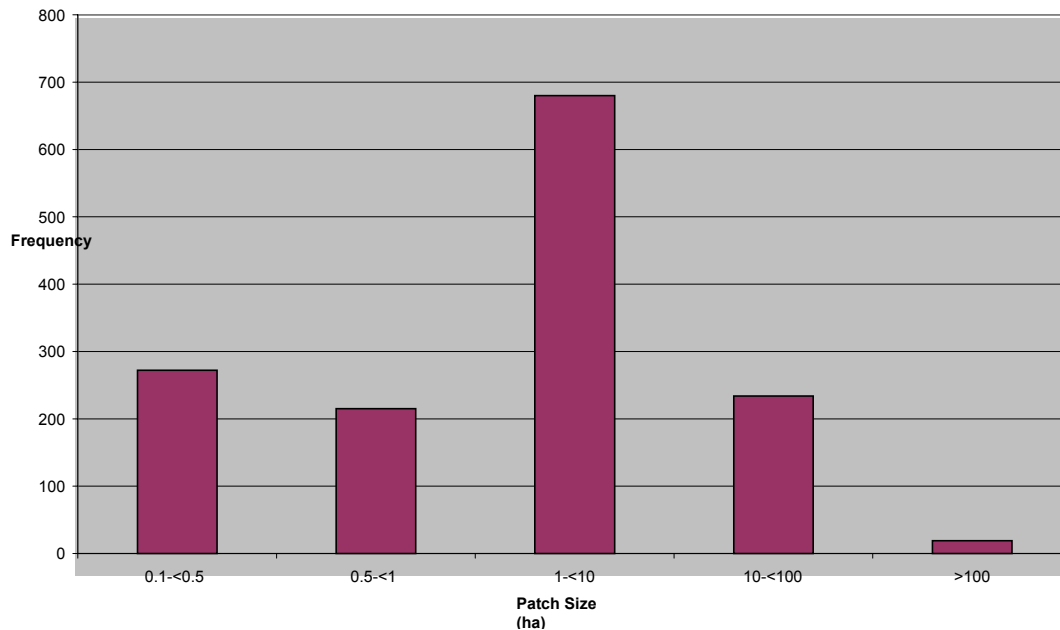


Figure 1. Frequency chart showing patch size frequency for the Littoral Rainforest and Coastal Vine Thickets of Eastern Australia.

The fragmented and linear nature of the patches, their small size and their small area to perimeter length ratios indicate that the ecological community is susceptible to disturbance including loss of fringing protective ecotones and has an inherently higher risk of extinction (Adam 1992).

Demonstrable threats to the ecological community, as outlined earlier in this document, are occurring along its entire extent on the eastern coastline. Patches with no protection are being cleared for development. This situation is unlikely to improve given the forecast of population growth in coastal areas. Patches with conservation protection are being degraded through a series of processes, including visitor disturbance, weed invasion and feral deer, on both patch and landscape scales. In addition, natural disturbances, such as cyclones, have the potential to intensify spatially and temporally due to global warming and thus increase their impact on the ecological community.

The Committee considers that the nature of the ecological community's very restricted distribution makes it likely that a threatening process could cause it to be lost in the immediate future. Therefore, the ecological community is **eligible** for listing as **critically endangered** under this criterion.

Criterion 3 - Loss or decline of functionally important species

The nationally endangered *Casuarium casuarium johnsonii* (Southern Cassowary) occurs in the Cape York Peninsula and the Wet Tropics Bioregions where it requires complex tropical vegetation consisting of dense tropical rainforest and associated habitats such as woodlands and swamps that can provide a year round supply of fleshy fruit (Bentrupperbaumer 1998). The species is recognised as a keystone species in north Qld rainforest communities (QPWS 2006) due to its role in the dispersal of larger fleshy rainforest fruits and seeds. The most important fruits in the bird's diet relevant to the ecological community include those belonging to the Lauraceae (laurels), Myrtaceae (lilypillies) and Arecaceae (palms) (Buosi & Burnett 2006).

Habitat loss and fragmentation are amongst the principal threats to the Southern Cassowary and the primary cause of the species' decline (Buosi & Burnett 2006). Nationally, the total population of this species ranges from less than 1500 to less than 2500 (Moore & Moore 2001). As the remaining cassowary habitat becomes increasingly fragmented by roads and development, the increased mortality rates due to vehicle collisions has the potential to eliminate many local populations (Bentrupperbaumer 1998) and the important role they play in sustaining rainforests. However, only a few areas, such as Mission Beach and Daintree lowlands, have been well studied and surveyed in the context of the cassowary's functional role in rainforests generally (Buosi & Burnett 2006; Crome & Moore 1993).

The nationally vulnerable *Pteropus poliocephalus* (Grey-headed Flying Fox) is also important in the processes that sustain the ecological community. The species occurs along the coastal belt from south-eastern Qld to Melbourne, Victoria. Its distribution, thus, overlaps with the ecological community. The Grey-headed Flying Fox is a canopy-feeding frugivore and nectarivore, which utilizes vegetation communities including different types of rainforests, open forests, closed and open woodlands, *Melaleuca* swamps and *Banksia* woodlands. The species is recognised as a functionally important species because of its seed dispersal function (Eby 1996), being responsible for the seed dispersal of many rainforest trees, including those of littoral rainforest, such as native figs and palms (Tidemann 1998). The extent of seed dispersal by this species is exceptional among Australian frugivores as it can transfer seeds between widely isolated rainforest patches (Eby 1991).

Grey-headed Flying Foxes are subject to ongoing threats, particularly habitat clearance in coastal areas in northern NSW (TSCC 2007). As a result, the population has experienced a 25% decline, based on the 1998 and 2004 national counts (Parry-Jones 2000). However, there are no studies on the role of Grey-headed Flying Foxes on the survival of the ecological community or the consequences of its decline on this ecological community. As a result, there are insufficient data to determine if the ecological community has undergone a loss or decline of the abovementioned functionally important species. Therefore, it is **not eligible** for listing in any category under this criterion.

Criterion 4 - Reduction in community integrity

There has been a reduction in the integrity of the ecological community on both patch and landscape scale due to past and present key threats outlined in detail under 'Description of Threats'.

Fragmentation

The ecological community is undergoing increasing fragmentation which, amongst other things, is causing a reduction in patch size, an increase in the distance between patches and greater susceptibility to increased degradation. As a result of fragmentation, the ecological community is more susceptible to disturbance and less amenable to recovery.

Moreover, this increased fragmentation generates secondary processes, which severely impact on the structural and compositional integrity of the ecological community. Such secondary

processes include weed invasion and genetic isolation of key species, edge effects, loss of canopy integrity from salt or wind damage as a result of clearing on the margins, degradation associated with rubbish dumping and overuse associated with increased access (Miles and Kendall 2006). For example, the narrow seaward fringe of the ecological community between Manning Point and Farquhar Inlet, NSW, which survived past sandmining operations, has largely been lost since mining ceased through erosion of the frontal dune systems (Williams 1993).

With fragmentation, the risk of fire increases due to the accumulation of weeds on the perimeter of a patch. As a result, whole patches of the ecological community can be destroyed depending on fire intensity and frequency.

Fragmentation also threatens the integrity and viability of the ecological community through its impact on functionally important species, such as the nationally endangered *Casuarius casuarinus johnsonii* (Southern Cassowary) and the vulnerable *Pteropus poliocephalus* (Grey-headed Flying Fox) which are key seed dispersers of the ecological community.

Weed invasion

Transformer weeds are currently detrimentally affecting the integrity and viability of the ecological community in multiple ways. The invasion and spread of weeds have the capacity to displace native plant taxa, and alter vegetation structure, animal habitat and fire regimes pertaining to an ecological community (Tozer et al 2006). For example, many rainforest plants are capable of germinating in low light conditions and slowing their growth rate until a gap in the canopy appears, whereupon they grow rapidly to occupy the gap. However, if a weed such as Lantana occupies all such gaps, there could be a significant impact on species composition over time, whereby fast-growing primary coloniser species dominate the ecological community and suppress the establishment of rainforest canopy species (Miles and Kendall 2006).

In 2002-03 Peel (in prep.) observed that weed invasion alone (i.e. without any other disturbance) in the Marlo Estuary, Victoria, destroyed a third of the littoral rainforest stand whilst the remaining two thirds was in severe decline. The transformer weeds involved include Blue Periwinkle (*Vinca major*), Cape Ivy (*Delairea odorata*) and Wandering Jew (*Tradescantia albiflora*). Peel (in prep.) concluded that the ecological community, in this area, could disappear in the next five to ten years without proper intervention. Given the aggressive nature of transformer weeds, it can generally be deduced that seriously infested patches of the ecological community will be lost in the short to medium term in the absence of effective weed control and recovery action.

In northern NSW, remnant stands of the ecological community have been invaded by vines such as Cat's Claw Vine (*Macfadyena unguis-cati*) and Madeira Vine (*Anredera cordifolia*) which aggressively invade disturbed rainforest and vine thickets (Adam 1992). Along the eastern coastline, Asparagus Fern (*Asparagus aethiopicus*) and Lantana are well established in many patches of the ecological community. These transformer weeds pose a serious threat to littoral rainforest species through their habit of climbing and smothering. Not only are established trees killed by these weeds, but germination and recruitment of seedlings are severely hindered if not inhibited (Bradley & Marilyn 1992). The NSW Threat Abatement Plan for Bitou Bush recognises that this weed poses a serious threat to littoral rainforest in northern NSW by invading the rainforest margins and canopy gaps, thereby disrupting recruitment processes (DEC 2006b).

Fire

A further threat to the integrity of the ecological community is fire. Fire can be facilitated by the presence of weeds, fragmentation and edge effects. Moreover, climate change can alter the nature of fire with serious consequences for the ecological community. Littoral rainforest cannot develop under a regime of even occasional fires, so complete fire exclusion is necessary for full development of this community (Miles & Kendall 2006).

Fire events have the demonstrated potential to seriously impact on the structure and species composition of the ecological community. The potential impacts of fire are most obvious at Seven Mile Beach, NSW, where the area south of Beach Road, with a history of regular burning, carries only occasional young coppice of *Glochidion ferdinandi*, whereas the area north of Beach Road, that is relatively unburnt, is well advanced towards littoral rainforest development (Miles and Kendall 2006).

Existing stands of the ecological community can be eroded around the edges by fire, or if small, could be overrun by wildfire. While some of the component species have capacity to recover from fire, for example, *Glochidion ferdinandi*, *Acmena smithii*, *Ficus rubiginosa*, *Elaeocarpus reticulatus* and *Synoum glandulosum*, and some mature palms are relatively fire-tolerant, immature plants of all these species are unlikely to survive a fire event. Even low intensity fires will check the gradual spread of rainforest tree saplings around stand edges (Miles and Kendall 2006).

Depending on the intensity and frequency of fire and the species composition and age structure of the ecological community, regeneration of the full suite of species may not occur.

Grazing/browsing

Grazing by feral and domestic animals results in significant changes in the species diversity and structural complexity of native vegetation, depending on the grazing regimes and resilience of component plant taxa (Tozer et al. 2006).

Overgrazing by *Macropus giganteus* (Eastern Grey Kangaroos), in areas where Kikuyu (*Pennisetum clandestinum*) has invaded littoral rainforest, leads to the maintenance and extension of this weedy sward. This has three observable and cascading impacts (Peel in prep.) which lead to the reduction in integrity of the ecological community and its eventual demise:

- prevention of ground-layer regeneration of native grasses and forbs;
- maintenance of vegetation in a more open conformation that leads uninhibited access to any natural regeneration of rainforest trees and shrubs by Black Wallabies (*Wallabia bicolor*) and feral deer, which effectively prevents the rainforest from renewing itself or expanding; and
- loss of littoral rainforest species followed by a loss in structural integrity, which then leads to a contraction in stand area and ultimately the loss of the stand.

Natural disturbance

The ecological community exists in areas subject to ongoing natural disturbance. While the ecological community is generally resilient to changes imposed by natural events such as storm surges, wind storms and cyclones, the frequency and intensity of these disturbances can change the structure of individual patches and, thus, facilitate the intrusion and exacerbation of fire and weeds. For example, if a patch that is buffeted by a wind storm loses a number of canopy trees, it is more susceptible to weed invasion or to existing weeds spreading further into the patch. Similarly, that same patch may then be more susceptible to fire penetration.

Restorability

The present degraded state of the ecological community is difficult to reverse on private land due to the increasing demand on coastal land for urban development. The associated land

clearance has various cascading and irreversible impacts on the ecological community including fragmentation and associated patch size reduction, genetic isolation of key species, edge effects and loss of canopy integrity from salt or wind damage. As the majority of the ecological community occurs on private land, the change in its integrity is such that regeneration is unlikely within the immediate future.

Whilst patches of the ecological community found in conservation areas are more amenable to regeneration with positive human intervention, the nature and extent of degradation may not necessarily allow complete regeneration of the ecological community. This situation is made more difficult with the occurrence of a fire that has the capacity to completely destroy a patch of littoral rainforest. Moreover, the makeup of patches of littoral rainforest can be altered significantly if adjacent to human habitation where the impacts are constant.

Irrespective of whether the ecological community is protected, climate change has the capacity to augment the detrimental effects of natural disturbances including fire, coastal erosion, storm surges and rising sea levels. As a result, depending on the magnitude of such events, regeneration rates and success may be affected.

As a result of the above, the ecological community continues to be degraded at both patch and landscape scale. Such degradation becomes increasingly difficult to reverse as the impacts of persistent disturbance accumulate. This ongoing modification, while not necessarily leading to the total destruction of all elements of the ecological community, threatens it with extinction.

The Committee considers that the change in the integrity of this ecological community across most of its range through land clearance, fragmentation, weed invasion, fire, animal grazing/browsing and natural disturbance is very severe. The changes have been such that re-establishment of the ecological processes, species composition and community structure of the original ecological community is unlikely in the immediate future, even with positive human intervention. The ecological community is therefore **eligible for listing as critically endangered** under this criterion.

Criterion 5 - Rate of continuing detrimental change

The ecological community is undergoing continuing detrimental change arising from clearance of native vegetation for coastal development, visitor disturbance, weed invasion, animal grazing/browsing, fires and the effects of fragmentation. In addition, natural disturbances, such as storms and cyclones, are likely to continue impacting the ecological community as their frequency and intensity are likely to increase due to climate change.

Estimates on decline are available for the Qld Regional Ecosystems (REs) only. These estimates cover the period from 1997 to 2003. The data indicate that the rate of decline for the ecological community is 11% which, however, is less than the minimum threshold for this criterion. No equivalent data are available for NSW or Victoria. Therefore, it is **not eligible** for listing in any category under this criterion.

Criterion 6 - Quantitative analysis showing probability of extinction

There are no quantitative data available to assess this ecological community under this criterion. Therefore, it is **not eligible** for listing under this criterion.

