# Threatened Species Assessment

## *Conospermum taxifolium*
## Variable Smoke-bush

### Taxonomy

*Conospermum taxifolium* Sm.

Johnson and McGillivray (1975) recognise a number of informal forms of this highly polymorphic taxon. Victorian populations are referable to the 'common form' which is characterized by rather short, narrow, almost linear, smooth, glabrous leaves (VicFlora, 2019).

### Current conservation status

Categorised as Vulnerable in the 2014 Advisory list of rare or threatened flora (DEPI 2014).

### Proposed conservation status

Endangered in Victoria

Criteria B1ab(iii)+2ab(iii); D

The bushfires of 2019/2020 are believed to have impacted more than 78% of the taxon's modelled habitat. The overall impacts of the fire are yet to be determined, and its recovery depends on the effective control of the impacts of feral herbivores and prevention of major soil and vegetation disturbance as a result of fire recovery activities.

### Species Information

#### Description and Life History

The taxon is an erect shrub to c. 1 m high; branches hoary-tomentose, glabrescent. Leaves crowded, erect or spreading, linear, narrowly elliptic to narrowly oblanceolate, 5-30 mm long, mostly 1.5-3 mm wide, often twisted, green, both surfaces usually glabrous; apex acute, aristate. Inflorescence a terminal or upper-axillary corymbose panicle, mostly 1-3 cm across; common peduncles ascending, mostly 1-3 cm long, not significantly longer than branches of inflorescence; flowers arranged in short, dense, pedunculate spikes, each flower sessile, subtended by a blue-grey, persistent bract c. 3 mm long; perianth tubular at base, splitting c. two-thirds of the way up; tepals 6-7 mm long, white or cream, moderately hairy; ovary comose at apex, also ringed by basal hairs. Nut 2-3 mm long, hairy. The taxon flowers from August to November (VicFlora, 2019).

#### Generation Length

The generation length of *Conospermum taxifolium* is estimated to be 10 to 30 years. This is estimated from its lifeform (i.e. low shrub) and the estimated disturbance regimes of near-coastal heath. *Conospermum* taxa are known to respond well following fire, and this taxon is likely to recruit following such events.

#### Distribution

The taxon is rare in Victoria, where it is confined to the grass-tree plains of far East Gippsland, in the vicinity of Mallacoota Inlet. The taxon also occurs in Queensland, New South Wales, Australian Capital Territory (Jervis Bay), and Tasmania (VicFlora, 2019).

#### Habitat

The taxon occurs in heathy open woodland, often near margins of wet seepages and swamps on grass-tree flats or adjoining sandy rises (VicFlora, 2019).

### Threats

The taxon is threatened in the long-term by climatic drying and warming, resulting in changes in vegetation structure such as increasing shrub density, and potential changes in soil microflora particularly of mycorrhizal fungi. Observations made in 2016 indicate that plants occur in small stands (i.e., of 10s of plants), therefore low genetic diversity and inbreeding may also be a threatening process. However, these low numbers may only be an indication of time since fire, and number of individuals may increase significantly after the next fire in this area.

The taxon is likely to be threatened by feral herbivores, notably Sambar Deer (*Rusa unicolor*), and soil and vegetation disturbance as a result of fire recovery activities (e.g., machinery impacts, removal of hazardous trees). Drought, hot weather, and repeat fires have the potential to damage or destroy recovering plants and/or seedlings. The taxon's recovery depends on the effective control of the impacts of herbivores and by preventing soil disturbance following fire recovery.

The bushfires of 2019/2020 are believed to have impacted around 78% of the taxon's modelled habitat, with a further 92% of modelled habitat projected to be damaged as of early January 2020. The overall impacts of the fire are yet to be determined.

## IUCN Criteria

**Criterion A. Population size reduction.**
Population reduction (measured over the longer of 10 years or 3 generations) based on any of A1 to A4

| | Critically Endangered | Endangered | Vulnerable |
|---|---|---|---|
| A1 | ≥ 90% | ≥ 70% | ≥ 50% |
| A2, A3, A4 | ≥ 80% | ≥ 50% | ≥ 30% |

A1 Population reduction observed, estimated, inferred or suspected in the past and the causes of the reduction are clearly reversible AND understood AND ceased.

A2 Population reduction observed, estimated, inferred or suspected in the past where the causes of the reduction may not have ceased OR may not be understood OR may not be reversible.

A3 Population reduction, projected or suspected to be met in the future (up to a maximum of 100 years) [*(a) cannot be used for A3*]

A4 An observed, estimated, inferred, projected or suspected population reduction where the time period must include both the past and the future (up to a max. of 100 years in future), and where the causes of reduction may not have ceased OR may not be understood OR may not be reversible.

