

NSW SCIENTIFIC COMMITTEE

Preliminary Determination

The Scientific Committee, established by the Threatened Species Conservation Act, has made a Preliminary Determination to support a proposal to list the shrub *Grevillea caleyi* R. Br. as a CRITICALLY ENDANGERED SPECIES in Part 1 of Schedule 1A of the Act, and as a consequence, to omit reference to *Grevillea caleyi* R. Br. from Part 1 of Schedule 1 (Endangered species) of the Act. Listing of Critically Endangered species is provided for by Part 2 of the Act.

The Scientific Committee has found that:

1. *Grevillea caleyi* R. Br. (family Proteaceae) is a “spreading shrub, mostly 1–3 m high. Leaves deeply divided with usually 19–36 simple spreading lobes, 7–18 cm long, 3–7.5 cm wide; lobes linear to oblanceolate, 1.5–3.5 cm long, 2–6 mm wide; lower surface ± villous. Inflorescences erect, simple, secund, 4–8 cm long. Perianth fawn, villous outside, glabrous inside. Gynoecium 25–38 mm long; ovary densely hairy; style red, glabrous, pollen presenter erect to oblique. Follicle hairy with reddish brown stripes or blotches. Flowering August to April.” (Royal Botanic Gardens & Domain Trust Plantnet accessed Feb 2013).
2. *Grevillea caleyi* is restricted to sites within several suburbs in northern Sydney, approximately 20 kilometres north of the Sydney CBD. These suburbs include Terrey Hills, Duffys Forest, Belrose and Ingleside. The species is generally found on ridgetops, growing on lateritic soils in open forests (and occasionally woodlands) associated with the Duffys Forest Ecological Community. A few remnant occurrences of *G. caleyi* occur on sandstone just outside the lateritic soils. All these habitats have a diverse understorey of shrubs. The Duffys Forest Ecological Community in the Sydney Basin Bioregion is listed under the NSW *Threatened Species Conservation Act 1995* as an endangered ecological community.
3. The geographic distribution of *Grevillea caleyi* is very highly restricted. There are 26 known sites for the species that represent fragmented remains of a formerly more widespread population on each ridge (J. Scott *in litt.* April 2013). The size of remnant sites occupied by *G. caleyi* varies from a few m² to 1.2 ha, with a few sites having further unoccupied suitable habitat. The extent of occurrence and the area of occupancy for *G. caleyi* were estimated to be approximately 56 km². This estimate is equivalent to 14 (2x2 km) grid cells, the recommended measure for calculating area of occupancy in the IUCN (2011) guidelines.
4. The number of mature individuals of *Grevillea caleyi* at any one time is likely to be variable due to fire history, but is estimated to be between 2,500 and 10,000. The variation in abundance is due to the species’ response to fire (Scott *et al.* 1995; Auld and Scott 2004; DEC 2004). *Grevillea caleyi* plants are killed by fire and the species relies for regeneration entirely on seed that is stored in the soil. The amount of regeneration following fire events can depend on many factors, such as the time since the last fire, the fire severity, fire season and post-fire conditions (Auld and Scott 2004; Auld and Keith 2009). Comparisons of estimates of abundance before and after fires have shown very large changes in the number of plants of *G. caleyi* above ground, with changes in abundance of over two orders of magnitude having been observed (Auld and Scott 2004). The longer a site is left unburnt, the greater the

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magnitude of change in abundance after the next fire. Above-ground plants may be rare or absent at sites unburnt for over 15–20 years, but are abundant after fire, due to re-establishment from the soil seed bank. Sites burnt by two fires in less than five years, have shown declines in population abundance, most likely due to the soil seed bank not being replenished between such short interval fires (Auld and Scott 2004). Unless the time since fire is taken into consideration, an estimate of above ground plants at a site is not a reliable predictor of the species' abundance. At any one site, the amount of available habitat for *G. caleyi* was a moderate predictor of the likely magnitude of abundance of the species after fire (Auld and Scott 2004). For long-unburnt sites where there are none or few *G. caleyi* plants above ground, the size of the available habitat can be used as an approximate surrogate to predict likely future abundance of *G. caleyi* following fire (Auld and Scott 2004).