9. CONCLUSION

Conservation status

The **Littoral Rainforest and Coastal Vine Thickets of Eastern Australia** ecological community meets:

- Criterion 2 as **critically endangered** because its geographic distribution is very restricted and the nature of its distribution makes it likely that multiple demonstrable threats could cause it to be lost in the immediate future; and
- Criterion 4 as **critically endangered** because the change in community integrity is very severe and regeneration is unlikely to occur in the immediate future even with positive human intervention.

Decision to have a Recovery Plan

The Committee has taken the following issues into account when considering the need to develop a recovery plan for the ecological community:

- the cross-jurisdictional nature of the ecological community and the lack of a national cohesive recovery approach;
- the need to raise public awareness of the ecological community as the public may not recognise, nor be fully aware of the threatened status, of the ecological community;
- the extensive nature of the ecological community and the potential for certain threats to expand their range on the eastern coastline e.g. certain transformer weeds;
- the presence of nationally threatened flora and fauna associated with the ecological community plus other species and ecological communities that are, or may be, under consideration by the Committee in the near future.

The Committee is of the view that a recovery plan for the Littoral Rainforest and Coastal Vine Thickets of Eastern Australia ecological community would make a significant contribution to the conservation of the ecological community.

10. Recommendation

TSSC recommends that:

- the list referred to in section 181 of the EPBC Act be amended by including in the list in the **critically endangered** category: **Littoral Rainforest and Coastal Vine Thickets of Eastern Australia** ecological community; and
- there should be a national recovery plan for the **Littoral Rainforest and Coastal Vine Thickets of Eastern Australia** ecological community.

Associate Professor Robert J.S. Beeton

Chair

Threatened Species Scientific Committee

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Appendix E. Littoral Rainforest CEEC EPBC Conservation Advice

A statement for the purposes of approved conservation advice
(s266B of the *Environment Protection and Biodiversity Conservation Act 1999*)

**Approved Conservation Advice for the Littoral Rainforest and Coastal Vine
Thickets of Eastern Australia ecological community**

This Conservation Advice has been developed based on the best available information at the time this conservation advice was approved.

The Littoral Rainforest and Coastal Vine Thickets of Eastern Australia ecological community is a complex of rainforest and coastal vine thickets on the east coast of Australia influenced by its proximity to the sea. The canopy, which protects less tolerant species and propagules in the understorey from salt laden winds, can range from patchy to closed and may include emergents as well as dead trees due to ongoing natural disturbance. The vegetation height depends on the degree of exposure and can range from dwarf to medium (<1-25 m; Specht 1970) and tends to merge in a height continuum due to coastal processes. Plant diversity declines from a north to south direction with the species composition also differing with latitude subject to substrate and nutrient inflow.

The ecological community meets criteria 2 and 4 of the Guidelines for ecological community nomination. The ecological community is listed as critically endangered.

The ecological community occurs within 2 km of the eastern coastline of Australia, including offshore islands, from Princess Charlotte Bay, Cape York Peninsula to the Gippsland Lakes in Victoria. It is known to occur in Queensland, New South Wales and Victoria where the relevant Natural Resource Management regions are: Cape York, Wet Tropics, Mackay-Whitsunday, Fitzroy, Burnett-Mary and South East (Queensland); Northern Rivers, Hunter-Central Rivers, Hawkesbury-Nepean, Sydney Metro, Southern Rivers (New South Wales); and East Gippsland (Victoria).

The ecological community has been significantly reduced and fragmented by sandmining, agriculture and coastal development. Presently, the main key threats to the ecological community include clearing of native vegetation, coastal development, visitor disturbance, weed invasion, animal grazing/browsing, fire and the effects of fragmentation. In addition, natural disturbances, such as storms and cyclones, can impact the ecological community and are likely to increase in frequency and intensity with climate change.

The following are actions that can be carried out to stop the decline or support the recovery of the ecological community.

Regional Priority Actions

The regional priority recovery and threat abatement actions required for this ecological community are identified below.

Habitat Loss, Disturbance and Modification

- Identify known sites of high conservation priority and implement conservation mechanisms, such as covenants or inclusion in reserve tenure.

- Protect areas of native vegetation, which contain remnants of the listed ecological community.
- Manage any changes to hydrology which may result in increased run off or sediment or changes to the water table levels.
- Ensure chemicals or other mechanisms used to eradicate weeds do not have a significant adverse impact on the ecological community.
- Repair, expand and connect existing remnants of the listed ecological community through appropriate rainforest rehabilitation methods.
- Maintain and monitor rehabilitated remnants of the listed ecological community.
- Undertake appropriate collection and storage of seed of component species for future planting.

Invasive Weeds

- Develop and implement a management plan for the control of transformer weeds in the local region.

Trampling, Browsing and Grazing

- Develop a management plan or for the control and, as appropriate, eradication of feral deer, such as Rusa, Sambar and Hog Deer.

Fire

- Develop and implement a suitable fire management strategy for the ecological community.
- Provide maps of known occurrences of the ecological community to local and state rural fire services and seek inclusion of mitigative measures in bush fire risk management plan(s), risk register and/or operation maps.

Conservation Information

- Raise awareness of the ecological community within the local community.

Local Priority Actions

The local priority recovery and threat abatement actions for this ecological community are identified below:

Habitat Loss, Disturbance and Modification

- Monitor known sites to identify key threats or progress of recovery.
- Modify access routes to prevent vehicular and pedestrian access.
- Ensure the proper placing of access points and orientation of track access to the beach to ensure that protected vegetation continues to be buffered from prevailing salt laden winds.
- Undertake survey work in suitable habitat or potential habitat to locate any additional remnants.
- Minimise adverse impacts from changed land use at known sites.
- Protect remnants of the listed ecological community on private land through the development of conservation agreements and covenants.
- Preserve remnants of the listed ecological community on private and leased land through the development of reserves (if possible) and/or zoning for environmental purposes.

Invasive Weeds

- Identify and undertake weed management of known sites to reduce or remove transformer weeds.
- Identify and remove weeds in the local area, which could become a threat to the ecological community.

Trampling, Browsing and Grazing

- Manage known sites in reserve areas and on private property to exclude feral deer such as Rusa, Sambar and Hog Deer.
- Control feral animals by appropriate means.

Fire

- Implement hazard reduction zones in the vicinity of remnants of the listed ecological community and fire suppression which includes keeping stand margins in as weed-free a condition as possible.

This list does not necessarily encompass all actions that may be of benefit to this ecological community, but highlights those that are considered to be of highest priority at the time of listing.

Appendix F. Littoral Rainforest CEEC EPBC List of Sydney Basin Species

SYDNEY BASIN

FLORA SPECIES	
<p>Trees</p> <p><i>Acmena smithii</i> <i>Acronychia oblongifolia</i> <i>Banksia integrifolia</i> <i>Claoxylon australe</i> <i>Cupaniopsis anacardioides</i> <i>Diospyros pentamera</i> <i>Elaeodendron australe</i> <i>Eucalyptus botryoides</i> <i>Eupomatia laurina</i> <i>Ficus obliqua</i> <i>Glochidion ferdinandi</i> <i>Guttoa semiglauc</i> <i>Livistona australis</i> <i>Pittosporum undulatum</i> <i>Podocarpus elatus</i> <i>Myrsine howittiana</i> <i>Sarcomelicope simplicifolia</i> <i>Synoum glandulosum</i></p>	<p>Shrubs</p> <p><i>Breynia oblongifolia</i> <i>Notelaea longifolia</i> <i>Pittosporum revolutum</i> <i>Syzygium paniculatum</i></p> <p>Vines/Creepers</p> <p><i>Cissus antarctica</i> <i>Cissus hypoglauc</i> <i>Eustrephus latifolius</i> <i>Geitonoplesium cymosum</i> <i>Hibbertia scandens</i> <i>Marsdenia rostrata</i> <i>Parsonsia straminea</i> <i>Smilax australis</i> <i>Stephania japonica</i></p> <p>Ferns</p> <p><i>Pellaea falcata</i></p>
TRANSFORMER WEEDS	
<p><i>Asparagus aethiopicus</i> <i>Chrysanthemoides monilifera</i> <i>Delatrea odorata</i> <i>Ehrharta erecta</i> <i>Lantana camara</i> <i>Senna pendula</i> <i>Tradescantia albiflora</i> (just goes across ground layer, not into canopy, but still impacts on the ecological community significantly if infestation is thick)</p>	

Appendix G. Littoral Rainforest CEEC EPBC brochure on management

Littoral Rainforest and Coastal Vine Thickets of Eastern Australia

A nationally threatened ecological community

This brochure is designed to assist land managers, owners and occupiers to identify, assess and manage the Littoral Rainforest and Coastal Vine Thickets of Eastern Australia, an ecological community listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The brochure is a companion document for the listing advice which can be found at the Australian Government's species profile and threats database (SPRAT). Please go to the Littoral Rainforest and Coastal Vine Thickets of Eastern Australia profile in SPRAT:

www.environment.gov.au/cgi-bin/sprat/public/publiclookupcommunities.pl

What is an ecological community?

An ecological community is a unique and naturally occurring group of plants and animals. Its presence and distribution is determined by environmental factors such as soil type, position in the landscape, climate and water availability. Species within such communities interact and depend on each other - for example, for food or shelter. Examples of communities listed under the EPBC Act include woodlands, grasslands, shrublands, forests, wetlands, ground springs and cave communities

Together with threatened species, ecological communities are protected as one of several matters of National Environmental Significance under the EPBC Act. Threatened ecological communities can be listed as **Critically Endangered**, **Endangered** or **Vulnerable**, categories which reflect their decline and potential for extinction across their national extent. Protection through the EPBC Act is vital for some ecological communities because they often occur outside of conservation reserves.

Ecological communities provide a range of ecosystem services, including the natural management of water, air and soil nutrients, the reduction of erosion and salinity and the provision of carbon storage. In addition to providing vital connections for wildlife corridors and habitat refuge for many threatened plant and animal species, they also contribute to tourism, recreation and the productivity of our farmlands.

What is the Littoral Rainforest and Coastal Vine Thickets of Eastern Australia ecological community?

The Littoral Rainforest and Coastal Vine Thickets of Eastern Australia is a critically endangered ecological community listed under the Australian Government's EPBC Act. The ecological community provides habitat for over 70 threatened plants and animals and it provides an important buffer to coastal erosion and wind damage.

Littoral Rainforest and Coastal Vine Thickets of Eastern Australia typically occurs close to the coast from northern Queensland southwards to eastern Victoria and on offshore islands. It occurs as a series of naturally disjunct and localised stands, on a range of landforms which have been influenced by coastal processes including dunes and flats, headlands and sea-cliffs.

The appearance of this ecological community and its plant species can vary greatly

depending on location, but it appears as a complex of rainforest and vine thickets. The vegetation generally is structurally diverse, with native trees, shrubs, vines and ground layers all potentially being present. The vegetation typically has a closed canopy.

- The Littoral Rainforest and Coastal Vine Thickets of Eastern Australia is a highly fragmented, critically endangered ecological community.
- Littoral Rainforest and Coastal Vine Thickets of Eastern Australia is relatively resilient and is still functional even after some disturbances (such as storm events and weed invasion).
- Setting aside this ecological community for long-term protection is encouraged for future generations to experience.
- Implementing favourable land use and management practices is encouraged at sites containing this ecological community.

How do I know if I am standing in a patch of the Littoral Rainforest and Coastal Vine Thickets of Eastern Australia?

This guide is designed to help you determine if a native vegetation remnant could be part of the listed Littoral Rainforest and Coastal Vine Thickets of Eastern Australia ecological community. The *description* and *condition thresholds* of the ecological community in the listing advice are always the definitive source of information for identifying a nationally threatened ecological community and any mapped vegetation units should only be used as a guide. The description in the listing advice is summarised in the following pages.

A patch of the listed ecological community is defined as a discrete and continuous area that comprises the ecological community. It does not include substantial elements of other ecological communities, such as coastal scrublands and other drier types of forests. However, a patch of the listed ecological community may include small-scale disturbances, such as tracks or breaks that do not significantly alter its overall functionality, for instance the easy movement of wildlife or dispersal of plant spores and seeds.

If a native vegetation remnant meets ALL the criteria below, then you are likely to be standing in the nationally listed threatened ecological community.

Where should a rainforest patch be located?

- The ecological community occurs in the following bioregions identified in the Interim Biogeographic Regionalisation of Australia (IBRA): Cape York Peninsula (from Princess Charlotte Bay southwards), Wet Tropics, Central Mackay Coast, South Eastern Queensland, NSW North Coast, Sydney Basin and South East Corner. (See map on page 7).
- Patches of the ecological community typically occur within two kilometres of the east coast, or on offshore islands, or adjacent to a large body of salt water, such as an estuary, where they are subject to maritime influences.
- The ecological community occurs on coastal headlands, dunes, sea-cliffs or other places influenced by the sea.

What is the native vegetation like?

- The structure typically includes a closed canopy of trees, so when you are in the ecological community it often appears dark, but the canopy can be patchy when in exposed situations or after storm events. That is, at times the canopy may have temporary gaps, due to natural disturbance such as storm events or tree fall, allowing more light in the ecological community.
- Usually, several vegetation layers are present. The canopy protects less tolerant species underneath it from salt-laden winds. However, where there is extreme exposure to salt laden winds, these distinct layers demonstrate a height continuum. Moreover, wind sheared canopy can be present on the frontal section (closest to the sea).
- The Littoral Rainforest and Coastal Vine Thickets of Eastern Australia typically has tall trees as part of the canopy, but not always. The height of the canopy plants varies depending on the degree of exposure and can range from one to 25 metres. Emergent trees may be present above the canopy, for example species from the genera *Araucaria* (Bunya and Hoop pines in the northern bioregions only), *Banksia* or *Eucalyptus*. The ground layer of the vegetation typically is sparse.
- There are a range of plant life forms including trees, shrubs, vines, herbs, ferns and epiphytes (plants that are supported by or grow on other plants). To the north, most plant species diversity is in the tree and shrub layers rather than in the lower layer. The opposite, where the ground layer is typically more diverse, generally occurs from the Sydney Basin Bioregion southwards.
- Plants with drought tolerant and succulent features are generally more common in littoral rainforest than in more inland rainforest types. Trunks often host lichens (but rarely mosses) and canopy stem sizes tend to be smaller compared to that in more inland rainforest. Ground ferns and epiphytes are lower in diversity in littoral rainforests compared to many other rainforest types. Feather palms, fan palms and large leaved epiphytes are generally rare.
- Plant species are mainly rainforest species and can be regionally predictable. However there may be considerable variation in the composition of individual stands of the listed community within any given bioregion. The number of different species that can be found in the ecological community declines the further south the ecological community is located. There are more than 500 species of plants that could be part of the ecological community. A list of typical species for each bioregion can be found on the SPRAT database. Go to the Littoral Rainforest and Coastal Vine Thickets of Eastern Australia 'Details' link, then view 'Further Information':
www.environment.gov.au/cgibin/sprat/public/publiclookupcommunities.pl

What other condition criteria apply?