*based on any of the following:*

(a) direct observation [*except A3*]

(b) an index of abundance appropriate to the taxon

(c) a decline in area of occupancy, extent of occurrence and/or quality of habitat

(d) actual or potential levels of exploitation

(e) the effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites

## Evidence:

### Ineligible under Criterion A

The past population reduction does not meet the threshold for eligibility under criterion A2, and the future population reduction does not meet the threshold for eligibility under criterion A3.

| Criterion B. Geographic range in the form of either B1 (extent of occurrence) and/or B2 (area of occupancy | Critically Endangered Very restricted | Endangered Restricted | Vulnerable Limited |
|---|---|---|---|
| B1. Extent of occurrence (EOO) | < 100 km² | < 5,000 km² | < 20,000 km² |
| B2. Area of occupancy (AOO) | < 10 km² | < 500 km² | < 2,000 km² |
| AND at least 2 of the following 3 conditions: | | | |
| (a) Severely fragmented OR Number of locations | = 1 | ≤ 5 | ≤ 10 |
| (b) Continuing decline observed, estimated, inferred or projected in any of: (i) extent of occurrence; (ii) area of occupancy; (iii) area, extent and/or quality of habitat; (iv) number of locations or subpopulations; (v) number of mature individuals | | | |
| (c) Extreme fluctuations in any of: (i) extent of occurrence; (ii) area of occupancy; (iii) number of locations or subpopulations; (iv) number of mature individuals | | | |

## Evidence:

**Eligible under Criterion B1 as Endangered**

The Extent of Occurrence (EoO) across the taxon's range is estimated to be 120 km², based on accepted, post-1970 records from the Victorian Biodiversity Atlas (VBA).

It is estimated to have 1 location as all key identified threats apply across its range and can rapidly affect all individuals of the taxon present.

It has a continuing decline in (iii) above as a result of climatic warming which may result in reduction of moisture in the specific habitat occupied by this taxon, and may possibly lead to shrub encroachment excluding this taxon.

**Eligible under Criterion B2 as Endangered**

The Area of Occupancy (AoO) across the taxon's range is estimated to be 26 km², based on 2 x 2 km grids derived from accepted, post-1970 records in the VBA.

As above it has 1 location, and has a continuing decline in (iii) above.

| Criterion C. Small Population size and decline | | | | |
|---|---|---|---|---|
| | | Critically Endangered | Endangered | Vulnerable |
| Number of mature individuals | | < 250 | < 2,500 | < 10,000 |
| AND at least one of C1 or C2 | | | | |
| C1 | An observed, estimated or projected continuing decline of at least (up to a max. of 100 years in future): | 25% in 3 years or 1 generation (whichever is longer) | 20% in 5 years or 2 generations (whichever is longer) | 10% in 10 years or 3 generations (whichever is longer) |
| C2 | An observed, estimated, projected or inferred continuing decline AND least 1 of the following 3 conditions: | | | |
| (a) | (i) Number of mature individuals in each subpopulation | ≤ 50 | ≤ 250 | ≤ 1,000 |
| | (ii) % of mature individuals in one subpopulation = | 90 – 100% | 95 – 100% | 100% |
| (b) Extreme fluctuations in the number of mature individuals | | | | |

## Evidence:

**Ineligible under Criterion C**

It is estimated that there are 120 to 360 (midpoint 180) mature individuals but other thresholds under this criterion have not been met.

| Criterion D. Very small or restricted population | | | |
|---|---|---|---|
| | Critically Endangered | Endangered | Vulnerable |
| Number of mature individuals (observed or estimated) | <·50 | <·250 | <·1,000 |
| D2 Only applies to the VU category<br>Restricted area of occupancy or number of locations with a plausible future threat that could drive the species to critically endangered or Extinct in a very short time. | - | - | D2. Typically:<br>AoO <·20 km2 or number of locations ≤·5 |

## Evidence:

**Eligible under Criterion D as Endangered**

The taxon is estimated to have 120 to 360 (midpoint 180) mature individuals. The number of mature individuals is based on notes on herbarium records. It is estimated that in each of the six 4 km² stands there may be as few as only 20-60 plants, with an average of 30 plants per grid.

**Criterion E (Quantitative Analysis) was not addressed as the taxon does not have a detailed Population Viability Analysis.**

## References

DEPI (2014). *Advisory list of rare or threatened plants in Victoria - 2014*. Department of Environment and Primary Industries, Melbourne.

VicFlora (2019). Flora of Victoria, Royal Botanic Gardens Victoria: *Conospermum taxifolium*. Retrieved from: https://vicflora.rbg.vic.gov.au/flora/taxon/56674098-477e-44bc-b7b5-8d29d21db7ee