

THREATENED SPECIES SCIENTIFIC COMMITTEE

Established under the *Environment Protection and Biodiversity Conservation Act 1999*

The Minister's delegate approved this Conservation Advice on 16/12/2016.

Conservation Advice

Epacris hamiltonii

Conservation Status

Epacris hamiltonii is listed as Endangered under the *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth) (EPBC Act) effective from the 16 July 2000.

The species was eligible for listing under the EPBC Act as it was listed as Endangered under Schedule 1 of the preceding Act, the *Endangered Species Protection Act 1992* (Cwlth).

Species can also be listed as threatened under state and territory legislation. For information on the current listing status of this species under relevant state or territory legislation, see <http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl>

The main factors that are the cause of the species being eligible for listing in the Endangered category are a geographic distribution that is restricted.

Description

Epacris hamiltonii is a flattened or matted shrub to one metre high, often with more than one stem (Beadle et al., 1982 cited in NSW NPWS 2001). The silky hairs on both surfaces of the leaves are very distinctive, and give the leaves a soft grey/green appearance. Leaves are broad-lanceolate to approximately 1 cm long (Beadle et al., 1982 cited in NSW NPWS 2001). The flower is white with a corolla-tube 0.7-1 cm long and 3-5 mm in diameter. The style is longer than the corolla tube. The fruit is a capsule approximately 2 mm in length (Harden 1991). It generally flowers from September to December. Fruits mature in January and are retained on the plant into the following season after dehiscing. The seed is very fine and dust-like (NSW NPWS 2001).

Epacris hamiltonii can be distinguished from other Epacrid species that share common habitat, such as *E. longifolia* and *E. crassifolia*. The principal distinguishing feature is the long silky hairs, which occur on both surfaces of the leaves of *E. hamiltonii*. Other features include the shape of the leaves and length of sepals. It is recommended that an identification guide be used when initially distinguishing these species in the field (NSW NPWS 2001).

Distribution

Epacris hamiltonii is only known to occur in the Blue Mountains, west of Sydney NSW. The majority of the populations occur within the Blue Mountains National Park. Until 1994, the species was only known from one population (NSW NPWS 2001). The range of *E. hamiltonii* has now been extended, with the species now known to occur within three creek catchments (Greaves Creek, Katoomba Creek, and Popes Glen and Govetts Creek) in the upper Blue Mountains (NSW NPWS 2001). The creeks are all located on the northern side of the escarpment and flow into the Grose Valley (NSW NPWS 2001). In 2012 the *E. hamiltonii* was recorded at 72 sites within three creek catchments (OEH 2016).

Little information on historical distribution is available. Mr A.A. Hamiltons' original 1900 site location is thought to be at Neates Glen. A later collection of the plant by Constable in 1959 appears to have been in the upper Greaves Creek area, this population has not yet been relocated, despite survey of the area (NSW NPWS 2001).

All historical and present locations place *E. hamiltonii* within the Blackheath area. Therefore, it is likely that *E. hamiltonii* has always been rare, occurring within limited environmental parameters.

Further searches may reveal other populations in nearby creek catchments. (NSW NPWS 2001).

The number of plants was estimated to be 4000 at 72 sites within three creek catchments in 2001 (NSW NPWS 2001). It is difficult to establish the exact number of plants within each population due to the degree of potential clonality exhibited by the species. However many populations appear to consist of several hundred mature stems. These stems may represent varying recruitment stages. Some sites contain only one or a few individuals.

Relevant Biology/Ecology

Epacris hamiltonii grows under wet cliff overhangs next to temperate rainforest. This species is dependent upon water seeping through the sandstone cliffs. Species that often grow nearby include *Todea barbara* (king fern), *Cyathea australis* (rough tree fern), *Gleichenia rupestris* (coral fern), *Blechnum watsii* (hard water fern) and *Epacris longiflora* (fuschia heath) (DEC 2016, OEH 2016).

Populations of *E. hamiltonii* tend to be dense, often having a matted appearance. Due to the habit of this species it is difficult to identify and count individual plants (NSW NPWS 2001).

Previous research has linked mycorrhizal associations with species from the Epacridaceae family (Hutton et al., 1994; Hutton et al., 1996). Establishment and growth trials at Mt Tomah Botanic Gardens found that seedlings grown in soil from an *E. hamiltonii* site at Neates Glen site exhibit greater growth rates than seedlings grown in other soil media (Turton et al., 1997 cited in NSW NPWS 2001). This suggests that mycorrhizal fungi in the soil may be an influencing factor in growth for this species (NSW NPWS 2001).

