

NSW SCIENTIFIC COMMITTEE

Final Determination

The Scientific Committee, established by the *Threatened Species Conservation Act 1995* (the Act), has made a Final Determination under Section 23 of the Act to list the Blue Mountains Basalt Forest in the Sydney Basin Bioregion as an ENDANGERED ECOLOGICAL COMMUNITY Part 3 of Schedule 1 of the Act.

This determination contains the following information:

Parts 1 & 2: Section 4 of the Act defines an ecological community as “an assemblage of species occupying a particular area”. These features of Blue Mountains Basalt Forest in the Sydney Basin Bioregion are described in Parts 1 and 2 of this Determination, respectively.

Part 3: Part 3 of this Determination describes the eligibility for listing of this ecological community in Part 2 of Schedule 1A of the Act according to criteria as prescribed by the *Threatened Species Conservation Regulation 2010*.

Part 4: Part 4 of this Determination provides additional information intended to aid recognition of this community in the field.

Part 1. Assemblage of species

1.1 Blue Mountains Basalt Forest in the Sydney Basin Bioregion (hereafter referred to as Blue Mountains Basalt Forest) is characterised by the assemblage of species listed below.

<i>Acacia elata</i>	<i>Glycine tabacina</i>
<i>Acacia melanoxylon</i>	<i>Hedycarya angustifolia</i>
<i>Acaena novae-zelandiae</i>	<i>Indigofera australis</i>
<i>Ajuga australis</i>	<i>Lagenifera stipitata</i>
<i>Austrocynoglossum latifolium</i>	<i>Lomandra longifolia</i>
<i>Blechnum cartilagineum</i>	<i>Marsdenia flavescens</i>
<i>Blechnum nudum</i>	<i>Melicytus dentatus</i>
<i>Carex appressa</i>	<i>Microlaena stipoides</i>
<i>Centella asiatica</i>	<i>Myrsine howittiana</i>
<i>Clematis aristata</i>	<i>Oplismenus imbecillis</i>
<i>Cyathea australis</i>	<i>Pandorea pandorana</i>
<i>Cyathea leichhardtiana</i>	<i>Pellaea falcata</i>
<i>Daviesia ulicifolia</i>	<i>Plantago debilis</i>
<i>Desmodium varians</i>	<i>Polyscias sambucifolia</i>
<i>Dichondra</i> spp.	<i>Polystichum proliferum</i>
<i>Doodia aspera</i>	<i>Poranthera microphylla</i>
<i>Doryphora sassafras</i>	<i>Prostanthera lasianthos</i>

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<i>Echinopogon ovatus</i>	<i>Pteridium esculentum</i>
<i>Eucalyptus blaxlandii</i>	<i>Pyrrosia rupestris</i>
<i>Eucalyptus cypellocarpa</i>	<i>Senecio linearifolius</i>
<i>Eucalyptus fastigata</i>	<i>Sigesbeckia orientalis</i>
<i>Eucalyptus oreades</i>	<i>Smilax australis</i>
<i>Eucalyptus radiata</i> subsp. <i>radiata</i>	<i>Stellaria flaccida</i>
<i>Eustrephus latifolius</i>	<i>Stellaria pungens</i>
<i>Geitonoplesium cymosum</i>	<i>Tylophora barbata</i>
<i>Geranium homeanum</i>	<i>Urtica incisa</i>
<i>Geranium potentilloides</i>	<i>Viola hederacea</i>

- 1.2 The total species list of the community across all occurrences is likely to be considerably larger than that given above. Due to variation across the range of the community, not all of the above species are present at every site and many sites may also contain species not listed above.

Characteristic species may be abundant or rare and comprise only a subset of the complete list of species recorded in known examples of the community. Some characteristic species show a high fidelity (are relatively restricted) to the community, but may also occur in other communities, while others are more typically found in a range of communities.

The number and identity of species recorded at a site is a function of sampling scale and effort. In general, the number of species recorded is likely to increase with the size of the site and there is a greater possibility of recording species that are rare in the landscape.

