

THREATENED SPECIES SCIENTIFIC COMMITTEE

Established under the *Environment Protection and Biodiversity Conservation Act 1999*

The Minister's delegate approved this Conservation Advice on 01/04/2016.

Conservation Advice

Verticordia spicata subsp. *squamosa*

scaly-leaved featherflower

Conservation Status

Verticordia spicata subsp. *squamosa* (scaly-leaved featherflower) is listed as Endangered under the *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth) (EPBC Act). The species is eligible for listing as Endangered as, prior to the commencement of the EPBC Act, it was listed as Endangered under Schedule 1 of the *Endangered Species Protection Act 1992* (Cwlth).

The main factors that are the cause of the species being eligible for listing in the Endangered category are its very low total number of mature individuals (fewer than 250) and a severe population size reduction in the past (based on declines in extent and habitat quality).

The scaly-leaved featherflower is also listed as Critically Endangered under the *Wildlife Conservation Act 1950* (Western Australia). The Western Australian Government identifies that the species is eligible for listing in the Critically Endangered category under IUCN criteria A4c (very severe reduction in population size based on declines in extent and habitat quality), B1ab (i,ii,iii,iv,v)+2ab (i,ii,iii,iv,v) (very restricted distribution that is precarious for survival based on severe fragmentation and observed continuing decline), C2a(i) (very low population size, observed continuing decline and fewer than 50 individuals in each subpopulation) and D (extremely low number of mature individuals) (DPAW 2014).

Description

The scaly-leaved featherflower is a dense bushy shrub growing 1.5 m tall and 1 m wide. It has rounded to elliptic leaves that are 1.5-2 mm long with prominent oil glands. The leaves closely overlap and are pressed to the stem, providing the scaly appearance from which this subspecies derives its name (the Latin word for scaly is *squamosus*). Flowers are produced in late spring and early summer and are closely packed, forming dense spikes on the ends of the branches. They open mauve-pink before the whole spike fades evenly to white with age (George 2002, and Brown et al. 1998, cited in Stack et al., 2004).

The scaly-leaved featherflower differs from *V. s.* subsp. *spicata* in its smaller leaves and flowers (George, 2002, cited in Stack et al., 2004), and the latter seems to occur further north (Western Australian Herbarium, 2015). Scaly-leaved featherflower individuals may live for at least 35 years (Stack et al. 2004) and the subspecies is known to hybridise with the co-occurring *V. comosa* (George 2002, cited in Stack et al. 2004).

Distribution

The scaly-leaved featherflower is endemic to the Three Springs and Mingenew areas, 300 km south-east of Geraldton in Western Australia. The species occurs over an estimated linear range of 20 km. The area that it occurs in has been extensively cleared and most subpopulations occur along narrow road reserves (Stack et al., 2004).

Scaly-leaved featherflower has been recorded from ten subpopulations, however, only six were extant in 2011 (DEC 2011, cited in DSEWPaC 2011). Between 2004 (when the national recovery plan was adopted) and 2011, two wild subpopulations became extinct (DEC 2011, cited in DSEWPaC 2011).

In 2011, the subspecies had an abundance of 37 mature plants: the largest subpopulation was a translocated site (17 plants), three sites had fewer plants (12 plants, 7 plants and 1 plant) and the three other sites had not been monitored since 2003 (DEC 2011, cited in DSEWPaC 2011). The translocated population exists in very good habitat, however, no recruitment has been observed at the site and abundance increases are the result of follow up plantings (DEC 2011, cited in DSEWPaC 2011).

Relevant Biology/Ecology

Scaly-leaved featherflower occurs in open mallee over low scrub (Stack et al., 2004) on sandplain flats on deep yellow sands, yellow-brown sand and yellow clayey sand (Spooner 2005, cited in Western Australian Herbarium, 2015). Associated species include *Eucalyptus ebbanoensis* (sandplain mallee), *E. jucunda*, *Actinostrobos arenarius*, *Grevillea biformis*, *G. eriostachya*, *Jacksonia* sp., *Ecdeiocolea monostachya*, *Verticordia comosa*, *V. monadelpha* (woolly featherflower), *V. densiflora* var. *stelluligera* and *V. eriocephala*.

Verticordia plants are generally killed by fire and post-fire regeneration occurs mainly from seed, however, a few species have a lignotuber and resprout after fire (George, pers. comm., cited in Stack et al., 2004). The specific fire response of scaly-leaved featherflower is unknown.

Propagation of scaly-leaved featherflower has generally been unsuccessful. Of 916 cuttings that were struck in 1999 and 2001, only three survived and these were planted at the translocation site in 2002. Of an unknown number of seeds that were sown and smoke treated, 18 survived and were also used in the translocation (Shade, pers. comm., cited in Stack et al., 2004). In the wild, seed viability correlates with abundance of mature plants and habitat quality; as such, larger populations in better quality habitat should be protected to improve the species' chance of recovery (Stack et al., 2004). Physical soil disturbance appears to have a positive influence on germination of seed, with two seedlings germinating after roadworks at one subpopulation (Stack et al. 2004).

