

## *Eucalyptus falciformis* Western Peppermint

### Taxonomy

*Eucalyptus falciformis* (Newnham, Ladiges & Whiffin) Rule

*Eucalyptus falciformis* is part of a taxa complex including *E. dives*, *E. willisii*, *E. molyneuxii* and *E. arenicola*. The two western taxa, *E. falciformis* and *E. molyneuxii*, have a distinctive juvenile leaf development, where the leaf lamina is soon separated from the stem and vertically orientated. Aside from characters in the key, *E. molyneuxii* can be distinguished from *E. falciformis* by its smaller habit and narrower, green juvenile leaves.

*E. falciformis* was previously treated as a subspecies of *E. willisii*, however adult leaves are thicker and less glandular, and fruits and buds are larger than those of *E. willisii*.

### Current conservation status

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

### Proposed conservation status

Vulnerable in Victoria

Criteria A2bce+4bce; B2ab(ii,iii,iv)

### Species Information

#### Description and Life History

Tree to 15 m tall or mallee; bark rough, fibrous on trunk, often only near base on smaller stems. Juvenile leaves sessile, opposite, soon becoming subsessile and vertically-orientated, narrowly lanceolate to ovate, falcate, 8-17 cm long, 1.5-7 cm wide, dull blue-grey; adult leaves petiolate, alternate, lanceolate to falcate, 10-22 cm long, 1.7-3.5 cm wide, concolorous, sometimes slightly glossy, blue-green; lateral veins subparallel; oil glands numerous, mostly island. Inflorescences axillary, unbranched, occasionally paired; peduncles 0.8-1.2 cm long, 11-many-flowered; buds pedicellate, clavate, to 0.9 cm long, 0.5 cm diam., no scar (single operculum); operculum conical or obtuse-conical; stamens mostly inflexed; anthers dorsifixed, reniform; ovules in 2 vertical rows; flowers white. Fruit pedicellate, slightly obconical, cupular, or subcylindrical, 0.6-0.8 cm long, 0.6-0.8 cm diam.; disc level; valves 3 or 4, rim level; seed brown to dark brown, glossy, smooth, pyramidal but distorted by one curved face, hilum terminal. Flowers spring (VicFlora 2019).

Slender trees or less often robust, spreading mallees, 5-15 m tall (Rule 2008).

#### Generation Length

The generation length of *Eucalyptus falciformis* is estimated to be 80 to 120 years. This is based on a plausible longevity of 150-200 years. It is also based on the ability of the taxon to resprout from the lignotuber and larger stems, thereby extending the life of the individual beyond the pre-settlement fire interval estimated at 45-90 years.

Like most eucalypts in fire-prone dryland habitats, the taxon recruits episodically from an elevated or soil-stored seedbank following intense bushfire events. With only a proportion of adults killed by fire, a majority resprouting successfully follows each successive fire event. In addition, there may be a low level of opportunistic trickle recruitment in response to outstanding seasonal conditions or localised site disturbance events.

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### Distribution

The taxon occurs from the Anglesea area west to the SA border, and is also locally common in the Grampians. Populations in the Otways may be somewhat intermediate between *E. falciformis* and *E. radiata* (VicFlora 2019). The taxon is also found in SA (VicFlora 2019)

### Habitat

*E. falciformis* usually occurs on impoverished, well-drained sandy soils in near-coastal heathy woodland, sometimes adjacent to wetter vegetation, across the moist, temperate regions of south-west Victoria. Whilst populations in the Grampians occur as high as 1000 m altitude, others occur in undulating terrain or on cliff tops close to the ocean (Rule 2008, VicFlora 2019).

### Threats

A major threat to the taxon is the continuing and incremental habitat loss to agricultural intensification and infrastructure, including roadside management in rural landscapes. Another possible threat is the potential impact of increasing fire risk, repeat fire events, recruitment failure in response to climatic drying and warming, and imposed anthropogenic fire regimes. Recruiting stands may also be threatened by targeted browsing by native and exotic herbivores including wallabies, goats, rabbits, deer, and stock. Although the identified threats are in operation and the taxon often occurs in small, sporadic populations, it remains a common taxon across its Victorian range.