The longevity of individual plants was unknown in 2001, but was thought to be in excess of 15 years (NSW NPWS 2001). Inspections of *E. hamiltonii* monitoring sites showed seedlings to take a number of years to mature, with seedlings germinating in 1994 still in a juvenile state in 2000 (NSW NPWS 2001).

Epacris hamiltonii flower and produce seed annually. NSW NPWS (2001) observed recruitment between fire intervals but with few individuals. *Epacris hamiltonii* reproduce via a stored soil seedbank, basal sprouts and possibly by root suckers (NSW NPWS 2001).

Threats

Epacris hamiltonii is threatened by habitat loss and fragmentation, altered moisture regimes, invasive species and too frequent fire. These threats and their effects on the species are described in the table below. The threats outlined below have corresponding conservation management actions.

Table 1 – Threats impacting the *Epacris hamiltonii* in approximate order of severity of risk, based on available evidence.

Threat factor	Threat type and status	Evidence base
Habitat loss and fragmentation		
Altered Moisture regimes, ground water extraction	known potential	<i>E. hamiltonii</i> favours moist sheltered gullies under overhangs, and is dependent upon water seeping through the sandstone cliffs. As the hanging swamps above feed these seepages, they are persistent even in short dry periods. A prolonged drought event, with accompanying low rainfall and high temperatures, will reduce or stop seepage from swamps (Holland et al., 1992 cited in NSW NPWS 2001) and therefore have the potential to affect <i>E. hamiltonii</i> and other wet gully species. Groundwater aquifer extraction also has the potential to affect the survival of the species and its habitat, as does development that impacts on groundwater movement above <i>E. hamiltonii</i> sites. (NSW NPWS 2001).
Trampling	known potential	<i>E. hamiltonii</i> grows in areas adjacent to popular bushwalks and although the populations are not situated directly on walking tracks, people straying from the marked tracks could potentially cause damage either directly by breaking the fragile, brittle stems, or indirectly by causing erosion on the steep slopes (NSW NPWS 2001, OEH 2016).
Invasive species		
Invasive Weeds	suspected current	Weed species are invading some areas, especially in Katoomba Creek and Govetts Creek where, scotch broom (<i>Cytisus scoparius</i>), blackberry (<i>Rubus fruticosus</i>) and ivy (<i>Hedera helix</i>) are threatening populations of <i>E. hamiltonii</i> . These species thrive in the moist creeklines where <i>E. hamiltonii</i> grows (NSW NPWS 2001) and compete for resources and change species composition within invaded areas.
Fire		
Too frequent burning	suspected potential	Too frequent burning is a potential threat to this <i>E. hamiltonii</i> . <i>Epacris hamiltonii</i> populations may decline to extinction whenever fire regimes deplete the pool of individuals within different life stages by mortality without replacement over an appropriate time scale (Keith 1996). Therefore, should fire occur in <i>E. hamiltonii</i> habitat at frequencies more regularly than the time it takes for seedlings to establish fire resistant rootstock (and thus replace adults that died) populations of <i>E. hamiltonii</i> could be expected to decrease (NSW NPWS 2001). Too frequent burning can alter ecosystem processes, leading to changes in species presence and abundance, population demographics and structure, as well as affecting other associated factors such as pollinators and mycorrhizal fungi, which may affect the health of <i>E. hamiltonii</i> and its habitat (NSW NPWS 2001).

Conservation Actions

Conservation and Management priorities

Habitat loss disturbance and modifications

- Prevent extraction of ground water from area where *E. hamiltonii* is known to and likely to occur.
- Ensure that swamps that feed seepages for over hangs are not altered.
- Prevent habitat disturbance. Control access routes by installing gates to suitably redirect public access around known sites on public land and manage access on private land and other land tenure to ensure that *E. hamiltonii* is not damaged during recreational activities such as bush walking.
- Ensure land managers are aware of the species' occurrence and provide protection measures against key and potential threats such as bush walking.

Invasive species (including threats from grazing, trampling, predation)

- Identify and undertake weed control, in the local area that could become a threat to the *E. hamiltonii*, using appropriate methods. Consider the possible disturbance/overspray threats associated with the control method.