Species presence and relative abundance (dominance) will vary from site to site as a function of environmental factors such as soil properties (chemical composition, texture, depth, drainage), topography and climate and through time as a function of disturbance (*e.g.* fire, logging, grazing) and weather (*e.g.* flooding, drought, extreme heat or cold).

At any one time, above ground individuals of some species may be absent, but the species may be represented below ground in the soil seed bank or as dormant structures such as bulbs, corms, rhizomes, rootstocks or lignotubers.

The species listed above are vascular plants, however the community also includes micro-organisms, fungi and cryptogamic plants as well as vertebrate and invertebrate fauna. These components of the community are less well documented.

Part 2. Particular area occupied by the ecological community

- 2.1 The assemblage of species listed in Part 1.1 above which characterises Blue Mountains Basalt Forest occurs within the Sydney Basin Bioregion. This Bioregion is defined by SEWPaC (2012) Interim Biogeographic Regionalisation for Australia, Version 7. Department of Sustainability, Environment, Water, Population and Communities.

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<http://www.environment.gov.au/parks/nrs/science/bioregion-framework/ibra/maps.html>

- 2.2 Blue Mountains Basalt Forest occurs on basalt caps overlying sandstone and adjacent areas where soils are influenced by weathering of upslope basalt.
- 2.3 It is the intent of the Scientific Committee that all occurrences of the ecological community (both recorded and as yet unrecorded and independent of their condition) that occur within this bioregion be covered by this Determination.

Part 3. Eligibility for listing

3.1 Reasons for determining eligibility for listing

- 3.1.1 Blue Mountains Basalt Forest has undergone a large reduction in geographical distribution. Blue Mountains Basalt Forest is a forest community characterised by long-lived trees and shrubs. IUCN (2014) suggests that the appropriate time scale for assessing reduction is three generations or 10 years, whichever is the longer. For the characteristic overstorey and some understorey species, three generations exceeds 200 years. On that basis, time since European settlement represents an appropriate time scale for assessing reduction. Vegetation on basalt was preferentially cleared during early settlement so that vegetation on basalt currently exists only as small remnants (Keith 2004). Blue Mountains Basalt Forest is equivalent to map unit p72 (Tozer *et al.* 2010). Blue Mountains Basalt Forest extends beyond the study area used by Tozer *et al.* (2010) and there is uncertainty about the extent of clearing but it is likely to be in the range 50–70% (D. Binns *in litt.* Oct. 2013).
- 3.1.2 Blue Mountains Basalt Forest is at risk of further reduction in distribution. Less than half of the remaining area is in conservation reserves (Tozer *et al.* 2010). Areas outside reserves are close to urban or rural residential areas and are subject to ongoing clearing for residential development and development of other infrastructure.
- 3.1.3 Blue Mountains Basalt Forest is subject to ongoing threats in addition to the risk of further clearing. It is susceptible to weed invasion due to proximity to urban and rural residential areas, high soil fertility and large boundary to area ratios of many of the remaining small remnants. Proximity to urban areas also constrains fire management, leading to altered fire regimes with potentially adverse impacts. Some areas may be burnt at short intervals to maintain fire protection zones for urban areas. ‘High frequency fire resulting in the disruption of life cycle processes in plants and animals and loss of vegetation structure and composition’ is listed as a Key Threatening Process under the Act. Much of the remaining area of Blue Mountains Basalt Forest was previously subject to livestock grazing, including areas now in conservation reserves (Tozer *et al.* 2010). Grazing continues in areas on private land. Grazing by stock can simplify floristic composition and vegetation structure by trampling, removal of palatable species, prevention of regeneration and facilitation of weed invasion.
- 3.1.4 The extent of occurrence of Blue Mountains Basalt Forest is estimated to be between 185 km² (known occurrences) and 5400 km² (known and potential occurrences), based on a minimum convex polygon enclosing all occurrences, the method of assessment

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recommended by IUCN (2014). The area of occupancy (AOO) is estimated to be between 120 and 180 km² (D. Binns *in litt.* Oct. 2013), based on 2 x 2 km grid cells, the scale recommended for assessing area of occupancy by IUCN (2014). Based on the AOO the Blue Mountains Basalt Forest has a highly restricted distribution.