- The minimum patch size needs to be 0.1 hectares (1000 m²)
- The cover of transformer weed species is 70 per cent or less. Transformer weeds are highly invasive taxa with the potential to seriously alter the structure and function of the ecological community. This threshold recognises

the relative resilience and recoverability of the ecological community to invasion by weed species. A list of the transformer weeds for each bioregion may be found on the indicative bioregional plant Species Lists (found on SPRAT)

- Of the native plant species present in the patch at least 25 per cent of these must occur on the indicative plant Species Lists for the associated bioregion of this ecological community (found on SPRAT)OR

OR

- At least 30 per cent of the canopy cover in the patch must be from one or more of the rainforest canopy species (either a tree or shrub) that are on the indicative bioregional plant Species Lists (found on SPRAT) excluding *Banksia* or *Eucalyptus* species.

If a patch is too degraded and does not meet the above criteria, then it will be excluded from the listed ecological community. However, managing areas to maintain and enhance remaining values is encouraged (please see the Threats, Impacts and Conservation Actions section on page 11 of this guide). If a patch is not listed because it's too degraded, suitable management may improve it to the point that it can be regarded as part of the listed ecological community.

Some Key Species

The following photos show some of the key species of the Littoral Rainforest and Coastal Vine Thickets of Eastern Australia. The following abbreviations indicate the IBRA Bioregion in which each species may be found: Cape York Peninsula = **CYP**, Wet tropics = **WT**, Central Mackay Coast = **CMC**, South East Queensland = **SEQ**, NSW North Coast = **NNC**, Sydney Basin = **SB**, South East Corner = **SEC**. (See distribution map on page 7 for IBRA Bioregion boundaries).

<i>Micromelum minutum</i> CYP, WT, CMC, SEQ © M. Fagg. ANBG	<i>Eugenia reinwardtiana</i> , beach cherry CYP, WT, CMC © M. Fagg. ANBG	<i>Hibbertia scandens</i> , snake vine WT, SEQ, NNC, SB, SEC © M. Fagg. ANBG
<i>Eustrephus latifolius</i> , wombat berry CMC, SEQ, SB, SEC © M. Fagg. ANBG	<i>Pandorea pandorana</i> , wonga wonga vine SEQ, NNC, SEC © M. Fagg. ANBG	<i>Smilax australis</i> , barbed wire vine WT, CMC, SEQ, SB, SEC © M. Fagg. ANBG
<i>Stephania japonica</i> , subsp. discolour SEQ, SEC © M. Fagg. ANBG	<i>Pittosporum revolutum</i> , rough-fruit pittosporum SEQ, NNC, SEC © M. Fagg. ANBG	<i>Livistona australis</i> , cabbage tree palm SB © D. Greig. ANBG
<i>Morinda jasminoides</i> , jasmine morinda SEC © M. Fagg. ANBG	<i>Asplenium australasicum</i> , birds nest fern SEC © M. Fagg. ANBG	<i>Doodia Aspera</i> , prickly rasp fern SEC © M. Fagg. ANBG

Exception - Brigalow Belt North Bioregion

If the site is located in the Brigalow Belt North Bioregion and a patch of native vegetation fulfils the criteria above for Littoral Rainforest and Coastal Vine Thickets of

Eastern Australia, then it is likely to be within the Queensland (QLD) Regional Ecosystem 11.2.3, Low notophyll to microphyll vine forest (“beach scrub”) on sandy beach ridges, which is a component of the Semi-evergreen Vine Thickets of the Brigalow Belt (North and South) and Nandewar Bioregions ecological community. This ecological community was listed under the EPBC Act in 2001 and includes coastal vine forests within the Brigalow Belt Bioregion.

Further information on the Semi-evergreen Vine Thickets of the Brigalow Belt (North and South) and Nandewar Bioregions ecological community can be found in the SPRAT profile of that ecological community:

www.environment.gov.au/cgi-bin/sprat/public/publiclookupcommunities.pl

The Environmental Protection Agency of Queensland has produced information on Regional Ecosystem 11.2.3 Low notophyll to microphyll vine forest (“beach scrub”) on sandy beach ridges. This can be found at:

www.epa.qld.gov.au/publications?id=2186

Where is the ecological community found?

The Littoral Rainforest and Coastal Vine Thickets of Eastern Australia ecological community is found on the east coast of Australia typically within two kilometres of the coast, or adjacent to a large body of salt water (such as an estuary), or on offshore islands. The ecological community is not associated with a particular soil type but is found on a variety of landforms, such as headlands and dunes.

The ecological community occurs from Princess Charlotte Bay, at the southern end of Cape York Peninsula in QLD to the Gippsland Lakes in Victoria as well as on offshore islands on the east coast. Warm temperate, sub-tropical and tropical climate zones may contain this ecological community. Other coastal rainforests occur further north but are not included in this ecological community.

The map on page 7 shows the areas along the east coast of Australia where the Littoral Rainforest and Coastal Vine Thickets of Eastern Australia is likely to occur. The description and condition thresholds of the ecological community in the listing advice are always the definitive source of information for identifying a nationally threatened ecological community and any mapped vegetation units should only be used as a guide. Coastal areas in the Brigalow Belt North Bioregion do not contain the listed community (see the exception - Brigalow Belt North Bioregion).

State equivalents to the listed community?

The three states in which the listed ecological community occurs, QLD, New South Wales (NSW) and Victoria, classify plant communities in different ways. NSW and QLD have equivalent vegetation types for Littoral Rainforest and Coastal Vine Thickets of Eastern Australia and these are listed below. This list may enable land managers who are familiar with their own state’s vegetation classification to identify whether the listed community is likely to occur at a particular site.

In QLD, the Regional Ecosystems that currently equate **wholly** to the ecological community are: 3.2.1a, 3.2.1b, 3.2.12, 3.2.13, 3.2.28, 3.2.29, 3.2.31, 3.2.11, 3.12.20, 7.2.1a-i, 7.2.2a-h, 7.2.5a, 7.2.6b, 7.11.3b, 7.12.11d, 8.2.2 and 12.2.2. A description for each of the Regional Ecosystems is found at:

www.epa.qld.gov.au/nature_conservation/biodiversity/regional_ecosystems

- In NSW, the ecological community is protected under the Threatened Species Conservation Act 1995 as “Littoral Rainforest in the South East Corner, Sydney Basin and NSW North Coast Bioregions”.

www.threatenedspecies.environment.nsw.gov.au/tsprofile/pas_profile.aspx?id=10867

- In Victoria, the ecological community is known as Littoral Rainforest but is not described under the Ecological Vegetation Class and is not protected as a threatened ecological community under state legislation (as at January 2009).

The listing of Littoral Rainforest and Coastal Vine Thickets of Eastern Australia under the EPBC Act protects the ecological community throughout its entire range including in Victoria.

Some Examples of Littoral Rainforest and Coastal Vine Thickets of Eastern Australia

The listed ecological community varies greatly in appearance across its distributional range and from site to site; there may be differences in structure and plant species present. The following photos show some examples of this ecological community and some of the variations in appearance. The labels indicate the IBRA regions where the photo was taken (see distribution map on page 7 for IBRA boundaries).

Palm Cove, North of Cairns, QLD Wet Tropics © G W. & R. F. Wilson	Palm Cove, North of Cairns, QLD Wet Tropics © G W. & R. F. Wilson	Ellis Beach, North of Cairns, QLD Wet Tropics © G W. & R. F. Wilson
Ellis Beach, North of Cairns, QLD Wet Tropics © G W. & R. F. Wilson	Mission Beach, South of Cairns, QLD Wet Tropics © Liz Gallie	Mission Beach, South of Cairns, QLD Wet Tropics © Liz Gallie
Mission Beach, South of Cairns, QLD Wet Tropics © Steve McDermott	Wagnetti Beach, North of Cairns, QLD Wet Tropics © Steve McDermott	Central Mackay Coast © Steve McDermott
Central Mackay Coast © Marie Cali	North of Cabarita Beach, Northern NSW South East Queensland © Bill O'Donnell	North of Cabarita Beach, Northern NSW South East Queensland © Bill O'Donnell
Wooyung Nature Reserve, North of Byron Bay, NSW. South East Queensland © Bill O'Donnell	Wooyung Nature Reserve, North of Byron Bay, NSW. South East Queensland © Bill O'Donnell	Iluka World Heritage Area, North of Yamba. NSW North Coast © Bill O'Donnell
Sea Acres Nature Reserve, Port Macquarie. NSW North Coast © F. Barzi	NSW North Coast © Helena Mills	Booti Booti, National Park, South of Forest. NSW North Coast © Helena Mills
NSW North Coast © F. Barzi	NSW North Coast © F. Barzi	Bournda National Park, North of Merimbula, NSW. South East Corner © T. Wright
Bournda National Park, North of Merimbula, NSW. South East Corner © T. Wright	Bournda National Park, North of Merimbula, NSW. South East Corner © T. Wright	Ninety Mile Beach, near Lakes Entrance, VIC. South East Corner © Bill Peel
South East Corner © Bill Peel	South East Corner © Bill Peel	North Arm, near Lakes Entrance, VIC. South East Corner © Bill Peel

Species of Special Importance

Many threatened species that are listed under the EPBC Act have been either recorded in, or near to, known sites of the Littoral Rainforest and Coastal Vine Thickets of Eastern Australia ecological community. This includes more than 50 plants, as well as various birds, mammals, reptiles and frog species. Please refer to the listing advice for details:

www.environment.gov.au/cgi-bin/sprat/public/publiclookupcommunities.pl

Two species of particular note are the nationally-listed southern cassowary (*Casuarus casuaris johnsonii*) and grey-headed flying fox (*Pteropus poliocephalus*). These species are an integral part of the listed ecological community in some areas, relying on the fruits of the listed community plants for food and in return they disperse the seeds of these plants. The grey-headed flying fox has the potential for wide dispersal of seeds as it covers long distances in its foraging behaviour.

On pages 13-15 of this booklet there is a table of species which are associated with the Littoral Rainforest and Coastal Vine Thickets of Eastern Australia and are listed under the EPBC Act. There are also some photos of these listed species.

Why is the ecological community listed as critically endangered?

The decision to list the ecological community was made by the Minister for the Environment, Heritage and the Arts after a rigorous process that involved consultation with stakeholders and advice from the Threatened Species Scientific Committee (TSSC). The TSSC is an independent scientific body that advises the Minister on the conservation status of native species and ecological communities.

The Littoral Rainforest and Coastal Vine Thickets of Eastern Australia has been listed under the EPBC Act based on the TSSC finding that it is typically fragmented and small patch sizes coupled with demonstrable threats and the very severe reduction in the integrity of the ecological community, make it critically endangered.

National listing of an ecological community recognises that its long-term survival is under threat. The listing aims to prevent any further decline and to promote and assist recovery through government, landholder and community efforts.

What does the listing of the ecological community mean for land managers or developers?

If a patch of the listed ecological community is present, then continuation of supportive land use and practices is vitally important if it is to persist for the benefit of future generations.

The listing of the Littoral Rainforest and Coastal Vine Thickets of Eastern Australia under the EPBC Act will not prevent land managers from continuing to use land in the same way they were before, providing that they do not significantly change or intensify their activities (and the activity is lawful).

National protection means any new or intensified activities that may have a significant impact upon one or more patches of the listed ecological community should be referred to the Minister for the Environment, Heritage and the Arts for assessment and approval.

Such activities include clearing of the listed community and activities leading to or contributing to degradation of the community, such that its values or ecological viability are threatened. For example logging, clearing of understorey or ground layer, permanent changes in hydrology, introduction of invasive exotic species, fragmentation through construction of permanent access tracks. Also note that even

if your remnant vegetation does not meet the criteria for the listed ecological community (on pages 2 to and 4) some plants or animal species that occur within the remnant may be individually protected under the EPBC Act.

The EPBC Act allows for some exemptions to the requirement for assessment and approval. This means that some activities may not need to be referred for an assessment or approval under certain conditions. However, failure to refer an action that has a significant impact on the listed ecological community may have legal consequences such as financial penalties or remediation orders.

Further information is available on:

Approvals: www.environment.gov.au/epbc/approval.html

Exemptions: www.environment.gov.au/epbc/about/exemptions.html

Referrals: www.environment.gov.au/epbc/assessments/referral-form.html

Enquiries may also be directed to **1800 803 772**

You should also check with relevant authorities whether any state or Local Government approvals are required in addition to EPBC Act requirements.

If you have the listed ecological community on your property and intend to use that land for farming practices, then you are encouraged to seek advice from the Environmental Liaison Officer at the National Farmers' Federation. The officer can be contacted by phone **1800 704 520** or email environment@nff.org.au

Threats, Impacts and Conservation Actions

What was once an almost continuous group of patches of the ecological community along the eastern coast of Australia has been and continues to be reduced and fragmented by land clearance, weed invasion, recreational disturbance, animal browsing/grazing, fire and natural disturbance.

There are many benefits to the long-term protection of native biodiversity. Native vegetation remnants, such as the listed Littoral Rainforest and Coastal Vine Thickets of Eastern Australia community, provide a range of ecosystem services along the east coast of Australia, like buffering salt laden winds and the prevention of erosion.

To assist in the protection of the listed community, survey work and mapping is encouraged to help identify more remnants of the listed rainforest. Monitoring to identify key threats as well as protecting known sites of the listed community through the development of conservation agreements and covenants with state conservation agencies, or re-zoning land would also help to protect the Littoral Rainforest and Coastal Vine Thickets of Eastern Australia.

Clearing and land development pose serious threats to the Littoral Rainforest and Coastal Vine Thickets of Eastern Australia. These activities remove vegetation and the seedbank, further fragmenting the listed community and having a significant negative impact on biodiversity. Developments that are near or are upstream of the listed community and that change drainage patterns can also have negative impacts on the community. Changes in water runoff and timing potentially threaten the

community as they can alter the surrounding vegetation and impact on the listed ecological community.

Climate change may directly impact on the listed community by changes to rainfall and temperature regimes and by an increased intensity of coastal processes. This may include changes to inundation regimes and an increase in severity and frequency of storm events. Storm events may directly damage the forest canopy and increase the chances of weed invasion and establishment within the rainforest. Other indirect impacts may include changes to fire regimes and to species composition.