Fire

- Fires must be managed to ensure that prevailing fire regimes do not disrupt the life cycle of *E. hamiltonii*, that they support rather than degrade the habitat necessary to *E. hamiltonii*, that they do not promote invasion of exotic species, and that they do not increase impacts of grazing/predation.
- Avoid successive fire intervals that are shorter than the period required to maintain recovery capacity of resprouting individuals. The NSW rural fire service Threatened species hazard reduction list recommend fire intervals for no more than one fire in a 15 year period (NSW RFS 2013).
- Physical damage to the habitat and individuals of *E. hamiltonii* must be avoided during and after fire operations. Guidance is provided in the Rules and Notes for the implementation of the Threatened Species Hazard Reduction List for the Bush Fire Environmental Assessment Code (NSW RFS 2003).
- Ensure that fires do not occur within populations before an accumulation of a seedbank large enough to replace the number of fire-killed standing plants. Note: replacement should incorporate expected post-fire rates of seedling survival.
- Ensure that fires do not occur in winter or spring, avoiding the exposure of sub-mature seedling recruits to desiccating conditions over summer.
- Ensure that intervals between successive fires take into account the longevity of the standing plant population.
- Avoid uses of prescribed fire between mid-autumn and late spring.
- Avoid successive fire intervals that are shorter than the period required to maintain recovery capacity of resprouting individuals.

Seed collection, propagation and other ex-situ recovery action

- Establish plants in cultivation in appropriate institutions such as the Royal Botanic Gardens Sydney.
- To manage the risk of losing genetic diversity, undertake appropriate seed and storage in appropriate institutions, such as the NSW Plantbank, Royal Botanic Gardens Sydney, and determine viability of stored seed. Best practice seed storage guidelines and procedures should be adhered to, to maximise seed viability and germinability. Seeds from all natural populations to be collected and stored.

Stakeholder Engagement

- Engage with the local government, NSW state government and local catchment authorities in relation to the future care, control and management of the areas of the Blue Mountains which contain populations of *E. hamiltonii*.
- Fire management authorities and land management agencies should use suitable maps and install field markers to avoid damage to *E. hamiltonii*.
- Land managers (including pastoralists, indigenous communities, IPAs, etc) should be given information about managing fire for the benefit of the threatened species.

Survey and Monitoring priorities

- More precisely assess population size, distribution, ecological requirements and the relative impacts of threatening processes by undertaking annual surveys.
- Design and implement a monitoring program or, if appropriate, support and enhance existing programs for potential threats and liaise with relevant stakeholders.
- Monitor the progress of recovery, including the effectiveness of management actions and the need to adapt them if necessary.
- Monitor the size and structure and reproductive status of populations at different stages in the fire cycle, taking opportunities to monitor after planned and unplanned fires (where they occur) and improve understanding of the fire response of the species.

Information and research priorities

- Investigate options for linking, enhancing or establishing additional populations.
- Undertake survey work in suitable habitat and potential habitat to locate any additional populations and any additional occurrences to more precisely assess population size and distribution.
- Undertake research into *E. hamiltonii* and mycorrhizal fungi relating to growth to aid in the establishment of *ex situ* populations and management and understanding of *in situ* populations.
- Undertake research to understand seed bank longevity.
- Assess the ecological requirements relevant to the persistence of the species.
- Research the effects of public access where this is likely and the effects are unknown.
- Improve understanding of the mechanisms of response to different fire regimes and identify appropriate fire regimes for conservation of *E. hamiltonii* by undertaking appropriately designed experiments in the field and/or laboratory.

- Where appropriate, use understanding and research on fire responses among related (e.g. congeneric) or functionally similar species to develop fire management strategies for conservation.

References cited in the advice

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- NSW National Parks and Wildlife Service (NSW NPWS) (2001). *Epacris hamiltonii* Recovery Plan. NSW NPWS, Hurstville.

Other sources cited in the advice

- Department of Environment and Conservation (DEC) (2016) Blue Mountains Endangered Species *Epacris hamiltonii*. Viewed: 22 April 2016. Available on the Internet at: <http://www.bmcc.nsw.gov.au/>
- Office of Environment and Heritage (OEH) (2016) Threatened Species Profile *Epacris hamiltonii*. NSW Government. Viewed: 22 April 2016. Available on the Internet at: <http://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10272>
- NSW RFS (2003). Rules and Notes for the implementation of the Threatened Species Hazard Reduction List for the Bush Fire Environmental Assessment Code. NSW Rural Fire Service. NSW Government. Viewed: 6 April 2016. Available on the Internet at: <http://www.rfs.nsw.gov.au/resources/publications/hazard-reduction/bush-fire-environmental-assessment-code>
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