

Approved Conservation Advice for *Conospermum hookeri* (variable smoke-bush)

(s266B of the *Environment Protection and Biodiversity Conservation Act 1999*)

This Conservation Advice has been developed based on the best available information at the time this Conservation Advice was approved; this includes existing and draft plans, records or management prescriptions for this species.

Description

Conospermum hookeri (variable smoke-bush), family Proteaceae, also known as the Tasmanian smoke-bush, is an erect, slender, much-branched shrub growing to 1-1.5 m (Bennett, 1995; TSS, 2008). The leaves are grey-green, 1-3 cm long, upward-directed, and crowded, densely covered with silky hairs (Bennett, 1995; TSS, 2008). Flowers occur in groups of up to 20, and each is creamy-white, borne on a stalk up to 25 mm long, with a sparsely hairy tube 3.25-4 mm long (Bennett, 1995; TSS, 2008). The fruit is a reddish-brown, cone-shaped nut, approximately 2 mm long and 2–2.25 mm wide (Bennett, 1995; TSS, 2008).

This species typically flowers between September and November, with fruit setting by early to mid summer (TSS, 2008). The variable smoke-bush reproduces from seed, especially after fire; the species can also resprout after fire, although how this is affected by fire intensity is unknown (TSS, 2008).

Conservation Status

Conospermum hookeri is listed as vulnerable under the name Tasmanian Smoke-bush. This species is eligible for listing as vulnerable under the *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth) (EPBC Act) as it has a restricted distribution, with 27 known subpopulations (TSS, 2008). The estimated total number of individuals is limited and the number is likely to decline in the future (TSSC, 2007). Its population structure is precarious for survival, as none of the subpopulations contain more than 1000 individuals (TSSC, 2007).

The species is also listed as vulnerable in Tasmania under the *Threatened Species Protection Act 1995*.

Distribution and Habitat

The variable smoke-bush is endemic to Tasmania, and occurs along the east coast from Bruny Island in the south to Cape Barren Island in the Furneaux Group in the north, with an outlying inland population near Avoca in the Fingal Valley (TSS, 2008). Populations are generally small and localised within a widely scattered distribution. This species has a linear range of approximately 330 km, an estimated extent of occurrence of approximately 12,500 km², and an area of occupancy of approximately 19 hectares (TSS, 2008).

The species usually occurs in coastal heathland and heathy forest/woodland on granite or sandy, acid, low nutrient soils, and has an altitudinal range of 0-460 m (TSSC, 2007). Approximately two-thirds of the populations occur on lands managed for conservation, such as national parks, state and regional reserves, and recreation and conservation areas (TSS, 2008). Approximately one third of the known number of mature plants occurs within formal conservation reserves, or on private land protected by conservation covenants under the *Tasmanian Nature Conservation Act 2002* (TSS, 2008).

There are 27 confirmed extant populations, with most occupying small areas and consisting of fewer than 50 mature plants (TSS, 2008). There are currently estimated to be at least 2500 mature plants in total, though plant numbers for many populations have not been assessed in recent years and estimates are not available for several populations (TSS,

2008). The largest population (near Avoca in north-eastern Tasmania) comprises 820-920 mature individuals (TSS, 2008).

The species' patchy distribution, often on private land and in rugged habitat, suggests that additional small populations could occur; however, it is likely that the total number of mature plants will be less than 10 000 (TSS, 2008). There is also continuing decline in the quality of habitat due to impacts of adjacent land use and development and the presence of the soil-borne pathogen *Phytophthora cinnamomi* (TSS, 2008).

This species occurs within the Furneaux, Ben Lomond and Tasmanian South East IBRA Bioregions, and the North and South Natural Resource Management Regions.

The distribution of this species is not known to overlap with any EPBC Act-listed threatened ecological community.

Threats

The main identified threats to the variable smoke-bush are:

- Land clearance and habitat fragmentation from subdivision of private land, threatening many populations along the east coast of the state (TSS, 2008). Several smaller populations have been threatened by proposals for clearing for a dam and other water management activities (TSS, 2008). Other impacts from subdividing private land include fire protection measures, access and infrastructure requirements, off road vehicle use, weed invasion from garden escapes, and dumping of rubbish (TSS, 2008). These activities increase the risk of direct damage to plants, the introduction and spread of disease as well as increased fire frequency (TSS, 2008).
- Small population size (TSS, 2008), with the risk that populations will become smaller than the minimum viable population limit. Most populations comprise fewer than 50 mature plants, and the species may be limited by a low rate of seed production and therefore low rate of recruitment (other species in the genus are known to have a low reproductive output) (TSS, 2008). Approximately 50% of flowers of *Conospermum* species form fruit, although only a small proportion of these produce viable seed (Morrison et al., 1994). Little is known of seed longevity or whether seed banks accumulate (TSS, 2008).
- Dieback caused by *Phytophthora cinnamomi* (TSSC, 2007; TSS, 2008). Many near-coastal populations are threatened by this soil-borne pathogen, especially where climatic conditions favour co-occurrence of the species (Schahinger et al., 2003).