While the ecological community is relatively resilient to natural disturbances, weeds have the ability to structurally change and transform the Littoral Rainforest and Coastal Vine Thickets of Eastern Australia. Weeds of particular concern for the listed community are lantana, bitou bush, pond apple, asparagus species, rubber vine, cape ivy, madeira vine and *Senna siamea* (some of these are pictured below). For information on the management of some of these weeds, visit the Weeds of National Significance site: www.weeds.org.au/WoNS

Below is a table showing key potential threats to the Littoral Rainforest and Coastal Vine Thickets of Eastern Australia listed community as well as possible actions that land managers may take to benefit the conservation of the listed community and their land. This list is not exhaustive. A conservation advice for this ecological community has been prepared. It highlights conservation actions of high priority at the time of listing and provides additional guidance and is available on SPRAT:

www.environment.gov.au/cgi-bin/sprat/public/publiclookupcommunities.pl

<i>Chrysanthemoides monilifera</i> bitou bush © H. Cherry	<i>Crypostegia grandiflora</i> rubber vine © D. Markovic	<i>Annona glabara</i> pond apple © C. G. Wilson	<i>Lantana camara</i> lantana © C. G. Wilson
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Threat	Impact	Management Actions
Clearing, disturbance and modification	<ul style="list-style-type: none"> Removal, damage, thinning or fragmentation of the community Increased edge effects including susceptibility to weed invasion Increased salt spray to plants 	<ul style="list-style-type: none"> Identify high conservation sites and implement conservation mechanisms Protect remnants Repair and expand and connect remnants Collect and store seeds for future plantings
Inappropriately placed paths/tracks including beach access and amenities	<ul style="list-style-type: none"> Direct plant damage Patch fragmentation Increased salt spray to plants 	<ul style="list-style-type: none"> Ensure proper placement of paths/tracks, public amenities around the community

Invasive weeds	<ul style="list-style-type: none"> • Introduced plants compete with native plants for space, water and nutrients 	<ul style="list-style-type: none"> • Remove key problem species such as lantana and bitou bush from known littoral rainforest sites.
	<ul style="list-style-type: none"> • May lead to structural changes or smothering as some noxious weeds proliferate, especially after disturbances like storms 	<ul style="list-style-type: none"> • Develop and use long-term management plans for controlling key exotic plant species in the region • Replant with local native species
Inappropriate fire regimes	<ul style="list-style-type: none"> • Can open up forest to weeds, structural and species change • Loss of habitat for native animals 	<ul style="list-style-type: none"> • Implement hazard reduction zones in the vicinity of remnants
Trampling, browsing and grazing by feral animals and livestock	<ul style="list-style-type: none"> • Vegetation removal • Soil compaction • Decrease in water uptake • Accelerated weed invasion 	<ul style="list-style-type: none"> • Control feral animal and livestock impacts by appropriate means • Manage known sites to exclude feral animals and livestock

Species listed under the *Environment Protection and Biodiversity Conservation Act, 1999*

The following table shows species listed under the *Environment Protection and Biodiversity Conservation Act 1999* as of February 2009 and associated with the Littoral Rainforest and Coastal Vine Thickets ecological community.

	Species	Common name(s)	EPBC Status
Plants	<i>Acacia caerulescens</i>	buchan blue wattle	Vulnerable
	<i>Acronychia littoralis</i>	scented acronychia	Endangered
	<i>Arenga australasica</i>	Australian arenga palm	Vulnerable
	<i>Arthraxon hispidus</i>	hairy jointgrass	Vulnerable
	<i>Asperula asthenes</i>	trailing woodruff	Vulnerable
	<i>Asterolasia elegans</i>		Endangered
	<i>Baloghia marmorata</i>	jointed baloghia	Vulnerable
	<i>Boronia umbellata</i>	orara boronia	Vulnerable

	<i>Bosistoa selwynii</i>	heart-leaved bonewood	Vulnerable
	<i>Bosioea transversa</i>	yellow satinheart	Vulnerable
	<i>Bulbophyllum globuliforme</i>	hoop pine orchid	Vulnerable
	<i>Clematis fawcettii</i>	northern clematis	Vulnerable
	<i>Corchorus cunninghamii</i>	native jute	Endangered
	<i>Corokia whiteana</i>	corokia	Vulnerable
	<i>Cryptocarya foetida</i>	stinking cryptocarya	Vulnerable
	<i>Cryptostlis hunteriana</i>	leafless tongue orchid	Vulnerable
	<i>Cupaniopsis shirleyana</i>	wedge-leaf tuckeroo	Vulnerable
	<i>Cynanchum elegans</i>	white-flowered wax plant	Endangered
	<i>Davidsonia jerseyana</i>	Davidson's plum	Endangered
	<i>Davidsonia johnsonii</i>	smooth Davidson's plum	Endangered
	<i>Desmodium acanthocladum</i>	thorny pea	Endangered
	<i>Diospyros mabacea</i>	red-fruited ebony	Vulnerable
	<i>Diploglottis campbellii</i>	small-leaved tamarind	Vulnerable
	<i>Durabaculum nindii</i>		Endangered
	<i>Endiandra floydii</i>	Floyd's walnut	Endangered
	<i>Endiandra hayesii</i>	rusty rose walnut	Endangered
	<i>Floydia praealta</i>	ball nut	Vulnerable
	<i>Fontainea australis</i>	southern fontainea	Vulnerable
	<i>Fontainea oraria</i>	coastal fontainea	Vulnerable
	<i>Gossia fragrantissima</i>	sweet myrtle	Endangered
	<i>Hicksbeachia pinnatifolia</i>	red boppel nut	Endangered
	<i>Huperzia dalhousieana</i>	blue tassel-fern	Vulnerable
	<i>Huperzia phlegmarioides</i>	layered tassel-fern	Endangered
	<i>Macadamia tetraphylla</i>	rough-shelled bush nut	Vulnerable
	<i>Medicosma obovata</i>		Vulnerable
	<i>Muehlenbeckia australis</i>	climbing lignum, native sarsparilla	Endangered
	<i>Neisosperma kilneri</i>		Endangered
	<i>Ozothamnus eriocephalus</i>		Vulnerable
	<i>Phaius australis</i>	southern swamp orchid	Vulnerable
	<i>Phaius tankervilleae</i>	Lady Tankerville's swamp orchid	Endangered
	<i>Phalaenopsis rosenstromii</i>		Endangered
	<i>Quassia bidwillii</i>	quassia	Endangered

	<i>Randia moorei</i>	spiny gardenia	Vulnerable
	<i>Rhizanthella slateri</i>	eastern Australian underground orchid	Endangered
	<i>Sophora fraseri</i>	brush sophora	Endangered
	<i>Syzygium hodgkinsoniae</i>	red lilly pilly	Vulnerable
	<i>Syzygium moorei</i>	rose apple	Vulnerable
	<i>Syzygium paniculatum</i>	magenta lilly pilly	Vulnerable
	<i>Tinospora tinosoroides</i>	arrow-head vine	Vulnerable
	<i>Vappaculum superbiens</i>		Vulnerable
Birds	<i>Amauornis olivaceus</i>	bush-hen	Listed Marine
	<i>Casuarius casuarius johnsonii</i>	southern cassowary	Endangered
	<i>Cyclopsitta diophthalma coxeni</i>	Coxen's fig-parrot	Endangered, Listed Migratory
	<i>Ducula bicolor</i>	pie imperial-pigeon	Listed Marine
	<i>Erythroriorchis radiatus</i>	red goshawk	Vulnerable
	<i>Hirundapus caudacutus</i>	white-throated needletail	Listed Marine, Listed Migratory
	<i>Merops ornatus</i>	rainbow bee-eater	Listed Marine, Listed Migratory
	<i>Monarcha melanopsis</i>	black-face monarch	Listed Marine, Listed Migratory
	<i>Monarcha trivirgatus</i>	spectacled monarch	Listed Marine, Listed Migratory
	<i>Pandion haliaetus</i>	osprey	Listed Marine, Listed Migratory
	<i>Pterodroma leucoptera leucoptera</i>	Gould's petrel	Endangered, Listed Migratory
	<i>Ptilinopus superbus</i>	superb fruit-dove	Listed Marine
	<i>Rhipidura rufifrons</i>	rufous fantail	Listed Marine, Listed Migratory
	<i>Turnix melanogaster</i>	black-breasted button-quail	Vulnerable
Mammals	<i>Dasyurus hallucatus</i>	northern quoll	Endangered
	<i>Dasyurus maculatus maculatus</i>	spotted-tailed quoll	Endangered
	<i>Petrogale persephone</i>	proserpine rock-wallaby	Endangered
	<i>Potorous tridactylus tridactylus</i>	long-nosed potoroo	Vulnerable
	<i>Pteropus conspicillatus</i>	spectacled flying-fox	Vulnerable
	<i>Pteropus poliocephalus</i>	grey-headed flying-fox	Vulnerable

Frogs	<i>Litoria aurea</i>	green and golden bell frog	Vulnerable
	<i>Mixophyes balbus</i>	stuttering barred frog	Vulnerable
	<i>Mixophyes iteratus</i>	giant barred frog	Endangered

Some species listed under the *Environment Protection and Biodiversity Conservation Act 1999*

Some species listed under the *Environment Protection and Biodiversity Conservation Act 1999* as of February 2009 and associated with the Littoral Rainforest and Coastal Vine Thickets ecological community. [**Vu**: Vulnerable, **En**: Endangered; **Ma**: Listed Marine, **Mi**: Listed Migratory]

<i>Boronia umbellata</i> , orara boronia Vu © M. Fagg ANBG	<i>Corchorus cunninghamii</i> , native jute En © M. Fagg ANBG	<i>Davidsonia jerseyana</i> , Davidson's plum En © M. Fagg ANBG
<i>Desmodium acanthocladum</i> , thorny pea En © M. Fagg ANBG	<i>Ptilinopus superbus</i> , superb fruit dove Ma © Wet Tropics Management Authority	<i>Pteropus conspicillatus</i> , spectacled flying-fox Vu © Mike Trenerry
<i>Casuarium casuarium johnsonii</i> , southern cassowary En © Wet Tropics Management Authority	<i>Diploglottis campbellii</i> , small leaved tamarind Vu © M. Fagg ANBG	<i>Phaius australis</i> , southern swamp orchid Vu © Andrew Benwell
<i>Acronychia littoralis</i> , scented acronychia En © Hugh Nicholson	<i>Litoria aurea</i> , green and golden bell frog Vu © Frank Lemckert	<i>Dasyurus maculatus</i> , spotted-tailed quoll En © Dave Watts
<i>Merops ornatus</i> , rainbow bee-eater Ma, Mi © Ester Beaton	<i>Floydia praealta</i> , ball nut Vu © D. Greig ANBG	<i>Fontainea oraria</i> , coastal fontainea Vu © M. Fagg ANBG
<i>Mixophyes balbus</i> , Stuttering barred frog Vu © Frank Lemckert	<i>Hicksbeachia pinnatifolia</i> , Red boppel nut En © M. Fagg ANBG	<i>Huperzia phlegmarioides</i> layered tassel fern En © M. Fagg ANBG
<i>Macadamia tetraphylla</i> rough-shelled bush nut Vu © D. Greig ANBG	<i>Neisosperma kilneri</i> En © M. Fagg ANBG	

<i>Petrogale persephone</i> , proserpine rock wallaby En © Barry Nolan		
<i>Phaius tankervilleae</i> , Lady tankerville's swamp orchid En © M. Fagg ANBG	<i>Syzygium paniculatum</i> , Magenta lilly pilli Vu © M. Fagg ANBG	<i>Mixophyes iteratus</i> Giant barred frog En © Frank Lemckert

Can I get funding to protect the ecological community?

If the ecological community is on your property, council land or public land, you may

be eligible for funding to help preserve or restore remnants.

Funding through Caring for our Country may be available for undertaking activities that are undertaken which have an environmental benefit. For more details:

www.nrm.gov.au/funding/future.html

The National Reserve System (NRS) has an important role in protecting biodiversity values. Building the NRS is one of the priorities under Caring for our Country. Funding is open to landholders who seek financial support to either purchase land or establish protected areas on private land for inclusion in the NRS. For more details:

www.nrm.gov.au/funding/2008/nrs.html

There may be state government initiatives to help protect the littoral rainforest, as it is also a state-listed threatened community in QLD and NSW. Regional offices of either the Environmental Protection Agency of QLD, or the Department of Environment and Climate Change of NSW, or your local Catchment Management Authority, Regional Natural Resource Management Group, or local council can provide you with information about any current programs in place to support conservation efforts on private property.

Where can I get further information?

Listing Advice and Conservation Advice for the Littoral Rainforest and Coastal Vine Thickets of Eastern Australia. Go to the ecological community and view the advices:

www.environment.gov.au/cgi-bin/sprat/public/publiclookupcommunities.pl

NSW Department of Environment and Climate Change (NSW listed ecological community). Littoral Rainforest ecological community profile:

www.threatenedspecies.environment.nsw.gov.au

Peel, B. (not yet published). *Rainforest Restoration Manual. Based on the Rainforests of South-eastern Australia*. Bill Peel. CSIRO PUBLISHING (Due for release May 2009).

Murphy, H. (2008). Habitat management guide—Rainforests: *Ecological principles for the strategic management of weeds in rainforest habitats*. CRC for Australian Weed Management, Adelaide. www.weedscrc.org.au/documents/CRC_HMG_Rainforests_v6a.pdf

Useful websites

- EPBC Act web site: www.environment.gov.au/epbc
- EPBC Act Administrative Guidelines on Significance: www.environment.gov.au/epbc/assessmentsapprovals/guidelines/index.html
- Information about naturally-listed threatened ecological communities

and species: www.environment.gov.au/cgi-bin/sprat/public/sprat.pl

- Caring for our Country – What can I do?: www.nrm.gov.au/do/landholders/index.html
- National Farmers' Federation:
www.nff.org.au/
- Department of Climate Change www.climatechange.gov.au/publications/index.html#impacts

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Email ciu@environment.gov.au

Freecall **1800 803 772**

Appendix H. Littoral Rainforest EEC, TSC Act Determination



[Home](#) > [Threatened species](#) > [Scientific Committee](#) > [Determinations](#)

Littoral rainforest in the NSW North Coast, Sydney Basin and South East Corner bioregions - endangered ecological community listing

NSW Scientific Committee - final determination

The Scientific Committee, established by the Threatened Species Conservation Act, has made a Final Determination to list Littoral Rainforest in the NSW North Coast, Sydney Basin and South East Corner Bioregions as an ENDANGERED ECOLOGICAL COMMUNITY in Part 3 of Schedule 1 of the Act, and as a consequence, to omit reference to the Sutherland Shire Littoral Rainforest from Part 3 of Schedule 1 (Endangered Ecological Community) of the Act. Listing of endangered ecological communities is provided for by Part 2 of the Act.