Historic decline has been largely due to habitat loss rather than any definable density decline, and the taxon may even have benefited from some anthropogenic disturbance regimes.

### IUCN Criteria

| Criterion A. Population size reduction.<br>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%      |
| <p>A1 Population reduction observed, estimated, inferred or suspected in the past and the causes of the reduction are clearly reversible AND understood AND ceased.</p> <p>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.</p> <p>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]</p> <p>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.</p> <p>based on any of the following:</p> <ul style="list-style-type: none"> <li>(a) direct observation [except A3]</li> <li>(b) an index of abundance appropriate to the taxon</li> <li>(c) a decline in area of occupancy, extent of occurrence and/or quality of habitat</li> <li>(d) actual or potential levels of exploitation</li> <li>(e) the effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites</li> </ul> |                       |            |            |

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### Evidence:

#### Eligible under Criterion A2 as Vulnerable

The population reduction over the past 240 to 360 years is estimated to be 25 to 30%, based on (b), (c) and (e) above.

Past decline in the Grampians region is estimated at only 10%, based largely on historic habitat loss to agriculture on the periphery of the Grampian Ranges. By contrast, past decline in far south-west Victoria and the eastern and western Otways is estimated at 30-40%, based on both habitat loss to agriculture and some habitat degradation.

The causes of the reduction may not have ceased, be understood or be reversible.

#### Eligible under Criterion A4 as Vulnerable

The population reduction over any 240 to 360 year period, including both past and future (up to 100 years in the future), is estimated to be 30 to 55% (midpoint 40%), based on (b), (c) and (e) above. The causes of reduction may not have ceased, be understood or be reversible.

Past decline is based largely on historic habitat loss to agriculture. Future decline is based on continuing and incremental habitat loss to agricultural intensification and infrastructure, including roadside management, in rural landscapes. It is also based on the potential impact of increasing fire risk, repeat fire events, recruitment failure in response to climatic drying and warming, and imposed anthropogenic fire regimes. Recruiting stands may also be threatened by targeted browsing by native and exotic herbivores including wallabies, goats, rabbits, deer, and stock.

| Criterion B. Geographic range in the form of either B1 (extent of occurrence) and/or B2 (area of occupancy)   |  |                          |                          |
|---|--|--------------------------|--------------------------|
|   | Critically Endangered<br>Very restricted | Endangered<br>Restricted | Vulnerable<br>Limited    |
| B1. Extent of occurrence (EOO)  | < 100 km <sup>2</sup>                    | < 5,000 km <sup>2</sup>  | < 20,000 km <sup>2</sup> |
| B2. Area of occupancy (AOO)   | < 10 km <sup>2</sup>                     | < 500 km <sup>2</sup>    | < 2,000 km <sup>2</sup>  |
| 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 B2 as Vulnerable

The Area of Occupancy (AoO) across the taxon's range is estimated to be 1,304 km<sup>2</sup>, based on 2 x 2 km grids derived from accepted, post-1970 records in the Victorian Biodiversity Atlas.

It is estimated to have 3 locations, and has a continuing decline in (ii), (iii) and (iv) above, based on identified threats.

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| 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 as Data Deficient

There is no available estimate of total population size.

| Criterion D. Very small or restricted populations  |  | 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 km <sup>2</sup> or<br>number of locations ≤ 5 |

## Evidence:

### Ineligible under Criterion D as Data Deficient

There is insufficient evidence to determine the number of mature individuals.

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.

Rule, K. (2008). A new species and a new combination in the shining peppermint group of *Eucalyptus* and notes on the distribution of *Eucalyptus willisii* sens. strict. *Muelleria* 26 (2): 94-95.



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VicFlora (2019). Flora of Victoria, Royal Botanic Gardens Victoria: *Eucalyptus falciformis*. Retrieved from: <https://vicflora.rbg.vic.gov.au/flora/taxon/8cb4f9ca-53fd-47eb-969e-b01ff408a4ac>