The main potential threats to the variable smoke-bush include:

- Inappropriate fire regimes (TSS, 2008). It is likely that the variable smoke-bush requires some level of fire disturbance. Fire is apparently an important factor in maintaining populations of the species, as several populations have been recorded in regenerating post-fire heath and woodland and germination is likely to include fire-related cues such as heat and smoke derivatives as observed in other *Conospermum* species (TSS, 2008). The species has been observed to resprout and/or recruit from seed after fire (TSS, 2008); however, more frequent and/or intense burning likely threatens the species' survival.
- Inappropriate habitat disturbance, noting that a level of disturbance is apparently required for species maintenance (TSS, 2008). The high number of plants comprising the largest population near Avoca is thought to be an artefact of severe disturbance, with mass germination following soil removal and gravel extraction from the site (TSS, 2008). Different types of disturbance, and the intensity, frequency and season of the disturbance events are expected to influence the species' population structure.

Research Priorities

Research priorities that would inform future regional and local priority actions include:

- Identifying the role of fire on the species' life cycle (e.g. burning trials to determine optimal fire regimes for regeneration, such as vegetative regrowth and/or seed germination, and response to other prevailing fire regimes). The period between fires must be long enough to enable viable seed production sufficient for population recruitment (TSS, 2008). Fire frequencies that favour the variable smoke-bush may be conservatively estimated to be between 10 to 30 years in heathy woodland/forest vegetation (TSS, 2008). Identify populations at greatest threat from inappropriate fire regimes as the highest priorities for management (TSS, 2008).
- Developing and implementing a research program to determine trends in population numbers, recruitment and mortality, timing of life history stages, threats and the impacts of threat abatement activities.
- Determining appropriate disturbance regimes that promote survival of the species (e.g. soil disturbance/removal).
- Acquiring baseline biological information on this species in its habitat. Address deficiencies in knowledge regarding identification of life cycle, such as pollinator(s), trigger(s) for seed germination other than by fire, and recruitment patterns. Investigate the longevity of seeds and whether viable seed banks accumulate in the soil.
- Clarifying the taxonomic status of *C. hookeri* in Tasmania (TSS, 2008). The species has been considered to be endemic to Tasmania (Bennett, 1995); however, there is doubt regarding the identity of populations from Cape Barren Island and at least one from the Freycinet Peninsula (TSS, 2008).

Regional/Local Priority Actions

The following regional priority recovery and threat abatement actions can be done to support the recovery of the variable smoke-bush:

Habitat Loss, Disturbance and Modification

- Investigate formal conservation arrangements, management agreements and covenants for any unprotected populations on private land, and for crown and private land investigate and/or secure inclusion in reserve tenure if possible. Upgrade the reservation status of patches of unallocated Crown land supporting key population(s) of this species (TSS, 2008).
- Develop a monitoring/survey program to: determine the species' status, monitor the progress of recovery (adapting management actions if necessary), identify potentially suitable habitat and locate any additional populations, and improve estimates of abundance and area of occupancy (TSS, 2008).
- Provide advice on the distribution and critical habitat of this species to organisations involved with clearing vegetation.
- Ensure there is no inappropriate disturbance in areas where *Conospermum hookeri* occurs.
- Develop and implement a roadside marker scheme for roadside populations, and with the cooperation of local councils and road authorities, encourage the responsible authority to appropriately manage the population(s).
- Where possible, limit movement of people through populations of variable smoke-bush, use signs to alert visitors to the presence of this species, and advise how their behaviour can affect its survival.

- Control the impacts of edge effects, including spray drift, intentional spraying, road and rail maintenance activities. One way to achieve this would be to hold discussions with relevant groups or individuals to emphasise the importance of biodiversity values and discuss options for best management practices.
- Erect appropriate fencing around specific populations to reduce impacts from adjacent residential and recreational activities (TSS, 2008).
- Ensure adequate surveys are undertaken prior to vegetation clearance or landscape modification activities (TSS, 2008).
- Discuss the importance of remnant vegetation and threatened species with relevant landholders. Maintain a buffer of natural habitat/native vegetation around populations; avoid removal of fallen branches, rocks, etc. (TSS, 2008).
- Manage any other known, potential or emerging threats, such as grazing or weed invasion.