5. Details of the ecology of *Grevillea caleyi* can be found in two recovery plans (DEC 2004; Scott *et al.* 1995) and a range of publications (Auld and Scott 1996, 1997, 2004; Auld and Denham 2001; Regan *et al.* 2003, Regan and Auld 2004, Auld and Keith 2009). Based on previous studies, DEC (2004) states that “*Grevillea caleyi* is killed by fire and relies entirely on seed that is stored in the soil (soil seed bank) for regeneration. Generally seedlings do not flower and produce seeds before 2-5 years of age. Flowering is sporadic throughout the year, but with a definite spring pulse. Fruits take 2-3 months to mature and usually produce 1 large seed per fruit. Fecundity is low with only about 3% of flowers resulting in seed. The level of fecundity in a population increases until around 10 years of age in response to plant growth. Seed dispersal is minimal, as upon maturity the fruits dehisce, dropping the seed to the ground beneath the parent plant. Seed predation is high and occurs at the fruit stage by the weevil *Cydmaea dorsalis*, and on the ground after seeds are released, by bush rats and swamp wallabies. As a result very little of the original developing seed will successfully add to the seedbank in the soil. It is estimated to take some 8-12 years for the seedbank to reach a sufficient level to possibly replace the population.” Llorens *et al.* (2004) highlight the genetic structuring of *G. caleyi* populations with most variation occurring between the major ridge lines, but significant variation also in remnant patches within each ridge line.
6. *Grevillea caleyi* is threatened by a range of factors associated with its close proximity to urban areas. An estimated 85% of the habitat has been lost through urbanisation (Scott *et al.* 1995). Much of the remaining habitat is severely fragmented, leaving small remnant patches of *G. caleyi*. The loss of habitat is still continuing and threatens the survival of many of the remaining patches. For example, current proposals for the widening of Mona Vale Road are likely to lead to the loss of *G. caleyi* plants and habitat at Terrey Hills and Ingleside (RMS 2012). Other threats to *G. caleyi* are an adverse fire regime, particularly high fire frequency due to hazard reduction burning and increased risk of ignition, and the absence of fire at some sites leading to plant reductions due to a lack of fire-stimulated regeneration (Regan *et al.* 2003; Regan and Auld 2004); the invasion of habitat by weeds, in particular Lantana (*Lantana camara*), Blackberry (*Rubus fruticosus* agg.), Privet (*Ligustrum* sp.), Crofton weed (*Ageratina adenophora*), *Cotoneaster* sp., Pampas Grass (*Cortaderia selloana*) and *Acacia saligna* (a native of Western Australia); and disturbance at some sites from vehicles, bikes, horse riding, and rubbish dumping (DEC 2004). ‘Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants’, ‘The invasion, establishment and spread of Lantana (*Lantana camara* L. *sens.*

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lat)' and 'High frequency fire resulting in the disruption of life cycle processes in plants and animals and loss of vegetation structure and composition' are listed as Key Threatening Processes under the NSW *Threatened Species Conservation Act 1995*.

7. Population reduction and continuing decline of *Grevillea caleyi* can be inferred from the reduction in extent and quality of habitat, as well as the ongoing loss of some individuals, and some remnant patches. Four remnant sites containing *G. caleyi* occur within Ku-ring-gai Chase and Garigal National Parks, however two of these sites may be lost or severely compromised by road widening as they occur on the edge of the parks, one has a relatively small abundance of plants (around 100's), and one has shown some evidence of possible decline in abundance (T. Auld pers. comm. 2013). A further small site of less than 40 m² exists in Ku-ring-gai Chase National Park that was created accidentally by soil translocation. However, this site is on a road verge and is not secure. Other sites are on land managed by Warringah and Pittwater Councils, road reserves and freehold land.
8. *Grevillea caleyi* R. Br. is eligible to be listed as a Critically Endangered species as, in the opinion of the Scientific Committee, it is facing an extremely high risk of extinction in New South Wales in the immediate future as determined in accordance with the following criteria as prescribed by the *Threatened Species Conservation Regulation, 2010*:

Clause 7 Restricted geographic distribution and other conditions

The geographic distribution of the species is estimated or inferred to be:

- (a) very highly restricted,
and either:
 - (d) a projected or continuing decline is observed, estimated or inferred in either of the key indicators:
 - (a) an index of abundance appropriate to the taxon, or
 - (b) the geographic distribution, habitat quality or diversity, or genetic diversity.

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Scientific Committee

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