The Scientific Committee has found that:

1. Littoral Rainforest in the NSW North Coast, Sydney Basin and South East Corner Bioregions is generally a closed forest, the structure and composition of which is strongly influenced by proximity to the ocean. The plant species in this ecological community are predominantly rainforest species with evergreen mesic or coriaceous leaves. Several species have compound leaves, and vines may be a major component of the canopy. These features differentiate littoral rainforest from sclerophyll forest or scrub, but while the canopy is dominated by rainforest species, scattered emergent individuals of sclerophyll species, such as *Angophora costata*, *Banksia integrifolia*, *Eucalyptus botryoides* and *E. tereticornis* occur in many stands. Littoral Rainforest in NSW is found at locations along the entire NSW Coast in the NSW North Coast Bioregion, Sydney Basin Bioregion and South East Corner Bioregion. The areas mapped for inclusion in State Environmental Planning Policy 26 Littoral Rainforest are examples of the Littoral Rainforest ecological communities, but the mapping for SEPP 26 is not exhaustive and stands of the Littoral Rainforest ecological community occur at locations not mapped under SEPP 26. Some stands may be regrowth or in the process of regenerating. The Sutherland Shire Littoral Rainforest Endangered Ecological Community which was previously listed as an endangered ecological community is included within this Community.

2. Littoral rainforest occurs on both sand dunes and on soils derived from underlying rocks (McKinley *et al.* 1999). Stands on headlands exposed to strong wind action may take the form of dense windpruned thickets (for example the Bunga Head Rainforest illustrated by Keith & Bedward 1999, or MU5 Littoral Windshear Thicket in NPWS 2002). In more sheltered sites, and in hind dunes, the community is generally taller, although still with wind pruning on the windward side of stands. Floristically there is a high degree of similarity between stands on different substrates. Most stands of Littoral Rainforest occur within 2 km of the sea, but may occasionally be found further inland, but within reach of maritime influence.

3. Littoral Rainforest comprises the *Cupaniopsis anacardioides* - *Acmena* spp. alliance of Floyd (1990). This alliance as described by Floyd includes five sub-alliances - *Syzygium luehmannii* - *Acmena hemilampra*, *Cupaniopsis anacardioides*, *Lophostemon confertus*, *Drypetes* - *Sarcomelicope* - *Cassine* - *Podocarpus* and *Acmena smithii* - *Ficus* - *Livistona* - *Podocarpus*. The distribution of some of these sub-alliances is geographically restricted - the *Syzygium luehmannii* - *Acmena hemilampra* sub-alliance is restricted to the north coast, while the most widespread sub-alliance *Acmena smithii* - *Ficus* - *Livistona* - *Podocarpus* is the only one present on the coast south of Sydney. The *Lophostemon confertus* suballiance, synonymous with Forest Type 25 Headland Brush Box (Forestry Commission of NSW 1989) is restricted to exposed headlands in the North Coast Bioregion. There is considerable floristic variation between stands and in particular areas localised variants may be recognised (for example on the south coast a number of variants within the *Acmena smithii* - *Ficus* - *Livistona* - *Podocarpus* sub-alliance have been described, see Mills 1996, Mills & Jakeman 1995; Keith & Bedward 1999, NCC 1999, NPWS 2002). Small, depauperate stands may be difficult to assign to sub alliances. A number of

species characteristic of Littoral Rainforest in NSW reach their southern limits at various places along the coast (for example *Cupaniopsis anacardioides* reaches its southern limit between Sydney and the Illawarra) but a number of temperate species are restricted to the south coast, and the total Littoral Rainforest flora declines from north to south.

Characteristic species of littoral rainforest include:

<i>Acacia binervata</i>	<i>Acmena hemilampra</i>
<i>Acmena smithii</i>	+ <i>Acronychia imperforata</i>
<i>Acronychia oblongifolia</i>	+ <i>Alpinia caerulea</i>
<i>Alectryon coriaceus</i>	<i>Alyxia ruscifolia</i>
+ <i>Aphananthe philippinensis</i>	+ <i>Archontophoenix cunninghamiana</i>
<i>Arthropteris tenella</i>	+ <i>Arytera divaricata</i>
<i>Asplenium australasicum</i>	+ <i>Baloghia marmorata</i>
<i>Banksia integrifolia</i> subsp. <i>integrifolia</i>	+ <i>Beilschmiedia obtusifolia</i>
<i>Breynia oblongifolia</i>	+ <i>Bridelia exaltata</i>
+ <i>Calamus muelleri</i>	<i>Canthium coprosmoides</i>
+ <i>Capparis arborea</i>	<i>Cayratia clematidea</i>
<i>Celtis paniculata</i>	<i>Cissus antarctica</i>
<i>Cissus hypoglauca</i>	<i>Cissus sterculiifolia</i>
<i>Claoxylon australe</i>	+ <i>Cordyline congesta</i>
+ <i>Cordyline stricta</i>	<i>Cryptocarya glaucescens</i>
<i>Cryptocarya microneura</i>	+ <i>Cryptocarya triplinervis</i>
<i>Cupaniopsis anacardioides</i>	<i>Cynanchum elegans</i>
<i>Dendrocnide excelsa</i>	+ <i>Dendrocnide photinophylla</i>
<i>Dioscorea transversa</i>	<i>Diospyros australis</i>
<i>Diospyros pentamera</i>	<i>Doodia aspera</i>
<i>Duboisia myoporoides</i>	+ <i>Dysoxylum fraserianum</i>
<i>Ehretia acuminata</i>	+ <i>Elaeocarpus obovatus</i>
+ <i>Elattostachys nervosa</i>	<i>Endiandra discolor</i>
<i>Endiandra sieberi</i>	<i>Eucalyptus botryoides</i>
<i>Eucalyptus tereticornis</i>	<i>Eupomatia laurina</i>
<i>Eustrephus latifolius</i>	<i>Ficus coronata</i>
<i>Ficus obliqua</i>	<i>Ficus rubiginosa</i>
+ <i>Ficus watkinsiana</i>	<i>Flagellaria indica</i>
<i>Geitonoplesium cymosum</i>	<i>Glochidion ferdinandi</i>
<i>Glycine clandestina</i>	+ <i>Gossia bidwillii</i>
<i>Guioa semiglauca</i>	+ <i>Ixora beckleri</i>
+ <i>Jagera pseudorhus</i>	+ <i>Lepidozamia peroffskyana</i>
<i>Litsea reticulata</i>	<i>Livistona australis</i>
<i>Lomandra longifolia</i>	+ <i>Lophostemon confertus</i>
<i>Maclura cochinchinensis</i>	+ <i>Mallotus philippensis</i>
<i>Melaleuca quinquenervia</i>	<i>Melicope micrococca</i>
+ <i>Melicope vitiflora</i>	+ <i>Mischocarpus pyriformis</i>
+ <i>Monococcus echinophorus</i>	+ <i>Morinda jasminoides</i>
+ <i>Mucuna gigantea</i>	<i>Myoporum acuminatum</i>
<i>Notelaea longifolia</i>	+ <i>Olea paniculata</i>
<i>Oplismenus imbecillis</i>	+ <i>Pandanus pedunculatus</i>
<i>Pandorea pandorana</i>	<i>Pararchidendron pruinatum</i> var. <i>pruinatum</i>
<i>Parsonsia straminea</i>	+ <i>Pentaceras australis</i>
<i>Piper novae-hollandiae</i>	+ <i>Pisonia umbellifera</i>
<i>Pittosporum multiflorum</i>	<i>Pittosporum undulatum</i>
<i>Platynerium bifurcatum</i>	<i>Podocarpus elatus</i>
<i>Pollia crispata</i>	<i>Polyscias elegans</i>
<i>Pouteria australis</i>	<i>Pouteria cotinifolia</i> var. <i>cotinifolia</i>

+ <i>Pouteria myrsinoides</i>	<i>Rapanea variabilis</i>
<i>Rhodamnia rubescens</i>	+ <i>Rhodomyrtus psidioides</i>
<i>Ripogonum album</i>	<i>Ripogonum discolor</i>
<i>Sarcomelicope simplicifolia</i>	<i>Scolopia braunii</i>
<i>Smilax australis</i>	<i>Smilax glycyphylla</i>
+ <i>Sophora tomentosa</i> subsp. <i>australis</i>	<i>Stephania japonica</i> var. <i>discolor</i>
<i>Synoum glandulosum</i>	<i>Syzygium australe</i>
+ <i>Syzygium luehmannii</i>	<i>Syzygium oleosum</i>
<i>Syzygium paniculatum</i>	+ <i>Tetrastigma nitens</i>
<i>Trophis scandens</i> subsp. <i>scandens</i>	<i>Viola banksii</i>
<i>Wilkiea huegeliana</i>	

Those species marked '+' are found in littoral rainforest north of Sydney, with some restricted to the north coast or in only a few sites south of the North Coast Bioregion. The other species are geographically more widespread.

Given the small size of many stands and the history of fragmentation, the number of characteristic species in any stand is likely to be smaller than this list. In addition, the total richness of stands declines with increasing latitude and a number of the species listed above are absent or rare in the south.

4. The total species list of the community is considerably larger than that given above, with many species present in 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 condition and by its disturbance (including fire) history. 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 but the assemblage in individual stands will depend on geographic location, size of stand, degree of exposure, history of disturbance and, if previously disturbed, stage of regeneration.

5. Threatened species and populations for which Littoral Rainforest is known or likely habitat include:

<i>Acronychia littoralis</i>	<i>Cryptocarya foetida</i>
<i>Archidendron hendersonii</i>	<i>Macadamia tetraphylla</i>
<i>Cynanchum elegans</i>	<i>Hicksbeachia pinnatifolia</i>
<i>Fontainea oraria</i>	<i>Syzygium moorei</i>
<i>Senna acclinis</i>	<i>Xylosma terrae-reginae</i>
<i>Syzygium paniculatum</i>	

<i>Amaurornis olivaceus</i>	Bush-hen
<i>Coracina lineata</i>	Barred Cuckoo-shrike
<i>Lichenostomus faciogularis</i>	Mangrove Honeyeater
<i>Monarchia leucotis</i>	White-eared Monarch
<i>Ninox strenua</i>	Powerful Owl
<i>Pandion haliaetus</i>	Osprey
<i>Ptilinopus magnificus</i>	Wompoo Fruit-dove
<i>Ptilinopus regina</i>	Rose-crowned Fruit-dove
<i>Ptilinopus superbus</i>	Superb Fruit-dove
<i>Tyto tenebricosa</i>	Sooty Owl
<i>Dasyurus maculatus</i>	Spotted-tailed Quoll
<i>Kerivoula papuensis</i>	Golden-tipped Bat
<i>Mormopterus beccarii</i>	Beccari's Freetail-bat
<i>Mormopterus norfolkensis</i>	Eastern Freetail-bat
<i>Myotis adversus</i>	Large-footed Myotis
<i>Nyctimene robinsoni</i>	Eastern Tube-nosed Bat

<i>Potorous tridactylus</i>	Long-nosed Potoroo
<i>Pteropus alecto</i>	Black Flying Fox
<i>Pteropus poliocephalus</i>	Grey-headed Flying Fox
<i>Syconycteris australis</i>	Eastern Blossom Bat
<i>Thylogale stigmatica</i>	Red-legged Pademelon
<i>Coeranoscincus reticulatus</i>	Three-toed Snake-tooth Skink
<i>Hoplocephalus bitorquatus</i>	Pale-headed Snake
<i>Thersites mitchellae</i>	Mitchell's Rainforest Snail

Emu, *Dromaius novaehollandiae*, population in the NSW North Coast Bioregion and Port Stephens Local Government Area

Menippus fugitivus (Lea), a beetle population in the Sutherland Shire

Most of the species included in this list are found at only some sites, or vary in occurrence and abundance. As such they are not regarded as part of the characterisation of the community. Nevertheless, they are of conservation significance and need to be considered in recovery planning.

6. Littoral Rainforest occurs in numerous, small stands and in total comprises less than 1% of the total area of rainforest in NSW. The largest known stand occurs in Iluka Nature Reserve, which is approximately 136 ha. Many, but not all, stands of Littoral Rainforest have been included in mapping for State Environmental Planning Policy 26 Littoral Rainforest, but degradation of the ecological community is still occurring.

7. Weed species that threaten the integrity of particular stands include *Ambrosia artemisifolia*, *Anredera cordifolia*, *Arecastrum romanzoffianum*, *Asparagus* spp., *Cardiospermum grandiflorum*, *Chrysanthemoides monilifera*, *Coprosma repens*, *Ehrharta* spp., *Gloriosa superba*, *Ipomoea* spp; *Impatiens walleriana*, *Lantana camara*, *Macfadyena unguis-cati*, *Rivina humilis*, *Pennisetum clandestinum*, *Schefflera actinophylla*, *Senna septemtrionalis*, *Solanum mauritianum* *Thunbergia alata* and *Tradescantia fluminensis*.

8. Other threats include loss of canopy integrity arising from salt and wind damage as a result of clearing or damage to stand margins; clearing of understorey (including for firewood collection); grazing and physical disturbance of understorey including by feral deer; inappropriate collection of a range of plant species (including, but not restricted to, epiphytes); fire, particularly fire incursion along boundaries: visitor disturbance including soil compaction, soil disturbance, erosion from foot, cycle, trail bike and 4 wheel drive tracks, introduction of pathogens, and disturbance from creation of new planned and unplanned tracks; increased visitation and resulting increased demand for and use of, visitor facilities such as walking tracks, viewing platforms, toilet blocks, picnic areas etc; dumping of garden waste causing weed infestation; car and other rubbish dumping. Loss of fauna due to predation by feral animals, road kill, loss of habitat and feeding resources, disturbance from human visitation (faunal elements are essential to the ecological functioning of littoral rainforest and loss, or reduction, in pollinators and seed dispersal agents will adversely affect long term vegetation health); fragmentation resulting in loss of connectivity and possibly reduced genetic exchange between populations. For stands not protected by State Environmental Planning Policy 26, clearing and development remains a possibility. (Adam 1987, 1992; Floyd 1990; Mills 1996).

9. In view of the above the Scientific Committee is of the opinion that Littoral Rainforest in 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.

Associate Professor Paul Adam

Chairperson

Scientific Committee

Proposed Gazettal date: 04/06/04

Exhibition period: 04/06/04 - 16/07/04

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[About the NSW Scientific Committee](#)

Page last updated: 28 February 2011

Appendix I. *Acacia terminalis* ssp. *terminalis*

Endangered Species EPBC Act Profile

Biodiversity

Species Profile and Threats Database

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[Glossary](#)

Acacia terminalis subsp. terminalis MS — Sunshine Wattle

SPRAT Profile

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- [Description](#)
- [Australian Distribution](#)
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- [Habitat](#)
- [Life Cycle](#)
- [Threats](#)
- [Threat Abatement and Recovery](#)
- [Threat Class Summary](#)
- [Species Profile References](#)
- [Newsletters](#)
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For information to assist proponents in referral, environmental assessments and compliance issues, refer to the Policy Statements and Guidelines (where available), the Conservation Advice (where available) or the Listing Advice (where available).