Threats

Scaly-leaved featherflower subpopulations that occur in linear populations are threatened by edge effects, inappropriate maintenance of roads, fences and firebreaks, and impacts associated with degraded habitat (insufficient pollinator activity and lack of available habitat for recruitment) (Stack et al. 2004). Habitat quality is degraded at all known natural sites and most subpopulations are threatened by weed invasion and competition, warren excavation by rabbits (*Oryctolagus cuniculus*) and inappropriate fire regimes (Stack et al. 2004). Habitat degradation or lack of appropriate disturbance has severely limited natural recruitment, which has only been recorded at one site (Stack et al. 2004).

Conservation Actions

Conservation and Management priorities

New subpopulations established

- As the subspecies only occurs on highly vulnerable roadsides, translocation to new, safe-sites within a substantial reserve system is a priority. Habitat matching (edaphic, vegetation, topography) should be undertaken in planning a translocation. Relevant policies should be referred to for guidance for undertaking translocations (e.g. CALM 1995; Vallee et al. 2004).

Habitat loss, disturbance and modifications

- Seek long term protection of habitat on private land. In 2004, there were no reserves that contained appropriate habitat for the species (Stack et al. 2004).
- With the cooperation of the landholders, rehabilitate habitat in and around subpopulations through the planting of local species (Stack et al. 2004). This activity would act as a buffer to subpopulations and reduce edge effects (Stack et al. 2004).

- Subpopulations may benefit from periodic disturbance, which may stimulate recruitment. Small scale mechanical disturbance should be used during hot weather. Long-term, intensive weed control should be undertaken following disturbance events. Protect juvenile plants (i.e. particularly after germination events) from grazing by livestock and rabbits.
- Ensure existing population is protected during road maintenance and upgrading.

Stakeholder Engagement

- Ensure relevant stakeholders (the local community, private landowners, and public land managers) are aware of the species' occurrence and provide protection measures against key threats to ensure subpopulations are not accidentally damaged or destroyed.
- Continue to promote awareness of the species with relevant stakeholders through the use of posters, fliers, electronic media and Declared Rare Flora markers.

Invasive species (including threats from grazing, trampling, predation)

- Suitably constraining stock access to known sites on public land, including prevention of grazing through fences, and manage sheep grazing on private land and other land tenure.
- Undertake annual rabbit baiting at Three Springs subpopulations. Continue annual rabbit baiting at the Geraldton District subpopulation. Install and maintain rabbit-proof fencing to limit the impact of rabbit warren construction. Relevant policies should be referred to for guidance for rabbit control (e.g. DEWHA, 2008).
- Undertake weed control for invasive species at affected populations and in the local area that could become a threat to the scaly-leaved featherflower. Suitable methods of weed control include hand weeding or localised application of herbicide during the appropriate season.

Fire

- Develop and implement a fire management strategy that recommends fire frequency, intensity, season and control measures. Relevant policies should be referred to for guidance for fire management in linear reserves (e.g. RCC 2011). The species is at risk of localised extinction caused by too frequent fire. Fire prevention, except when used as a recovery tool, has been recommended (Stack et al. 2004).
- Any use of prescribed or experimental fires must be very well justified, and is typically an action of last resort. It must have a carefully planned weed management strategy and demonstrated funding to ensure post-fire monitoring and control actions occur (e.g. weed control based on sound scientific evidence).
- Provide maps of known occurrences to local and state fire teams and seek inclusion of mitigation measures in bush fire risk management plan/s, risk register and/or operation maps.

Information and research priorities

- Undertake seed germination and/or vegetative propagation trials, including post fire, to determine the requirements for successful establishment (Stack et al., 2004). Seed is held by the Threatened Flora Seed Centre (Stack et al. 2004).
- The following research topics have been recommended to help inform the recovery of the subspecies: the causes of low levels of viable seed production; seed ageing requirements for the breaking of seed dormancy; the role of disturbance, competition, rainfall and grazing in germination recruitment; pollination biology; requirements of pollinators; reproductive strategies; the presence or absence of a lignotuber, enabling the recovery of adult plants following physical disturbance; and the population genetic structure (Stack et al. 2004).

Survey and monitoring priorities

- Develop predictive models for the species geographical distributions based on the environmental conditions of sites of known occurrences. Requires a reasonably sized

data-set of species presence information plus the range of environmental variables that are known to influence the species distribution. If this data is not available then a research priority should be to collect and assimilate this information. See Phillips and colleagues (2006) for guidance on species distribution modelling.

- Develop habitat suitability models to determine the ecological/environmental indices responsible for a species distribution, and how it may change due to the impending threats. Requires a reasonable high number of presence records, plus the environmental variables located at this site and other sites chosen at random. See Guisan & Zimmermann (2000) for guidance on habitat suitability modelling.
- With permission of landowners, undertake surveys for new subpopulations in suitable habitat on private property.
- Design and implement a monitoring program or, if appropriate, support and enhance existing programs. Annual monitoring has been recommended measuring habitat quality (weed invasion and salinity), abundance, pollinator activity, seed production, recruitment, subpopulation health, impacts of browsing and disease (Stack et al., 2004).

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