3.2 Criteria for listing

Blue Mountains Basalt Forest in the Sydney Basin Bioregion is eligible to be listed as an Endangered Ecological Community in accordance with Section 12 of the Act as, in the opinion of the Scientific Committee, it is facing a very high risk of extinction in New South Wales in the near future, as determined in accordance with the following criteria as prescribed by the *Threatened Species Conservation Regulation 2010*:

Clause 17 Reduction in geographic distribution of the ecological community

The ecological community has undergone, is observed, estimated, inferred or reasonably suspected to have undergone or is likely to undergo within a time span appropriate to the life cycle and habitat characteristics of its component species:

- (b) a large reduction in geographic distribution.

Clause 18 Restricted geographic distribution of the ecological community

The ecological community's geographic distribution is estimated or inferred to be:

- (b) highly restricted,

and the nature of its distribution makes it likely that the action of a threatening process could cause it to decline or degrade in extent or ecological function over a time span appropriate to the life cycle and habitat characteristics of the ecological community's component species.

Professor Michelle Leishman
Chairperson
NSW Scientific Committee

Exhibition period: 20/03/15 – 15/05/15

Proposed Gazettal date: 20/03/15

Part 4. Additional information about the ecological community

The following information is additional to that required to meet the definition of an ecological community under the Act but is provided to assist in the recognition of Blue Mountains Basalt Forest in the field. Given natural variability, along with disturbance history, Blue Mountains Basalt Forest may sometimes occur outside the typical range of variation in the features described below.

- 4.1 Blue Mountains Basalt Forest is usually a tall eucalypt forest (over 30 m in mature stands) with a dense shrub or small tree layer, often including tree ferns (*Cyathea* spp.) and moist herbaceous groundcover (Tozer *et al.* 2010). The canopy composition is variable but usually dominated by one or more of the species *Eucalyptus fastigata*, *E. blaxlandii*, *E. cypellocarpa* or *E. radiata* subsp. *radiata*. Other canopy species which may be locally common or dominant include *E. oreades* (which is often dominant on south-facing slopes at the transition to a sandstone substrate) and *E.*

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viminalis (Tozer *et al.* 2010, D. Connolly pers. comm. Nov. 2013). A eucalypt canopy may be absent from previously cleared or otherwise highly disturbed stands.

- 4.2 Blue Mountains Basalt Forest has been recorded south of the Wolgan and Colo Rivers in Wollemi IBRA subregion (SEWPaC 2012). The major area of distribution is the Blue Mountains including the basalt caps of Mount Irvine, Mount Wilson, Mount Bell, Mount Tomah, Mount Banks, Mount Caley and Mount Hay. However, there may be isolated outliers north to Mount Cameron and Mount Monundilla. Blue Mountains Basalt Forest occurs mostly between 750 m and 1050 m altitude, in areas with annual rainfall of 950 to 1350 mm (Tozer *et al.* 2010).
- 4.3 Blue Mountains Basalt Forest may grade into Intermediate Temperate Rainforest (map unit p116) on sheltered sites, into Shale-Basalt Sheltered Forest (map unit p168) where basalt adjoins shale or into Sandstone Scarp Warm Temperate Rainforest (map unit p114) on steep, south-facing sandstone slopes (Tozer *et al.* 2010). Intergrading vegetation is considered part of this determination if it is floristically more similar to Blue Mountains Basalt Forest than these adjoining communities. Shale-Basalt Sheltered Forest includes Blue Mountains Shale Cap Forest in the Sydney Basin Bioregion, an Endangered Ecological Community under the Act.
- 4.4 Blue Mountains Basalt Forest is floristically similar to two other communities listed as Endangered Ecological Communities under the Act, Robertson Basalt Tall Open-forest in the Sydney Basin Bioregion and Mount Gibraltar Forest in the Sydney Basin Bioregion but may be distinguished from these by differences in species composition and relative abundance of characteristic species. For example, species which are usually more common in Blue Mountains Basalt Forest compared to the two other communities include *Acacia elata*, *Cyathea* spp., *Doryphora sassafras*, *Geranium homeanum*, *Indigofera australis* and *Senecio linearifolius* (D Binns *in litt.* July 2012; M Tozer *in litt.* Nov 2013). Blue Mountains Basalt Forest is geographically disjunct from these communities (by at least 70 km for known occurrences) and occurs at generally higher altitudes. It also differs from Mount Gibraltar Forest because the latter occurs on syenite. Blue Mountains Basalt Forest is also distinct from Tablelands Basalt Forest in the Sydney Basin and South East Highlands Bioregions (map unit p20 of Tozer *et al.* 2010).
- 4.5 Blue Mountains Basalt Forest is included within the endangered ecological community listed under the *Environment Protection and Biodiversity Conservation Act 1999* as 'Upland Basalt Eucalypt Forests of the Sydney Basin Bioregion'. However, the community described in the Commonwealth listing advice is more broadly circumscribed and includes two other communities currently listed separately under the Act (Robertson Basalt Tall Open-forest in the Sydney Basin Bioregion and Mount Gibraltar Forest in the Sydney Basin Bioregion), as well as vegetation on basalt in the northern part of Wollemi Subregion, most of which is not included in Blue Mountains Basalt Forest. Conversely, the Commonwealth listing advice excludes some patches, here regarded as Blue Mountains Basalt Forest, on the basis of condition or structure thresholds (including patch size, ground cover and tree density).
- 4.6 Blue Mountains Basalt Forest has been recorded in the local government areas of Blue Mountains and Lithgow. However, unrecorded stands of the ecological community may occur in the Hawkesbury local government area or elsewhere in the Bioregion.