Invasive Weeds

- Identify and remove weeds in local areas that could become a threat to *Conospermum hookeri*, using appropriate methods.
- Manage sites to prevent introduction of invasive weeds that could become a threat to *Conospermum hookeri*, using appropriate methods.
- Ensure chemicals (if used) or other mechanisms used to eradicate weeds do not have a significant adverse impact on *Conospermum hookeri*.

Trampling, Browsing or Grazing

- If livestock grazing occurs in the area, ensure land owners/managers use an appropriate management regime and density that does not detrimentally affect this species.
- If other herbivores are found to graze on *C. hookeri*, manage total grazing pressure at important sites on all land tenures through exclusion fencing or other barriers.

Fire

- Develop and implement a suitable fire management strategy for the habitat of *Conospermum hookeri*. Consider the regeneration potential of the species when developing the strategy (TSS, 2008). Fire frequencies that favour *Conospermum hookeri* may be conservatively estimated to be between 10 to 30 years in heathy woodland/forest vegetation (TSS, 2008). More frequent hazard reduction burning could threaten the species' survival.
- Ensure that personnel planning and undertaking hazard reduction burns are able to identify the species and are aware of its habitat.
- Where appropriate provide maps of known occurrences 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.

Diseases, Fungi and Parasites

- Implement the threat abatement plan for dieback caused by the root-rot fungus *Phytophthora cinnamomi* (DotE, 2014).
- Develop and implement suitable hygiene protocols to protect known sites from further outbreaks of dieback caused by *Phytophthora cinnamomi*.
- Implement appropriate management actions to minimise the adverse impacts of existing *Phytophthora cinnamomi* infestations.

Conservation information

- Raise awareness of the variable smoke-bush within the local community. Build a network of government and nongovernment organisations and individuals to support management actions.
- Provide adequate information and extension to relevant stakeholders (e.g. natural resource management committees, local councils) regarding known localities, biodiversity significance and management of this species, as well as the locations of potential habitat (TSS, 2008).
- Engage with private landholders and land managers responsible for the land on which populations occur and encourage these key stakeholders to contribute to the implementation of conservation management actions.
- Undertake appropriate seed collection and storage.
- Develop and maintain a database to efficiently and securely store survey and monitoring data.

This list does not necessarily encompass all actions that may be of benefit to *Conospermum hookeri*, but highlights those that are considered to be of highest priority at the time of preparing the Approved Conservation Advice.

Existing Plans/Management Prescriptions that are Relevant to the Species

- Draft greater Freycinet region threatened species recovery plan 2006-2010 (TSS, 2006).
- Threat abatement plan for dieback caused by the root-rot fungus *Phytophthora cinnamomi* (DotE, 2014).

These prescriptions were current at the time of publishing; please refer to the relevant agency's website for any updated versions.

References

Bennett EM (1995). *Conospermum hookeri*. Flora of Australia online. Australian Biological Resources Study, Canberra.

Available on the Internet at:

<http://www.environment.gov.au/biodiversity/abrs/online-resources/flora/index.html>

Department of the Environment (DotE) (2014). *Threat abatement plan for dieback caused by the root-rot fungus Phytophthora cinnamomi* and associated background document.

Available on the Internet at:

<http://www.environment.gov.au/resource/threat-abatement-plan-disease-natural-ecosystems-caused-phytophthora-cinnamomi>

Morrison DA, McDonald M, Bankoff P, Quirico P and Mackay D (1994). Reproductive isolation mechanisms among four closely-related species of *Conospermum* (Proteaceae). *Botanical Journal of the Linnean Society* 116(1), 13-31.

Schahinger R, Rudman T and Wardlaw T (2003). Conservation of Tasmanian plant species and communities threatened by *Phytophthora cinnamomi*: strategic regional plan for Tasmania.

Available on the Internet at:

<http://www.dpiw.tas.gov.au/inter-nsf/WebPages/LJEM-6Q3UXQ?open>

Threatened Species Scientific Committee (TSSC) (2007). *Conospermum hookeri* Listing Advice.

Available on the Internet at:

<http://www.environment.gov.au/biodiversity/threatened/species/pubs/68161-listing-advice.pdf>

Threatened Species Section (TSS) (2006). Draft greater Freycinet region threatened species recovery plan 2006-2010. Department of Primary Industries, Water and Environment, Hobart.

Threatened Species Section (TSS) (2008). Listing Statement for *Conospermum hookeri* (Tasmanian smokebush). Department of Primary Industries and Water, Tasmania.

Available on the Internet at:

[http://www.dpiw.tas.gov.au/internnsf/Attachments/LJEM-6P94GZ/\\$FILE/Conospermum%20hookeri.pdf](http://www.dpiw.tas.gov.au/internnsf/Attachments/LJEM-6P94GZ/$FILE/Conospermum%20hookeri.pdf)