The Minister's delegate approved this Conservation Advice on 15/07/2016.

Conservation Advice

Prostanthera junonis

Somersby mintbush

Conservation Status

Prostanthera junonis (Somersby mintbush) 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 at that time as, immediately prior to the commencement of the EPBC Act, it was listed as Endangered under Schedule 1 of the *Endangered Species Protection Act 1992* (Cwlth).

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

Factors that contribute to the species' eligibility to be listed in the Endangered category include its restricted geographic distribution, small number of known populations and inferred decline.

Description

The Somersby mintbush is a low, spreading shrub, 0.1 - 0.3 m high and up to 1 m in diameter in open areas (NSW NPWS 2000). Branches grow along the ground, with tips growing upwards. Leaves are dull green above and paler below. Leaf shape varies from elliptic to narrowly elliptic (8 - 14 mm long x 3 - 6 mm wide); younger plants tend to have broader leaves. The species does not have square branches and aromatic stems and leaves that are characteristic of other species in the family. Flowers are 8 - 12 mm long and pale mauve to almost white with brown spots in the throat (NSW NPWS 2000).

Distribution

The Somersby mintbush is endemic to New South Wales. It is known from nine populations on the Somersby Plateau, north-west of Gosford, in the Gosford and Wyong Local Government Areas. Its extent of occurrence is estimated to be 47 km^2 (NSW NPWS 2000) and its area of occupancy is 36 km^2 (calculated using the IUCN 2 x 2 km grid method). It has a north-south range of 19 km and an east-west range of approximately seven kilometres (NSW NPWS 2000). The species previously occurred over a broader range, and is known to have become locally extinct in some areas (Quinn et al., 1995).

The Somersby mintbush occurs on land with a variety of public and private tenure, with two populations occurring on public lands that are managed for conservation (NSW NPWS 2000).

Relevant Biology/Ecology

The longevity of this species is unknown. A range of plant sizes are found in each population despite differences in the historic timing of burns, which suggests that recruitment may occur in the absence of fire (NSW NPWS 2000). Potted *ex situ* specimens have shown rapid growth rate, with the appearance of flowers after two years on plants grown from seed. There is some evidence that the species has a longevity of more than 20 years; however this has not been confirmed (NSW NPWS 2000).

The total population of the species in 2000 was estimated to be more than 3200 plants, distributed across the nine populations. It is difficult to determine the age structure of the population as plants can reproduce vegetatively by stolons and the width of stems does not appear to increase significantly with age. The size of plants may be more related to site conditions than age. Approximately 85 percent of all known plants occurred in one of the nine populations (NSW NPWS 2000).

The Somersby mintbush exhibits a degree of self-compatibility; that is, fruit set can result from both out-crossing and self-reproductive strategies (Tierney 1994, 1996; in NSW NPWS 2000). However, higher seed set is achieved by out-crossed flowers (NSW NPWS 2000). The species is also often stoloniferous, with stems forming roots at the nodes. In 2000, at least one of the known populations of this species consisted partially of clonal plants (NSW NPWS 2000).

The dominant flowering time is October to mid-December, with some individuals flowering until early February (NSW NPWS 2000). Scattered flowers may be observed on plants throughout the year, as is common in many species of the Lamiaceae in the Sydney region. The timing and duration of flowering is likely to be influenced by seasonal conditions and the exposure of the site (NSW NPWS 2000).

There have been no empirical studies on the fecundity, seed dispersal or seed predation of this species. A study on seed viability and longevity found that freshly-harvested seeds varied in viability (mean 36 percent) and that seeds were non-viable after 12 months in storage (Tierney 1996, in NSW NPWS 2000). This is unusual for a species occurring in a fire-prone environment. Further replication of this study is required to confirm results (NSW NPWS 2000), particularly given that seeds of other *Prostanthera* species stored under controlled conditions for nearly eight years have been shown to be viable and germinated to high levels (Ainsley & Jones 2010).

The species' response to fire and other disturbance is unknown. Seedling recruitment may be triggered by a range of natural disturbances, including light and smoke. Soil disturbance has possibly contributed to recruitment within four populations. Adult plants lack obvious mechanisms to survive and re-sprout after fire (such as lignotubers) and are therefore likely to be killed by fire; however, as there has been some evidence of post-fire recruitment in two of the populations of this species, seed dormancy may be broken by smoke (NSW NPWS 2000).