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- 4.7 Blue Mountains Basalt Forest is known or likely to contain the following threatened animal and plant species listed under State (all species) and Commonwealth (species with 'EPBC' annotation) threatened species legislation:

Scientific Name	Common Name	Status
<i>Cercartetus nanus</i>	Eastern Pygmy-possum	Vulnerable
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	Vulnerable (EPBC)
<i>Daphoenositta chrysoptera</i>	Varied Sittella	Vulnerable
<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	Vulnerable (EPBC)
<i>Falsistrellus tasmaniensis</i>	Eastern False Pipistrelle	Vulnerable
<i>Glossopsitta pusilla</i>	Little Lorikeet	Vulnerable
<i>Hieraetus morphnoides</i>	Little Eagle	Vulnerable
<i>Isoodon obesulus obesulus</i>	Southern Brown Bandicoot (eastern)	Endangered (EPBC)
<i>Litoria littlejohni</i>	Littlejohn's Tree Frog	Vulnerable (EPBC)
<i>Miniopterus schreibersii oceanensis</i>	Eastern Bentwing-bat	Vulnerable
<i>Mixophyes balbus</i>	Stuttering Frog	Endangered (Vulnerable EPBC)
<i>Ninox strenua</i>	Powerful Owl	Vulnerable
<i>Petroica boodang</i>	Scarlet Robin	Vulnerable
<i>Petroica phoenicea</i>	Flame Robin	Vulnerable
<i>Phascolarctos cinereus</i>	Koala	Vulnerable (EPBC)
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	Vulnerable (EPBC)
<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat	Vulnerable
<i>Tyto tenebricosa</i>	Sooty Owl	Vulnerable
<i>Lastreopsis hispida</i>	Bristly Shield Fern	Endangered

References:

IUCN Standards and Petitions Subcommittee (2014) Guidelines for Using the IUCN Red List Categories and Criteria. Version 11. Prepared by the Standards and Petitions Subcommittee.

<http://www.iucnredlist.org/documents/RedListGuidelines.pdf>.

Keith DA (2004) 'Ocean Shores to Desert Dunes: the native vegetation of New South Wales and the ACT'. (Department of Environment and Conservation: Sydney)

Tozer MG, Turner K, Keith DA, Tindall D, Pennay C, Simpson C, MacKenzie B (2010) Native vegetation of southeast NSW: a revised classification and map for the coast and eastern tablelands. *Cunninghamia* **11**, 359–406.

SEWPaC (2012) Interim Biogeographic Regionalisation for Australia, Version 7. Department of Sustainability, Environment, Water, Population and Communities.

<http://www.environment.gov.au/parks/nrs/science/bioregion-framework/ibra/maps.html>