In addition, proponents and land managers should refer to the Recovery Plan (where available) or the Conservation Advice (where available) for recovery, mitigation and conservation information.

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Legal Status and Documents

EPBC Act Listing Status	Listed as Endangered
Recovery Plan Decision	Recovery Plan required, included on the Commenced List (1/11/2009).
Adopted/Made Recovery Plans	National Recovery Plan for Sunshine Wattle Acacia terminalis terminalis (Department of Environment, Climate Change and Water, 2010) [Recovery Plan].
Federal Register of Legislative Instruments	Declaration under s178, s181, and s183 of the Environment Protection and Biodiversity Conservation Act 1999 - List of threatened species, List of threatened ecological communities and List of threatening processes (Commonwealth of Australia, 2000) [Legislative Instrument].
State Government Documents and Websites	NSW: Sunshine Wattle - profile (NSW Department of Environment and Conservation (NSW DEC), 2005b) [Internet]. NSW: Acacia terminalis subsp. terminalis (a shrub) endangered species listing. NSW Scientific Committee - final determination (NSW Department of Environment, Climate Change and Water (NSW DECCW), 2010) [Internet].
State Listing Status	NSW: Listed as Endangered (Threatened Species Conservation Act 1995 (New South Wales): December 2013 list)

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Naming

Scientific name *Acacia terminalis* subsp. *terminalis* MS [64829]

Family Fabaceae:Fabales:Magnoliopsida:Magnoliophyta:Plantae

Species author (Salisb.) J.F.Macbr.

Infraspecies author

Reference Kodela, P.G. & Harden, G.J. in Harden, G.J. (Ed) (2002), Flora of New South Wales Revised Edition 2: 466 [autonym, nom. inval.]

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Distribution Map

Distribution map



This is an indicative distribution map of the present distribution of the species based on best available knowledge. See [map](#) [caveat](#) for more information.

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Illustrations

Commonwealth attributions



From [Australian Plant Image Index](#)
[View larger image](#)



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Taxonomy

Scientific name: *Acacia terminalis* subsp. *terminalis*

Common name: Sunshine Wattle

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Description

Sunshine Wattle is a slender or spreading shrub, occasionally a small tree, growing to 6 m high. The flower heads are cream-coloured, pale yellow or golden yellow, and the seed pods are 3–11 cm long (NSW DEC 2005b; Orchard & Wilson 2001). Sunshine Wattle differs from other subspecies of *A. terminalis* by being hairier and possessing a thicker flower stalk and wider seed pods (NSW DEC 2005b).

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Australian Distribution

Sunshine Wattle is essentially confined to the eastern suburbs area of Sydney, NSW, between Botany Bay and the northern foreshore of Port Jackson (Benson & McDougall 1996; NSW DEC 2005b).

The southern-most record is 6 km north of Cronulla on the south side of Kurnell, and the northern-most record is around North Head. Sunshine Wattle is restricted to a few isolated points, mainly in Council Reserves (NSW NPWS 2000 pers. comm.). Specific known localities include Chifley, Cooper Park, North Head (Benson & McDougall 1996) and Waverley (Hirschfeld 1999). In 2005, recent collections of the species were only recorded from the Quarantine Station, Clifton Gardens, Dover Heights, Parsley Bay, Nielson Park, Cooper Park, Chifley and Watsons Bay (NSW DEC 2005b).

This species' distribution may be considered to be highly fragmented, as most areas of habitat or potential habitat are small and isolated (NSW DEC 2005b).

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Population Information

There is no information on the total population size of this species. *Acacia terminalis* is available from nurseries, and the stock source is uncertain (NSW DEC 2005b).

There is potential for Sunshine Wattle to hybridise with horticultural cultivars (NSW DEC 2005b).

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Land Tenure of Populations

Some small populations are located within conservation reserves (NSW Scientific Committee 1998b).

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Habitat

Sunshine Wattle is found in open coastal eucalypt woodland or forest, usually in sandy soil on creek banks, hill-slopes or in shallow soil in rock crevices and sandstone platforms on cliffs (NSW DEC 2005b; World Wide Wattle 2005).

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Life Cycle

Sunshine Wattle flowers in autumn, and is pollinated by small birds and bees. The seeds mature in November and are dispersed by ants. Recruitment in this species mainly occurs after fire (NSW DEC 2005b).

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Threats

The greatest threat to Sunshine Wattle is habitat loss due to urban development and clearing. This species' habitat is also being degraded through rubbish dumping, weed invasion, and access by people. Recreational use of the area and park management may affect Sunshine Wattle, since some plants are growing at the edge of walking tracks and roads (NSW DEC 2005b).

Inappropriate fire regimes may threaten some populations (NSW DEC 2005b).

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Threat Abatement and Recovery

Priority recovery actions recommended by the NSW Department of Environment and Conservation (NSW DEC 2005b) are to:

- Ensure personnel involved in track and road maintenance are aware of Sunshine Wattle locations and can identify the sub-species.
- Develop an appropriate fire regime to avoid frequent fire and long absence of fire.
- Undertake weed control as necessary.
- Protect known sites from clearing and degradation.
- Implement a monitoring program for known populations.
- Undertake research into Sunshine Wattle's biology and ecology (especially fire response).
- Conduct surveys of suitable habitat to search for new populations of Sunshine Wattle.

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Threat Class Summary

The following table lists known and perceived threats to this species. Threats are based on the International Union for Conservation of Nature and Natural Resources (IUCN) threat classification version 1.1.

Threat Class	Threatening Species	References
Climate Change and Severe Weather:Habitat Shifting and Alteration:Habitat loss, modification and/or degradation		National Recovery Plan for Sunshine Wattle Acacia terminalis terminalis (Department of Environment, Climate Change and Water, 2010) [Recovery Plan].
Ecosystem/Community Stresses:Indirect Ecosystem Effects:Loss and/or fragmentation of habitat and/or subpopulations		National Recovery Plan for Sunshine Wattle Acacia terminalis terminalis (Department of Environment, Climate Change and Water, 2010) [Recovery Plan].
Human Intrusions and Disturbance:Human Intrusions and Disturbance:Mechanical disturbance during construction, maintainance or recreational activities		Sunshine Wattle - profile (NSW Department of Environment and Conservation (NSW DEC), 2005b) [Internet].
Human Intrusions and Disturbance:Recreational Activities:Soil disturbance and/or trampling due to bushwalking		National Recovery Plan for Sunshine Wattle Acacia terminalis terminalis (Department of Environment, Climate Change and Water, 2010) [Recovery Plan]. Sunshine Wattle - profile (NSW Department of Environment and Conservation (NSW DEC), 2005b) [Internet].
Invasive and Other Problematic Species and Genes:Invasive Non-Native/Alien Species:Competition and/or habitat degradation	<i>Oryctolagus cuniculus</i> (Rabbit, European Rabbit)	National Recovery Plan for Sunshine Wattle Acacia terminalis terminalis (Department of Environment, Climate Change and Water, 2010) [Recovery Plan].
Invasive and Other Problematic Species and Genes:Invasive Non-Native/Alien Species:Competition	<i>Andropogon virginicus</i> (Whisky Grass, Broomsedge)	National Recovery Plan for Sunshine Wattle Acacia terminalis terminalis (Department of Environment, Climate Change and Water, 2010) [Recovery Plan].

and/or habitat
degradation

Invasive and Other Problematic Species and Genes:Invasive Non- Native/Alien Species:Competition and/or habitat degradation	<i>Pennisetum clandestinum</i> (Kikuyu)	<u>National Recovery Plan for Sunshine Wattle Acacia terminalis terminalis</u> (Department of Environment, Climate Change and Water, 2010) [Recovery Plan].
Invasive and Other Problematic Species and Genes:Invasive Non- Native/Alien Species:Competition and/or habitat degradation	<i>Ageratina adenophora</i> (Crofton Weed, Catweed, Hemp Agrimony, Mexican Devil, Sticky Agrimony, Sticky Eupatorium)	<u>National Recovery Plan for Sunshine Wattle Acacia terminalis terminalis</u> (Department of Environment, Climate Change and Water, 2010) [Recovery Plan].
Invasive and Other Problematic Species and Genes:Invasive Non- Native/Alien Species:Competition and/or habitat degradation	<i>Nephrolepis cordifolia</i> (Fishbone Fern, Herringbone Fern, Sword Fern, Pop Rock Fern)	<u>National Recovery Plan for Sunshine Wattle Acacia terminalis terminalis</u> (Department of Environment, Climate Change and Water, 2010) [Recovery Plan].
Invasive and Other Problematic Species and Genes:Invasive Non- Native/Alien Species:Competition and/or habitat degradation	<i>Lonicera japonica</i> (Japanese Honeysuckle, Chinese Honeysuckle Hall's Honeysuckle)	<u>National Recovery Plan for Sunshine Wattle Acacia terminalis terminalis</u> (Department of Environment, Climate Change and Water, 2010) [Recovery Plan].
Invasive and Other Problematic Species and Genes:Invasive Non- Native/Alien Species:Competition and/or habitat degradation	<i>Cortaderia selloana</i> (Pampas Grass, Common Pampas-grass)	<u>National Recovery Plan for Sunshine Wattle Acacia terminalis terminalis</u> (Department of Environment, Climate Change and Water, 2010) [Recovery Plan].
Invasive and Other Problematic Species and Genes:Invasive Non- Native/Alien Species:Competition and/or habitat degradation	<i>Lantana camara</i> (Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage)	<u>National Recovery Plan for Sunshine Wattle Acacia terminalis terminalis</u> (Department of Environment, Climate Change and Water, 2010) [Recovery Plan].
Invasive and Other Problematic Species and Genes:Invasive Non- Native/Alien Species:Competition and/or habitat degradation	<i>Coreopsis lanceolata</i> (Coreopsis, Kalliopsis)	<u>National Recovery Plan for Sunshine Wattle Acacia terminalis terminalis</u> (Department of Environment, Climate Change and Water, 2010) [Recovery Plan].
Invasive and Other	<i>Ligustrum lucidum</i> (Broad-leaved Privet,	<u>National Recovery Plan for Sunshine Wattle Acacia</u>

Problematic Species and Genes: Invasive Non-Native/Alien Species: Competition and/or habitat degradation	Tree Privet, Large Leaf Privet, Glossy Privet, Ligustrum, Wax Leaf Privet)	terminalis terminalis (Department of Environment, Climate Change and Water, 2010) [Recovery Plan].
Invasive and Other Problematic Species and Genes: Invasive Non-Native/Alien Species: Competition and/or habitat degradation	<i>Ligustrum sinense</i> (Chinese Privet, Narrow-leaved Privet. Small-leaved Privet, Privet, Hedge Privet, Narrow-leaf Privet, Chinese Ligustrum, Ligustrum)	National Recovery Plan for Sunshine Wattle Acacia terminalis terminalis (Department of Environment, Climate Change and Water, 2010) [Recovery Plan].
Invasive and Other Problematic Species and Genes: Invasive Non-Native/Alien Species: Competition and/or habitat degradation	<i>Ipomoea indica</i> (Purple Morning Glory, Blue Morning Glory, Blue Dawnflower, Dunny Creeper, Lear's Morning Glory, Morning Glory)	National Recovery Plan for Sunshine Wattle Acacia terminalis terminalis (Department of Environment, Climate Change and Water, 2010) [Recovery Plan].
Invasive and Other Problematic Species and Genes: Invasive Non-Native/Alien Species: Competition and/or habitat degradation	<i>Phytolacca octandra</i> (Inkweed, Red-ink Weed, Poke Weed)	National Recovery Plan for Sunshine Wattle Acacia terminalis terminalis (Department of Environment, Climate Change and Water, 2010) [Recovery Plan].
Invasive and Other Problematic Species and Genes: Invasive Non-Native/Alien Species: Competition and/or habitat degradation	<i>Chrysanthemoides monilifera</i> (Bitou Bush, Boneseed)	<i>Weeds of National Significance Bitou Bush and Boneseed (Chrysanthemoides monilifera ssp. rotundata and monilifera) Strategic Plan</i> (Agriculture & Resources Management Council of Australia & New Zealand, Australian & New Zealand Environment & Conservation Council and Forestry Ministers, 2000b) [Threat Abatement Plan]. National Recovery Plan for Sunshine Wattle Acacia terminalis terminalis (Department of Environment, Climate Change and Water, 2010) [Recovery Plan].
Invasive and Other Problematic Species and Genes: Invasive Non-Native/Alien Species: Competition and/or habitat degradation	<i>Cinnamomum camphora</i> (Camphor Laurel, Camphor Tree, Gum Camphor, True Camphor, Japanese Camphor, Formosa Camphor, Shiu Leaf)	National Recovery Plan for Sunshine Wattle Acacia terminalis terminalis (Department of Environment, Climate Change and Water, 2010) [Recovery Plan].
Invasive and Other Problematic Species and Genes: Invasive Non-Native/Alien Species: Competition and/or habitat degradation	<i>Asparagus densiflorus</i>	National Recovery Plan for Sunshine Wattle Acacia terminalis terminalis (Department of Environment, Climate Change and Water, 2010) [Recovery Plan].
Invasive and Other	<i>Rubus fruticosus aggregate</i> (Blackberry,	National Recovery Plan for Sunshine Wattle Acacia

Problematic Species and Genes: Invasive Non-Native/Alien Species: Competition and/or habitat degradation	European Blackberry)	terminalis terminalis (Department of Environment, Climate Change and Water, 2010) [Recovery Plan].
Invasive and Other Problematic Species and Genes: Invasive Non-Native/Alien Species: Competition and/or habitat degradation by weeds		Sunshine Wattle - profile (NSW Department of Environment and Conservation (NSW DEC), 2005b) [Internet].
Invasive and Other Problematic Species and Genes: Invasive Non-Native/Alien Species: Competition and/or habitat degradation caused by Cotoneaster spp.		National Recovery Plan for Sunshine Wattle Acacia terminalis terminalis (Department of Environment, Climate Change and Water, 2010) [Recovery Plan].
Invasive and Other Problematic Species and Genes: Invasive Non-Native/Alien Species: Vegetation and habitat loss caused by dieback	<i>Phytophthora cinnamomi</i>	National Recovery Plan for Sunshine Wattle Acacia terminalis terminalis (Department of Environment, Climate Change and Water, 2010) [Recovery Plan].
Invasive and Other Problematic Species and Genes: Problematic Native Species: Competition and/or habitat degradation	<i>Glochidion ferdinandi</i> (Cheese-tree)	National Recovery Plan for Sunshine Wattle Acacia terminalis terminalis (Department of Environment, Climate Change and Water, 2010) [Recovery Plan].
Invasive and Other Problematic Species and Genes: Problematic Native Species: Competition and/or habitat degradation	<i>Pittosporum undulatum</i> (Sweet Pittosporum, Snowdrop Tree, Engraver Wood, Mock Orange, Native Laurel, Wave Leaved Pittosporum, White Holly, Native Daphne, Victorian Box, Australian Cheesewood, New Zealand Daphne, Victorian Laurel, Wild Coffee)	National Recovery Plan for Sunshine Wattle Acacia terminalis terminalis (Department of Environment, Climate Change and Water, 2010) [Recovery Plan].
Natural System Modifications: Fire and Fire Suppression: Inappropriate and/or changed fire regimes (frequency, timing, intensity)		National Recovery Plan for Sunshine Wattle Acacia terminalis terminalis (Department of Environment, Climate Change and Water, 2010) [Recovery Plan]. Sunshine Wattle - profile (NSW Department of Environment and Conservation (NSW DEC), 2005b) [Internet].
Pollution: Garbage and Solid Waste: Dumping of household and industrial waste		Sunshine Wattle - profile (NSW Department of Environment and Conservation (NSW DEC), 2005b) [Internet].
Residential and		Sunshine Wattle - profile (NSW Department of

Commercial
Development: Residential
and Commercial
Development: Habitat
modification (clearance
and degradation) due to
urban development

Environment and Conservation (NSW DEC), 2005b
[Internet].