Tierney & Gross (2001) found that the ecological features of autogamy (self-pollination), clonal growth, early flowering in the life cycle, year-round flowering and higher seed set were more prevalent in open compared with dense sites. While the known populations are fragmented by development and dispersal between populations is likely to be limited, the Somersby mintbush has the reproductive ecology typical of a colonising species, which may assist its recovery (Tierney & Gross 2001).

Threats

Table 1 – Threats impacting the Somersby mintbush in approximate order of severity of risk, based on available evidence.

Threat factor	Threat type and status	Evidence base
Habitat loss and fragmentation		
Development	known past, current and future	The known habitat of the species occurs at the rural-urban fringe where active development is occurring. Some sites where the species occurs have previously been extensively affected by clearing and soil removal for urban development (Conn 1997, NSW NPWS 2000). Five of the nine populations of Somersby mintbush have been either directly or indirectly

		affected by development, with a further three populations likely to be subject to development pressure in the future (NSW NPWS 2000). The cumulative impacts of development and long-term indirect impacts of habitat loss, fragmentation and degradation remain a serious concern for this species (NSW NPWS 2000).
Vegetation clearing on private land	known past, current and future	It is possible that the species was once more widespread on the Somersby Plateau and that its distribution has been reduced due to the loss of large amounts of habitat through clearing of native vegetation, and/or alteration of habitat by activities such as grazing (NSW NPWS 2000). There have been frequent occurrences of unauthorised vegetation clearance in known and potential Somersby mintbush habitat. Populations on private land continue to be prone to unauthorised vegetation clearing and this will have an impact on the long-term viability of the species (NSW NPWS 2000, Tierney & Gross 2001).
Habitat degradation		
Impacts from adjacent development	suspected current and future	Adjacent development, particularly up-slope, has the potential to impact this species, depending on the size, position and proximity of the disturbance. Quarrying and intensive agriculture (e.g. poultry farming) are two forms of adjacent development in the vicinity of known populations of the species (NSW NPWS 2000). Such developments can significantly alter overland flows (leading to erosion through increased runoff), increase sediment or nutrient loads, divert the natural flow of water, create a 'shadowing' effect, and disrupt seed dispersal and/or natural pollination. Erosion and siltation are likely to disrupt the species' life cycle, particularly in relation to any soil-stored seed bank (NSW NPWS 2000). Development on adjacent sites may also lead to fire management (e.g. fuel free zones) in the surrounding areas, including Somersby mintbush habitat (NSW NPWS 2000).
Unrestricted access and rubbish dumping	known past; suspected current and future	Rubbish dumping, vegetation crashing and track widening associated with uncontrolled site access has lead to the degradation of several populations of the Somersby mintbush (NSW NPWS 2000).
Weed invasion	suspected current and future	Weed invasion has previously been apparent within several populations of the species, and may have adverse affects. Weeds can displace native plants and restrict seed germination, eventually changing the vegetation structure (NSW NPWS 2000).
Fire		
Too frequent fire	potential	The fire ecology of the species is unknown, but high frequency of fires is likely to have an adverse impact (NSW NPWS 2000).
Fire control activities	suspected current and future	In some populations, plants occur along track-edges and property boundaries, making them vulnerable to fire control activities (such as controlled burns and bulldozing) (NSW NPWS 2000).
Plant pathogens		

Phytophthora cinnamomi	potential	The *Prostanthera* genus is susceptible to pathogenic organisms such as *P. cinnamomi* and rootknot nematodes. Road and track construction, vehicle access, vegetation clearing, development and adjacent development, drainage works and high visitation rates all have the potential to increase the likelihood of infection (NSW NPWS 2000).

Conservation Actions

Conservation and Management priorities

Habitat loss and fragmentation, and habitat degradation

- Implement appropriate clearing controls for known populations.
- Ensure that an appropriate notation is placed on relevant councils' Section 149 Planning Certificates for each parcel of land on which the species is known to occur.
- Consider the need for, and feasibility of, declaring critical habitat for the species.
- Liaise with public authorities responsible for managing populations on public land, and discuss options for increasing the level of legislative protection of those lands.
- Liaise with private landholders to emphasise the conservation significance of populations occurring on or adjacent to their properties, and what activities they can undertake or avoid in order to conserve the species.
- Ensure that the species' conservation advice is considered by councils during preparation of environmental planning instruments, as relevant.
- Submit information regarding the discovery of any new populations to the NSW National Parks and Wildlife Service, and ensure this information is distributed to relevant authorities (e.g. local councils).
- Relevant authorities to maintain a permanent record, in an appropriate data retrieval system, of the exact location of populations of the species.
- Ensure field staff are informed as to the location of known populations.
- Ensure that searches for the species are carried out by development proponents prior to the assessment of their development and/or re-zoning applications.
- When considering potential impacts on the species, refer to the species' recovery plan and any available environmental assessment guidelines.
- Develop site-specific management plans for each population, where possible, to address issues such as weed invasion, urban stormwater/sedimentation, fire and unrestricted access. Consider a cooperative approach wherever possible.
- Monitor any conditions of consent that form part of an approval or determination under state or Commonwealth environmental legislation, that are relevant to the protection and management of the species, through site inspections.
- Assess the need for, and feasibility of, implementing an *ex situ* conservation strategy or programme for the species.

Fire

- Fires must be managed to ensure that prevailing fire regimes do not disrupt the life cycle of the Somersby mintbush, that they support rather than degrade the habitat necessary to the Somersby mintbush, that they do not promote invasion of exotic species, and that they do not increase impacts of grazing/predation.
- Consider and avoid the potential impacts of fire management activities on the species, particularly where plants occur along tracks and boundaries.
- Implement appropriate fire intervals for known and potential habitat of the species. Avoid uses of prescribed fire between mid autumn and late spring.
- Use physical or chemical control methods as an alternative to prescribed fire, where appropriate, noting that many invasive species germinate in response to physical disturbance of soils.
- Identify and address fire management requirements in site-specific management plans.
- Fire trials should only be undertaken as a last resort when all other means of regeneration of the species has been investigated and, in addition, all weed management and fire impacts including the timing of fire impacts are fully understood.

Plant pathogens

- Develop a species profile containing information about management issues, which references available information and guidance such as the *Phytophthora cinnamomi* threat abatement plan (Australian Government Department of the Environment 2014). Distribute to relevant private landholders and public authorities.
- Identify and address plant pathogen risks in site-specific management plans.

Survey and Monitoring priorities

Undertake targeted surveys for the species in areas of known and potential habitat, in order to:

- establish the full extent of the distribution of the species;
- more precisely assess total population size and number of populations;
- educate individuals, community groups and authorities about the conservation status of this species, by involving them in survey effort; and
- enable distribution of this information to management authorities and private landowners.

Undertake monitoring of known populations, in order to:

- detect any changes in numbers of plants, extent or health of these populations;
- identify any new or emerging threats to the species;
- assess the effectiveness of site-specific management plans to address issues such as weed control and fire management; and
- adapt management actions 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

There are several critical aspects of the species' lifecycle which are currently unknown and need to be understood for successful management. A biological and ecological research programme for the species is therefore required, focusing on critical stages of its life cycle.

Priority areas for this research are:

- investigation of seed ecology, using seed collected from several populations, which will provide insight into the timing of recruitment, the specific conditions required for seed germination, and the ability of populations to be self-maintaining (e.g. by determining proportion of viable seed, seed dormancy mechanisms, the fate of seed in the soil, and the rate of input of seed into the soil seed bank);
- monitoring of tagged populations, which will provide some insight into the population dynamics of the species (e.g. the frequency of flower and fruit production, whether recruitment occurs outside times of disturbance, the rate of seedling mortality, and the time taken for seedlings to mature and begin producing viable fruit);
- assessment of response to fire, by searching populations that have experienced fire to look for evidence of re-sprouting or high levels of seed germination, and/or using an experimental approach to investigate fire response; and
- investigation of genetic diversity within and among populations of the species, to identify the prevalence and extent of clonal growth (vegetative reproduction).

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