Species Stresses (suggest
Reproductive
Resilience?): Indirect
Species Effects: Reduction
of genetic integrity of a
species due to
hybridisation

[National Recovery Plan for Sunshine Wattle *Acacia terminalis terminalis*](#) (Department of Environment, Climate Change and Water, 2010) [Recovery Plan].
[Sunshine Wattle - profile](#) (NSW Department of Environment and Conservation (NSW DEC), 2005b) [Internet].

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Newsletters

EPBC Act email updates can be received via the [Communities for Communities newsletter](#) and the [EPBC Act newsletter](#).

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Caveat

This database is designed to provide statutory, biological and ecological information on species and ecological communities, migratory species, marine species, and species and species products subject to international trade and commercial use protected under the *Environment Protection and Biodiversity Conservation Act 1999* (the EPBC Act). It has been compiled from a range of sources including listing advice, recovery plans, published literature and individual experts. While reasonable efforts have been made to ensure the accuracy of the information, no guarantee is given, nor responsibility taken, by the Commonwealth for its accuracy, currency or completeness. The Commonwealth does not accept any responsibility for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance on, the information contained in this database. The information contained in this database does not necessarily represent the views of the Commonwealth. This database is not intended to be a complete source of information on the

matters it deals with. Individuals and organisations should consider all the available information, including that available from other sources, in deciding whether there is a need to make a referral or apply for a permit or exemption under the EPBC Act.

Citation: Department of the Environment (2014). *Acacia terminalis* subsp. *terminalis* MS in Species Profile and Threats Database, Department of the Environment, Canberra. Available from: <http://www.environment.gov.au/sprat>. Accessed Thu, 31 Jul 2014 10:19:54 +1000.

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Appendix J. *Acacia terminalis ssp. terminalis*

Endangered Species TSC Act Determination



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Acacia terminalis subsp. terminalis (a shrub) - endangered species listing

NSW Scientific Committee - final determination

The Scientific Committee established by the Threatened Species Conservation Act has made a Final Determination to list the Wattle *Acacia terminalis* (Salisb.) J.F. Macbr. subsp. terminalis as an ENDANGERED SPECIES on Schedule 1 Part 1 of the Threatened Species Conservation Act. Listing of endangered species is provided for by Section 10 of the Act. The definition of species in Section 4 of the Act permits listing of subspecies.

The Scientific Committee has found that:

1. The Sunshine Wattle, *Acacia terminalis*, a bipinnate wattle growing as a shrub to 5 metres tall is widespread in eastern Australia, from northern New South Wales to Tasmania.
2. *Acacia terminalis* was first collected by Banks and Solander in 1770. Recent research by Tindale and Kodela (currently unpublished) has shown that the original collection represents a distinct subspecies of very limited distribution.
3. *Acacia terminalis* subsp. terminalis differs from more widespread forms of the species in being hairier, and possessing thicker peduncles and wider seed pods.
4. Collections of *Acacia terminalis* subsp. terminalis have been made in scrub and dry sclerophyll woodland between Botany Bay and the northern foreshore of Port Jackson. The locations from which several of the early collections were made no longer provide habitat, having been cleared for development of the eastern suburbs.
5. Recent collections have been made only from Clifton Gardens, Dover Heights, Parsley Bay, Nielsen Park, Cooper Park, Chifley and Watsons Bay.
6. Although some populations are included within conservation reserves these are small and the largest known population, in Chifley, is not currently protected and the site may be subject to future development. One of the largest populations has been lost recently at Matraville.
7. In view of 4, 5, and 6 above the Scientific Committee is of the opinion that *Acacia terminalis* subsp. terminalis 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 and that the species is eligible for listing as an endangered species.

[About the NSW Scientific Committee](#)

Page last updated: 27 February 2011

Appendix K. *Acacia terminalis* ssp. *terminalis*

Recovery Plan 2010 Title Page

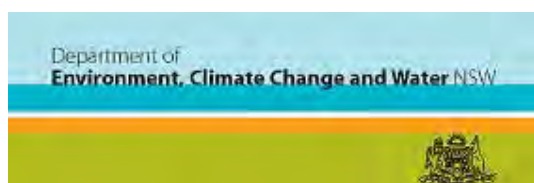
National
Recovery Plan

Acacia terminalis
subsp. *terminalis*
(Sunshine Wattle)



Authors: Martin Bremner and Ann Goeth

April 2010



Australian Government

Appendix L. *Acacia terminalis* ssp. *terminalis*

Known Distribution Map

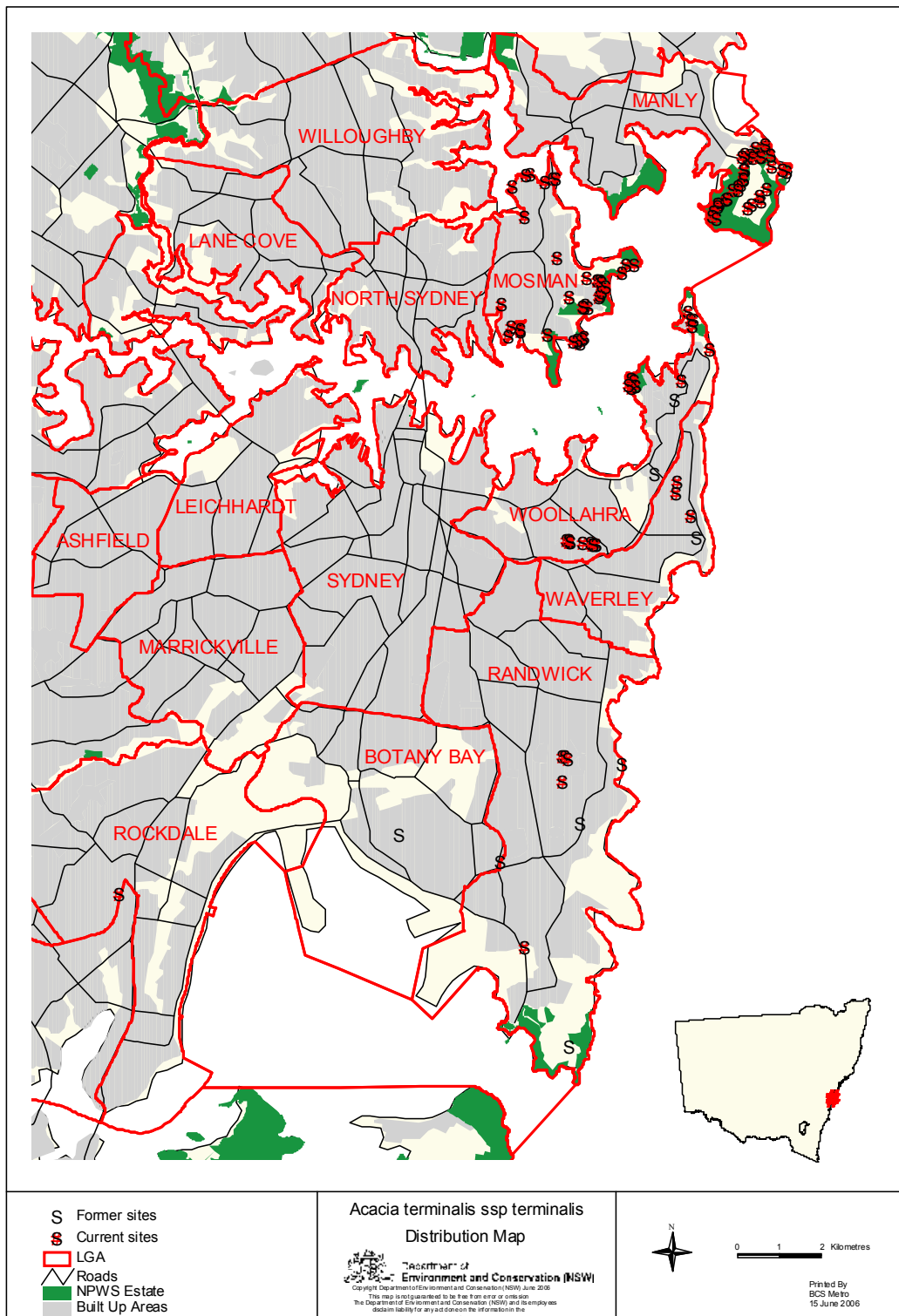


Figure 1. Known distribution of *Acacia terminalis terminalis* in NSW

Appendix M. Barking Owl Vulnerable Species Determination TSC Act



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Barking Owl - vulnerable species listing

NSW Scientific Committee - final determination

The Scientific Committee, established by the Threatened Species Conservation Act, has made a Final Determination to list the Barking Owl, *Ninox connivens*, Latham 1851 as a VULNERABLE SPECIES on Schedule 2 of the Act. Listing of vulnerable species is provided for by Part 2 of the Act.

The Scientific Committee has found that:

1. The Barking Owl *Ninox connivens* is approximately 40cm in length and weighs 300-500 grams. It is terrestrial, and generally nocturnal, although more active by day than most owls. It nests in tree hollows and lays 2-4 eggs. The species generally lives in pairs, and territory size is generally large (greater than 100 ha).
2. The Barking Owl is at the top of the food chain, taking birds, mammals and some invertebrates, although the exact requirements of the species are not well known in terms of prey, habitat floristics and habitat structure.
3. The Barking Owl lives in woodlands, primarily, but occurs in forests, partially cleared areas and occasionally near or in rural towns and well-treed suburbs.
4. The primary habitat of the Barking Owl - woodland - has declined dramatically due to clearing for agriculture and other human development.
5. The records of the Barking Owl in the past decade have declined, and there are records in the scientific literature that suggest the distribution and abundance of the species are in decline.
6. The Scientific Committee noted that information on the Barking Owl is contained in Debus, S.J.S. (1997) The Barking Owl in New South Wales Australian Birds 30(3) Journal of the NSW Field Ornithologists Club Inc.
7. Given the evidence of the decline in numbers, decline in habitat, low reproduction rate, and position at the top of the food chain, the Scientific Committee is of the opinion that the Barking Owl will become endangered in nature in New South Wales unless the factors threatening its survival or evolutionary development cease to operate and is therefore eligible for listing as a vulnerable species.

Proposed Gazettal Date: 12/6/98
Exhibition period: 12/6/98 to 17/7/98

[About the NSW Scientific Committee](#)

Page last updated: 28 February 2011

Appendix N. Grey-headed Flying Fox Vulnerable Species Listing EPBC Act



Australian Government
Department of the Environment

Pteropus poliocephalus (Grey-headed Flying-fox)

Advice to the Minister for the Environment and Heritage from the Threatened Species Scientific Committee (TSSC) on Amendments to the list of Threatened Species under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)

Date: September 2001

1. Scientific name, common name (where appropriate), major taxon group

Pteropus poliocephalus (Grey-headed Flying-fox)

2. National Context

This species is endemic to Australia, with a distribution ranging from Bundaberg in Queensland to Melbourne in Victoria. The species range extends from the coast inland to the western slopes of New South Wales. There have also been recent reports of *P. poliocephalus* present in South Australia.

3. How judged by TSSC in relation to the EPBC Act criteria

The Grey-headed Flying-fox has been nominated as vulnerable and was identified as vulnerable in the 1999 Bat Action Plan. The issue of threat classification and management for Grey-headed Flying-foxes has been controversial, due both to the perceived extent and contraction of the population and the interactions Grey-headed Flying-foxes continue to have with the orchard industry and other human activities.

The robustness of data presented to support listing has been challenged by some scientists. A thorough investigation of survey methodologies, data and expert discussion has been undertaken in order to verify data and estimates of population decline.

TSSC judges the species to be eligible for listing as vulnerable under the EPBC Act. The justification against the criteria is as follows:

Criterion 1 - Decline in numbers

Population size data obtained by fly-out count surveys contain a degree of error that is difficult to quantify. Two key sources of error have been considered in relation to assessing the robustness of the available data. Firstly, the survey methodology and secondly the comparability of the survey results for the purpose of calculating trends in population size or species abundance.

Fly-out counts are acknowledged by the scientific community to be the best method currently available of obtaining reliable and reproducible estimates of abundance (if not actual population counts) for flying-foxes. The available data for 1989 and 1998-2001 has been obtained using the same survey techniques that are widely acknowledged to be appropriate for estimating the abundance of this species. The data available from the fly-out counts conducted should be regarded as estimates of abundance, rather than precise population counts.

The 1989 estimate of abundance is notably incomplete in the survey coverage, lacking data from Qld, where the species is known to occur throughout the year in significant numbers, and several sites in NSW that were known to be occupied at the time. The 1989 estimate of abundance is therefore likely to be a significant underestimate of abundance of the species at that time. Use of the 1989 estimate of abundance provides a minimum indication of population decline when related to maximum estimates of populations sizes obtained during the 1998-2001 surveys.

The surveys of 1998-2001 have been much more comprehensive than the 1989 survey in terms of the number of roosts and extent of geographical range included. Despite the significantly increased knowledge of the species roost sites and survey effort, the estimates of abundance obtained indicate a decline in the abundance of the species. Using the maximum estimate from the 1998-2001 surveys (400,000) and the minimum estimate of abundance in 1989 (566,000), the rate of decline since 1989 has been in the order of 30%.

A number of experts commented that the projected habitat clearance in northern NSW is the primary ongoing threat to Grey-headed Flying-foxes. One expert stated that annually reliable winter resources are limited in distribution to a narrow coastal strip in northern NSW and Queensland. These coastal areas are targeted for intensive residential development to cater for a projected 25% increase in the human population over the next decade. It was this argument that convinced the Editorial Panel of the Bat Action Plan to identify Grey-headed Flying-foxes as vulnerable, although the Editorial Panel was not unanimous in its decision.

Therefore, the species is **eligible** for listing as **vulnerable** under this criterion.

Criterion 2 -Geographic distribution

The distribution of the species is not precarious for the survival of the species nor limited, the range of the species extending from Bundaberg in Queensland to Melbourne in Victoria and from the coast inland to the western slopes of New South Wales. There have also been recent reports of *P. poliocephalus* present in South Australia.

The threat to the species of a projected loss of habitat and associated winter food resources from northern NSW has been discussed under criterion 1.

The northern geographic range of Grey-headed Flying-foxes appears to be contracting. In the late 1800's and early 1900's, specimens were recorded from far north Queensland. In 1929 there were camp-sites occupied permanently or regularly around Rockhampton. Grey-headed Flying-foxes are no longer found in the Rockhampton area and known sites have experienced a northern contraction of about 300 kilometres.

However, Grey-headed Flying-foxes have expanded in the south of their range as evidenced by the permanent colonies in Melbourne and their recent detection in South Australia. It has been hypothesised that the northern contraction and the southern expansion relates to temperature changes over the last 30 years, as the average temperature has increased by approximately 2-3 degrees Celsius across the range of the species. However, the adaptability of Grey-headed Flying-foxes to exploit a wide range of food resources could also be a causative factor in their southerly range expansion.

It has been purported that habitat degradation in the north of its range is responsible for its disappearance from this area. However, it should be noted that the Black Flying-fox, *Pteropus alecto*, exploits similar niches as Grey-headed Flying-foxes in terms of camp-sites and food resources, and yet it is still abundant in areas of southern Queensland formerly occupied by Grey-headed Flying-foxes.

It is important to note that Grey-headed Flying-foxes are highly mobile and appear to be a highly adaptable species in response to changes in their habitat and surrounding environment. A number of 'urban' roost sites that are occupied year-round (Sydney suburbs, Botanic Gardens in Sydney and Melbourne) have become established due to consistently available food resources and suitable roosting habitat. At other 'non-permanent' roost sites,

Grey-headed Flying-foxes have shown themselves to be able to respond rapidly to the presence/absence of food availability.

Given the current extent of the species range, and clear evidence of its capacity to expand its range, the geographic distribution is not considered precarious for the survival of the species.

Therefore, the species is **not eligible** for listing under this criterion.

Criterion 3 - Population size and decline in numbers or distribution

The estimated abundance of this species is not limited, survey figures obtained during the period 1998-2001 indicating abundance to be in excess of 320,000 - 400,000 individuals. Discussion of historic or potential declines and geographic distribution is provided respectively under criterion 1 and 2 above.

Therefore the species is **not eligible** for listing under this criterion.

Criterion 4 - Population size

The estimated abundance of this species is not low, survey figures obtained during the period 1998-2001 indicating abundance to be in excess of 320,000 - 400,000 individuals.

Therefore, the species is **not eligible** for listing under this criterion.

Criterion 5 - Probability of extinction in the wild

There is no quantitative evidence available against this criterion. However, two experts have recently modeled the vulnerability of both the Grey-headed Flying-fox and the Spectacled Flying-fox, *Pteropus conspicillatus*, to decline and extinction using basic parameters of reproduction obtained from captive breeding data. This analysis shows that flying-fox populations have a low capacity for increase and depend on low levels of natural mortality and high survival of adults to maintain stable population levels. These experts conclude that current death rates of the Grey-headed Flying-fox imposed by fruit orchardists and other management approaches place populations at risk.

One expert challenged the validity of the inputs to the model, in particular, the fecundity of two year old animals, and the assumed sex ratio of 1:1. The model essentially assumes that flying-foxes do not breed until three years of age, based on observations of captive animals, but field based data is available for the closely related Black Flying-fox that indicates this is not the case. The sex ratio of flying-foxes in most camps is also closer to 70:30 (females:males). Changes to these and other inputs to the model should be made to further explore the impacts of these influences on the population survival.

However, whilst the modelling is imperfect, it provides clear messages about the likely impact of increased mortality to adults. Sustained high levels of mortality additional to natural mortality would undoubtedly increase the probability of extinction in the medium-term in virtually most scenarios. However, the current level of mortality at the hands of orchardists is unquantified, but has been substantially reduced through NSW government subsidised netting of orchards. This, combined with the equivocal nature of the data on population size, renders it difficult to be confident that current levels of non-natural mortality are likely to lead to negative population growth.

Based upon the population modelling, likely recruitment rates, and other characteristics such as its adaptability and mobility, there is not a 10% probability that the Grey-headed Flying-fox will become extinct in the wild in the medium-term future.

Therefore, the species is **not eligible** for listing under this criterion.

4. Conclusion

The estimates of abundance derived from surveys conducted in 1989 and during the period 1998-2001 indicate a rate of decline in abundance of the species in the order of 30%.

Given the limitations of the available data, research into both accurate estimates of abundance and mortality associated with human activities (eg orchard control) should be encouraged. For this reason, the decision on this species conservation status should be reviewed in three years time.

5. Recommendation

The Committee is of the view that priority should be given to the generation of more data and that this matter be revisited in 2004 or when significant new data becomes available. However, this review should only be initiated if substantial work is undertaken which significantly clarifies the conservation status of the species. In particular:

- count techniques need to be standardised and conducted annually across the range of this species;
- population modelling should be refined to incorporate field-derived data if possible; and
- quantification of the level of mortality currently occurring through the protection of fruit crops.

TSSC recommends that the list referred to in section 178 of the EPBC Act be amended by **including** in the list in the **vulnerable** category:

***Pteropus poliocephalus* (Grey-headed Flying-fox)**

Appendix O. Grey-headed Flying Fox Vulnerable Species Determination TSC Act



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Grey-headed flying fox - vulnerable species listing

NSW Scientific Committee - final determination

The Scientific Committee, established by the Threatened Species Conservation Act, has made a Final Determination to list the Grey-headed Flying-fox, *Pteropus poliocephalus* Temminck 1825, as a VULNERABLE SPECIES on Schedule 2 of the Act. Listing of Vulnerable species is provided for by Part 2 of the Act.

The Scientific Committee has found that:

1. The Grey-headed Flying-fox occurs primarily along the eastern coastal plain from Bundaberg in Queensland, through NSW and south to eastern Victoria. A colony has also established in Melbourne (FFG SAC 2001). Small numbers may occur as far west as Warrnambool (Menkhorst 1995). Regular movements are made over the Great Dividing Range to the western slopes of NSW and Queensland.
2. This species is a canopy-feeding frugivore, blossom-eater and nectarivore of rainforests, open forests, woodlands, Melaleuca swamps and Banksia woodlands. As such, it plays an important ecosystem function by providing a means of seed dispersal and pollination for many indigenous tree species (Eby 1996; Pallin 2000). Grey-headed Flying-foxes also feed on introduced trees including commercial fruit crops.
3. Grey-headed Flying-foxes are relatively long-lived mammals, with the average age of reproductive animals being between six and 10 years. They have a low rate of recruitment as sexual maturity is reached after at least two to three years and generally only one offspring is produced each year (Martin et al. 1996).
4. Grey-headed Flying-foxes congregate in large numbers at roosting sites (camps) that may be found in rainforest patches, Melaleuca stands, mangroves, riparian woodland or modified vegetation in urban areas. Individuals generally exhibit a high fidelity to traditional camps and return annually to give birth and rear offspring (Lunney and Moon 1997; Augee and Ford 1999). They forage opportunistically, often at distances up to 30 km from camps, and occasionally up to 60-70 km per night, in response to patchy food resources (Augee and Ford 1999; Tidemann 1999).
5. Grey-headed Flying-foxes show a regular pattern of seasonal movement. Much of the population concentrates in May and June in northern NSW and Queensland where animals exploit winter-flowering trees such as Swamp Mahogany *Eucalyptus robusta*, Forest Red Gum *E. tereticornis* and Paperbark *Melaleuca quinquenervia* (Eby et al. 1999; P. Birt and L. Hall, pers. comm.). Food availability, particularly nectar flow from flowering gums, varies between places and from year to year.
6. Historically, Grey-headed Flying-foxes had a greater range in Australia and numbers were estimated as being in the "many millions" (Ratcliffe 1932). Counts of flying foxes over the past decade suggest that the national population may have declined by up to 30% (Birt 2000; Richards 2000). Regular visits to flying-fox camps during this period have shown a marked decline in the numbers of animals using several camps (reductions of 31% to 94% have been recorded at five camps, Eby 2000; Hall 2000; Parry-Jones; P.Eby pers. comm.). It has also been estimated that the population will continue to decrease by at least 20% in the next three generations given the continuation of the current rate of habitat loss and culling (Martin 2000).

7. The main threat to Grey-headed Flying-foxes in NSW is clearing or modification of native vegetation. This removes appropriate camp habitat and limits the availability of natural food resources, particularly winter-spring feeding habitat in north-eastern NSW. The urbanisation of the coastal plains of south-eastern Queensland and northern NSW has seen the removal of annually-reliable winter feeding sites, and this threatening process continues (Catterall et al. 1997; Pressey and Griffith 1992; P. Clarke, unpublished data). In N.S.W less than 15% of potentially suitable forest for the Grey-headed Flying-fox occurs in conservation reserves; only 5% of roost sites are similarly reserved (Hall and Richards 2000).

8. The use of non-destructive deterrents, such as netting and noise generators, to limit flying-fox damage to fruit crops is not universal in the horticultural industry. While licences are issued to cull limited numbers of Grey-headed Flying-foxes, uncontrolled culling using destructive methods such as shooting and electrocution occurs and large numbers of bats are culled (Vardon and Tidemann 1995; Richards 2000). The impact of destructive methods has not been measured but is likely to be greatest in those years when natural food is scarce. Also, culling has a disproportionate impact on lactating and pregnant females (Parry-Jones 1993).

9. The species is also threatened by direct harassment via shooting at roosts, the destruction of camps and by being possible carriers for viral pathogens (Lunney and Moon 1997; Tidemann 1999).

10. Grey-headed Flying-foxes face potential competition and hybridisation from Black Flying-foxes, *Pteropus alecto*, as this species is extending its range south into northern NSW (Webb and Tidemann 1995). Colonisation of northern NSW may be assisted by the flexible reproduction of *P. alecto* and dispersal from largely intact northern habitats (Vardon and Tidemann 2000) into more fragmented habitat in the south.

11. In view of the above points, the Scientific Committee is of the opinion that the Grey-headed Flying-fox, *Pteropus poliocephalus*, is likely to become endangered unless the circumstances and factors threatening its survival or evolutionary development cease to operate, and is therefore eligible for listing as a Vulnerable species.

Proposed Gazettal date: 4/05/01
Exhibition period: 4/05/01 - 8/06/01

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*NOTE: The publication 'Proceedings of a Workshop to Assess the Status of the Grey-headed Flying Fox' is available on the [Australasian Bat Society website](#).

[About the NSW Scientific Committee](#)

Page last updated: 28 February 2011

Appendix P. Eastern Bentwing Bat, Vulnerable TSC Act Species Profile



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Eastern Bentwing-bat - profile

Scientific name: *Miniopterus schreibersii oceanensis*

Conservation status in NSW: [Vulnerable](#)

Commonwealth status: [Not listed](#)

Profile last updated: 29 May 2014

Description

The Eastern Bentwing-bat has chocolate to reddish-brown fur on its back and slightly lighter coloured fur on its belly. It has a short snout and a high 'domed' head with short round ears. The wing membranes attach to the ankle, not to the base of the toe. The last bone of the third finger is much longer than the other finger-bones giving the "bent wing" appearance. It weighs up to 20 grams, has a head and body length of about 6 cm and a wingspan of 30 - 35 cm.

Distribution

Eastern Bentwing-bats occur along the east and north-west coasts of Australia.

Habitat and ecology

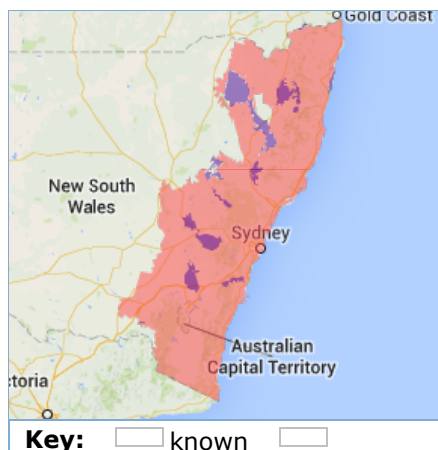
- Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other man-made structures.
- Form discrete populations centred on a maternity cave that is used annually in spring and summer for the birth and rearing of young.
- Maternity caves have very specific temperature and humidity regimes.
- At other times of the year, populations disperse within about 300 km range of maternity caves.
- Cold caves are used for hibernation in southern Australia.
- Breeding or roosting colonies can number from 100 to 150,000 individuals.
- Hunt in forested areas, catching moths and other flying insects above the tree tops.

Regional distribution and habitat

Click on a region below to view detailed distribution, habitat and vegetation information.

- [Border Rivers-Gwydir](#)
- [Central West](#)
- [Hawkesbury-Nepean](#)
- [Hunter-Central Rivers](#)
- [Lachlan](#)
- [Murray](#)
- [Murrumbidgee](#)
- [Namoi](#)
- [Northern Rivers](#)
- [Southern Rivers](#)
- [Sydney Metro](#)

Indicative distribution



The areas shown in pink and/purple are the sub-regions where the species or community is known or predicted to occur. They may not occur throughout the sub-region but may be restricted to certain areas. ([click here](#) to see geographic restrictions). The information presented in this map is only indicative and may contain errors and omissions.

Threats

- Disturbance by recreational cave climbers and general public accessing the cave and adjacent areas particularly during winter or breeding.
- Loss of foraging habitat.
- Loss of food resources and indirect poisoning of individuals from nearby use of herbicides / insecticides.
- Predation by feral cats and foxes.
- Introduction of exotic pathogens, specifically known White-nosed fungus.
- Threat of cave entrances being blocked for human safety reasons. Also, vegetation encroaching and blocking cave entrances.
- Potential for large scale wildfire to impact on resource availability in surrounding habitat. Direct threats at caves from fire.
- Weeds (blackberry) encroaching over cave entrances restrict access; need to ensure synthetic control techniques for blackberry.

Recovery strategies

A targeted strategy for managing this species has been developed under the Saving Our Species program; click [here](#) for details. For more information on the Saving Our Species program click [here](#)

Activities to assist this species

- Control foxes and feral cats around roosting sites, particularly maternity caves.
- Retain native vegetation around roost sites, particularly within 300 m of maternity caves.
- Minimise the use of pesticides in foraging areas.
- Protect roosting sites from damage or disturbance.

Information sources

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Images



Eastern Bentwing-bat
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